IRPTC

INSTRUCTIONS FOR THE SELECTION AND PRESENTATION OF DATA FOR THE INTERNATIONAL REGISTER OF POTENTIALLY TOXIC CHEMICALS WITH SIXTY ILLUSTRATIVE CHEMICAL DATA PROFILES

INTERNATIONAL REGISTER OF
POTENTIALLY TOXIC CHEMICALS (IRPTC)
1979

UNITED NATIONS ENVIRONMENT PROGRAMME
GENEVA, SWITZERLAND

IRPTC

REGISTER ATTRIBUTE SERIES

Number Two

INSTRUCTIONS FOR THE SELECTION AND PRESENTATION OF DATA

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UNITED NATIONS ENVIRONMENT PROGRAMME

GENEVA 1979

Prepared under U.N. Contract No. G/CON/79/05-UNEP/IRPTC

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TABLE OF CONTENTS

PREFACE

In 1977, the International Register of Potentially Toxic Chemicals (IRPTC) began to respond to the call for the development of an international data bank from the workshops held in Bilthoven, Netherlands, and Nairobi, Kenya, which was subsequently endorsed by the Governing Council of the United Nations Environment Programme (UNEP). In making this request, these bodies recognized the enormity of the task and the fact that the resources likely to be available to IRPTC would be unequal to the task assigned. They also recognized that the task could and must be approached by using assistance from similar efforts that were in varying stages of development by governmental and non-governmental agencies of national and international character around the world. In order to utilize these activities, networking was considered to be the effective mechanism for collaboration.

These mandates required that an accurate appraisal be performed of the information needed to evaluate and control hazards posed by chemicals to man and his environment. The start of this appraisal came from the recommendations for the use of selected attributes provided by the two workshops. IRPTC executed the appraisal by assembling experts to examine and recommend those attributes, activities and control mechanisms for chemicals that were actually used by national and international evaluating agencies and for which data existed in the publicly available literature.

Justification of the relevant attributes of chemicals was, however, only part of the requirements for the IRPTC. In producing the Data Profiles for Chemicals for the Evaluation of their Hazards to the Environment of the Mediterranean Sea, it was realized that the massive amounts of data to be collected and presented in the developed format would prevent the effective distribution of information in a written text, an essential service for those users who do not have computerized facilities for data handling and use. The data profile summaries that had been provided in this effort also would have to be eliminated from the printed Register in order to reduce the size of the publication. Moreover, the dynamic character of the information from the completion of new research would require continuous re-evaluations and frequent reworking of the narrative condensate in order to present an accurate and timely picture of the hazards from the particular chemical. Such summaries as may be required by the user could be prepared, on request, for the particular chemical and for the particular characteristic of immediate interest through the efforts of the IRPTC Query-Response Service. Summaries, thus generated, can be published and distributed to a broader public.

The product of this year's effort will permit the condensed presentation of collected data for the Register and will make possible the identification of network partners which have an information system pertinent to IRPTC's attribute requirements. The effort to locate these network partners has been started during the latter part of this year and will be a continuing effort. Network partners may be of several

distinctly different classes. Contributing network partners are one class which would be willing to participate in IRPTC by providing complete data profiles for chemicals or data for one or more attributes to the file according to mutually agreed upon specifications for data selection, extraction and presentation. The instructions presented in this document are essential for the participation of these partners.

Responding network partners are another important class. They can be identified as those partners which may have generated, in their files, information pertinent to the IRPTC attributes for their own proprietary use. This information could be made available to IRPTC within defined limits in response to a specific request from IRPTC. For this class of partner, IRPTC would need to know what chemicals are contained in their files and for which attribute data is collected. The third class of network partner, of course, is the National Correspondent, without whom IRPTC could not effectively perform its responsibilities of gathering and disseminating information.

Because of the importance of these Instructions for use by the network partners, it is essential that all parties have confidence that they are the best available for the purpose. To provide material to study their usefulness, sixty data profiles have been developed for chemical substances selected for the same categories as were chosen for the 1978 Mediterranean Data Profiles. It is anticipated that these products will be reviewed early in 1980 by an international group of experts selected from a broad variety of disciplines. This event is a normal sequence to ensure that the IRPTC Chemical Data Register meets the requirements of those who are expected to use it. It is the next step to be taken prior to the computerized storage of data for the Register.

Completion of these steps does not mean that the IRPTC Chemical Data Register will remain unchanged thereafter. The changing nature of the subject matter requires that the Register be able to change with it. The Register is being designed so that it is dynamic in terms of form and content to meet these changing requirements.

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1. INTRODUCTION

During the last few decades man has become increasingly aware of the deterioration of his environment due to chemical pollution. The magnitude of the problem has been accentuated by the production of increasing volumes and varieties of chemical products. Although many of these chemicals have a potential for reaching man and his environment, information on their possible damaging characteristics is often not readily available or non-existent.

To date, the Chemical Abstracts Service (CAS) of the American Chemical Society has given registry numbers to approximately five million different chemical substances including nearly thirteen thousand which are of unknown or variable composition, e.g. complex reaction products and biological materials such as those on the U.S. TSCA Chemical Substance Inventory UVCB (Chemical Substances of Unknown or Variable Composition, Complex Reaction Products, and Biological Materials) Index.[1]

The total number of substances which can be considered to be "old chemicals" of significance in US commerce is estimated to be around 66,000. This figure includes pesticides, precursors, intermediates and drugs and is based on the TSCA Inventory and the U.S. National Institute for Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS).[2]

In addition, it is estimated that there are about 20,000 other chemicals which do not qualify for the TSCA Inventory because of the limited quantity prepared. Although they are not listed, they may, nevertheless, be used in industry.

The additional substances contributed to world commerce by countries other than the United States are likely to expand the list by 10,000 substances, although this number cannot be confirmed as no world inventories presently exist. It follows that these 96,000 substances must have some potential for entering the environment and affecting the health and normal functioning of living organisms.

The majority of these substances, however, are not likely to pose a threat to man or his environment as they are not sufficiently potent to produce damage under conditions of normal use or in ambient concentrations.[3] On the other hand, the misuse of chemicals, e.g. glue sniffing,[4] can greatly magnify their potential hazard. Biological or physical properties which may not be known to the user, e.g. ability to bioconcentrate or high vapour density, may also greatly intensify the potential of a chemical to produce injury, as a result of concentration in limited areas.[5,6,7]

It is essential that the characteristics (attributes) of chemical substances be identified, systematically collected and presented for scientific review in order to recognize those chemical substances which have a potential for producing deleterious effects on man and his environment. The alternative is the accidental discovery of these characteristics after they have caused significant damage.

The International Register of Potentially Toxic Chemicals (IRPTC) is endeavouring to prepare a mechanism whereby reported chemical characteristics can be identified, collected and disseminated on a routine basis to those who have the responsibility for preventing damage from chemical substances.

1.1 BACKGROUND

In 1972 the United Nations Conference on the Human Environment held in Stockholm, recommended that plans be developed for an international registry of data on chemicals in the environment.[8] The history of IRPTC's early development has been summarized by Huismans;[9] a chronology of IRPTC development to 1976 is given below:

1972 - UNITED NATIONS CONFERENCE ON THE HUMAN ENVIRONMENT - Stockholm
- established United Nations Environment Programme
- recommended an international register of data on chemicals in the environment

1974 - SECOND GOVERNING COUNCIL OF UNEP - Nairobi

- authorized Executive Director to convene workshop for International Register of Potentially Toxic Chemicals

1975 - EXPERT WORKSHOP ON IRPTC - Bilthoven

1975 - THIRD GOVERNING COUNCIL OF UNEP - Nairobi

- authorized Executive Director to establish Programme Activity Centre for IRPTC

1975 - TASK TEAM FOR IRPTC STRATEGY, OPERATION AND PLAN OF ACTION - Nairobi

1976 - FOURTH GOVERNING COUNCIL OF UNEP - Nairobi

- decided to establish IRPTC as part of Earthwatch (the Global Environment Assessment Programme)

Earthwatch is composed of:

Information exchange - INFOTERRA (IRS) and IRPTC
Monitoring - Global Environmental Monitoring System (GEMS)
Research
Evaluation and Review

1976 - IRPTC PROGRAMME ACTIVITY CENTRE ESTABLISHED IN GENEVA, SWITZERLAND

In 1978, the Sixth Governing Council of UNEP approved four objectives for IRPTC:

(i) to facilitate access to existing data on the effects of chemicals on man and his environment, and thereby contribute to a more efficient use of national and international resources available for the evaluation of effects of chemicals and their control;

(ii) on the basis of information in the Register, to identify the important gaps in existing knowledge on the effects of chemicals, and call attention to the need for research to fill those gaps;

(iii) to identify, or help identify, potential hazards from chemicals, and to improve the awareness of such hazards;

(iv) to provide information about national, regional and global policies, regulatory measures and standards and recommendations for the control of potentially toxic chemicals.[10]

These objectives were to be achieved by a series of strategies:

(i) rendering the IRPTC programme activity centre capable of handling data and answering questions;

(ii) involving correspondents designated at the national, regional and sectoral levels in the operations of IRPTC;

(iii) building a network of participating data systems, which may make their files available to the IRPTC programme activity centre for incorporation in its central data files, or may respond directly to users' queries;

(iv) developing and continuously updating computerized central data files;

(v) publishing selected information on chemicals.[11]

IRPTC has, inter alia, been executing the third strategy, i.e. developing and updating a computerized central data file, by a series of projects designed to facilitate the process of collecting and collating data into a format which will allow the objective consideration of a chemical's potential to produce adverse effects on man and the environment. Comprehensive information on the identification of a substance, on its activity characteristics and on methods for controlling its hazardous effects is essential for this activity. In executing this strategy, IRPTC lays a foundation for performance of the remaining strategies.

1.2 DEVELOPMENT OF THE CHEMICAL DATA REGISTER

The first project initiated in 1978 was to select and define attributes, categories of information, which were being used on a worldwide basis by the various chemical hazard evaluation agencies to evaluate potential chemical hazard. The resulting report, Attributes for the Chemical Data Register, IRPTC/UNEP,[11] includes attributes which in their aggregate should provide the information needed for priority selection of chemicals for evaluation and, to some extent, for the process of evaluation itself.

Another task undertaken by the IRPTC in 1978 was the development of Data Profiles for Chemicals for the Evaluation of their Hazards to the Environment of the Mediterranean Sea.[12] These profiles were prepared in response to a request by the Regional Seas Programme Activity Centre of the United Nations Environment Programme (UNEP) that the IRPTC prepare data profiles for substances listed in Annex A and B (the black and grey lists respectively) of a Draft Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources.[13] These profiles, because of the limited time and resources which were available for the task, do not contain information for all of the categories of data in the IRPTC Register.

Preliminary to the computerization of the Register, detailed instructions for data selection and presentation were required. These instructions are now being developed for the purpose of facilitating data extraction and enabling an abbreviated presentation of the data. This condensation and abbreviation is considered essential as there are 17 major categories of data in the Register and the eventual number of chemical substances to be included may need to be rather large. It is also essential for the effective eventual updating of the data in the Register, a task that would be very difficult without a uniform presentation of data and the instructions for selecting it. Lastly, the abbreviations used for the Register do not need to be translated as the instructions for data selection and presentation, which include definitions for all abbreviations used in the Register, will be translated into the six official working languages of the United Nations.

The data are organized in such a way that they can be printed in book form or on comfiche, computer generated microfiche. This is essential for a widespread dissemination to users who do not have computers or adequate communication systems for sophisticated on-line access.

The instructions will be reviewed by a select international group of experts early in 1980. The development of a chemical data register is a dynamic process that is subject to change as information on chemicals increases and as changes in technology occur. The Register must reflect these changes and, in addition, add certain other activities as they become associated with previously unsuspected deleterious environmental effects, e.g. the effect of chlorofluorocarbons on the ozone layer.

1.2.1 THE IRPTC USER

It is important to identify the users of the Register as they will be the ones who determine its ultimate value. While it could be argued that a chemical data register should be available for use by anyone who has an interest in the properties and behaviour of chemical substances, it should be obvious that a register responding to such a wide audience would be very ponderous and expensive.

The Expert Workshop on an International Register of Potentially Toxic Chemicals held in Bilthoven, the Netherlands, in 1975[14] and a Nairobi Task Team[15] which followed, identified the potential IRPTC users as follows:

- the Member States of the United Nations, the United Nations Environment Programme, other bodies and organizations of the United Nations system, and other organizations concerned with the management of the environment;

- authorities responsible for human health or for regulating or controlling the production, transportation, import, export and use of goods known or likely to contain harmful substances or for the release, deliberate or otherwise, of such substances into the environment;

- scientists engaged in basic and applied research;

- industries and similar organizations involved in activities that could expose human beings or the environment to harmful substances.

The use of a chemical data register by research scientists as an information source must be summarily dismissed as other information resources, such as those listed in the "MITRE Report"[16] and in the European On-Line Information Services Relevant to IRPTC Attributes[17] are existent and are available to most of these investigators. Moreover, the IRPTC Register is also not designed for the layman with a transient interest in chemicals.

The IRPTC users are, therefore, those persons who have the responsibility for protecting their constituents from the noxious effects of chemicals on themselves and on their environment. These responsible persons may be found in local or national governments, in industry and in academia.

The governmental regulators may exercise control over chemicals which pollute the air, soil, water supplies, rivers and oceans, which are found and used in the occupational environment, which are found in or added to foods for human or animal consumption, which may be used as therapeutic agents and which may be found as consumer products used in the home or avocation.

The industrial counterpart may use the Register to identify potential problems involving chemical substances provided to them by the supplier without hazard information. He may also use the Register

to compare the relative hazards associated with the use of substitute chemicals either as precursors, intermediates, or end products.

Academia can use the Register to identify chemical substances which may have the potential for being noxious and for which little or no pertinent research has been performed to elucidate this potential. This latter use is also one of interest to both government and industry in the allocation of efforts for chemical research.

1.2.2 IRPTC CHEMICALS

The Bilthoven Workshop[14] recommended that all substances be entered on an "extensive" list of chemical substances and that an "intensive" list, containing only selected substances, also be prepared. The first Scientific Advisory Committee recommended that there be no distinction between the extensive and intensive lists. Essentially, therefore, all chemicals are considered to be of importance to the IRPTC files.

The Bilthoven Workshop also indicated the importance of collecting information on chemical mixtures, both those intentionally formulated for proprietary purposes and those which occur from the processes of production. Information on proprietary mixtures, however, is nearly impossible to collect and list because many of the formulations are confidential or changeable. Since there are few constraints on the proportions of ingredients in proprietary mixtures and since the ingredients themselves can even be changed in many cases, the inclusion of mixtures would be infeasible for the IRPTC unless regulatory instruments were developed to maintain constant formulations where potent or dangerous chemicals were involved. Mixtures resulting from production processes, however, do remain relatively constant and thus can be identified and included in the Register.

The substances to be included in the IRPTC Chemical Data Register are those which are of international commercial or environmental interest. While the list is open ended, it will initially be based on existing national inventories. The use of such inventories makes additional chemical selection criteria unnecessary, i.e. it is not necessary to identify and select for entry in the Register only those chemicals which are in use or which are known to endanger the environment.

1.2.3 IRPTC ATTRIBUTES

As it has been established that the user is likely to have a responsibility for the control of hazards from chemical substances to man and the environment, the question of what information should be provided for this task becomes paramount. One of the most important categories of data for the user is that dealing with identification. The name of the substance is an obvious prerequisite for the association of that substance with the other attributes in the Register.

It is therefore of prime importance that all chemical names used in international commerce be collected and properly associated with

the attribute data in the Register. The Chemical Abstracts Service has a large number of synonymous names in its files and the NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) contains the largest published collection of synonyms with toxicity data, i.e. approximately 100,000 names for 37,000 chemical substances. Even so, these collections are very inadequate for names in languages other than English. Recognizing this, the IRPTC is currently endeavouring to locate sources of synonyms that may have been collected for chemical substances, and to determine an effective mechanism for collecting additional names on a worldwide basis.

These substances must be carefully circumscribed to exclude proprietary mixtures which can be named capriciously or changed for market advantage without adequate notice for effective monitoring. Mixtures resulting from production reactions, extractions from naturally occurring materials or the naturally occurring materials themselves are, of course, important chemical substances for the Register.

Once a user has precisely identified a chemical substance in the Register, it is then possible for him to identify its undesirable or desirable (in the case of a search for a substitute) characteristics. The physical characteristics which indicate explosiveness, flammability, decomposition, solubility, volatility, vapour density, reactivity, etc., are important as they give a basis for determining the hazards involved in transportation by public means and in storage. They also indicate the degree of ease by which a substance enters the environment or comes into contact with humans.

The ease of environmental entry or contact with humans is further revealed by the estimates of production quantity, the production trends and the uses. These estimations may be additionally refined by information concerning the quantities or concentrations of a substance actually reported in the various media of the environment. Further, the user must know whether there are accepted methods for sampling and analysis of the chemical at the concentrations which are likely to be found.

The toxicology profile provides a knowledge of the toxic behaviour of chemical substances in man. The data selected for the understanding of the toxicology of substances are those which have been found to be used as a basis for the many regulations that have been promulgated throughout the world. Thus, the lowest doses that have been estimated to cause death in man, and the lowest dose which has caused an effect considered to be noxious to man, are quite important to the understanding of the toxic activity of a chemical on man.

As the potential toxic effects of a substance on man are often not known and as they frequently cannot be deliberately elicited, toxicity studies on animals are included as a means of predicting potential human effects. As the most common routes of human exposure are inhalation, oral and dermal, these routes are preferred when selecting data for the attributes in the profiles. The results from single administration lethal dose studies (LD50s), the lowest dose to cause an effect over a prolonged period of exposure, the highest dose to produce no effect

over prolonged exposure, and the different toxic effects that are produced at different levels and durations of exposure, are all important to the user's understanding of the relative toxicity that might be experienced by man.

Metabolites that have been reported as resulting from the exposure of an animal to the respective chemical are also important to the understanding of the hazard potential of that chemical. The entire Register, when computerized, could be searched for substances producing similar metabolites, a search capability which would be invaluable to the identification of chemicals with potentially similar hazard characteristics. This is also a very useful tool for providing capability for advance warning.

Further, the user will need to know whether a particular substance has been tested for several specific toxic effects, e.g. carcinogenesis, mutagenesis, teratogenesis, peripheral neuropathogenesis and psychotoxicology. This knowledge will enable him to decide whether the information is adequate for the assessment of the potential hazards or whether additional study is indicated.

It is important to known whether substances which have been shown to reach the environment through water, air or soil are degradable, whether the degradation products are hazardous to the environment and whether they are cumulated in the food chain and are therefore a potential hazard to man and other animals as a result of their persistence.

Other important information concerns the treatment of patients who have been over-exposed to a chemical, either from a massive immediate exposure or from a long term exposure to toxic quantities. References will be given to selected documents which contain evaluated data on the signs and symptoms for the diagnosis of the acute and chronic intoxication of humans as well as the available medical countermeasures for that intoxication. The treatment concept may also be carried over to the treatment of the environment when it too has been overexposed through the release of a chemical by accident or intent.

Finally, the listing of various international recommendations and national regulatory instruments for controlling the use or disposal of chemical substances is very helpful in identifying those controls which have been developed for the prevention of hazards from chemical activity. This same information can be used by representatives of industry and government alike to keep them informed of existing regulations that have an effect on the international movement of a chemical in commerce.

1.2.4 RELIABILITY OF DATA

When selected characteristics have been listed and existing data described, another important aspect of the data emerges, i.e. the reliability of that data. With the improvement of technology, findings frequently become controversial and may reverse earlier conclusions

or introduce new concepts. Data evaluation, therefore, is essential for a valid understanding of the chemical, physical and biological activity characteristics of a substance. Such evaluations are currently available for a number of chemicals and for specific attributes. Unfortunately, duplication of effort is very common among the agencies performing the task but such duplications may be reduced in the future by the effective use of the IRPTC Register.

For many attributes, evaluation by qualified agencies has not been performed. Such omissions are marked for the effects of chemicals on species other than man and on ecosystems other than air. Similarly, evaluations in the treatment of chemical spills and other releases, and in the treatment of chemical intoxication produced by long- and short-term exposures of chemicals to man have not been adequately performed. Data evaluation by panels of experts must be accelerated and must address new problems, as they are recognized, either by data which is suggestive of potential injury or by the absence of such data. It is envisaged that such a programme may be undertaken by the International Programme on Chemical Safety[18] which is now being organized by WHO in cooperation with other interested agencies of the UN.

Evaluations are currently executed by several agencies within the UN. The International Agency for Research on Cancer (IARC) of the World Health Organization (WHO) evaluates carcinogenesis and mutagenesis; the Environmental Health Division of WHO in collaboration with UNEP produces environmental health criteria documents which include most of the IRPTC Attributes; the Food and Agriculture Organization (FAO) in collaboration with WHO publishes evaluated data for food additives and pesticide residues; the Economic Commission for Europe (ECE) and the Inter-Agency Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) cover the physical and chemical hazard attributes; and the International Labour Organization (ILO) evaluates the data for the toxicology and workplace standards attributes. Other agencies of international character which produce evaluation reviews are: the Organization for Economic Cooperation and Development (OECD); the Council of Europe and the European Economic Community (EEC).

The above efforts are augmented by evaluations executed by national agencies, inter alia, the US Environmental Protection Agency (EPA), the US National Institute for Occupational Safety and Health (NIOSH), and the National Research Council of Canada (NRCC).

In addition there are publications prepared by non-governmental organizations, such as the International Commission for Protection against Environmental Mutagens and Carcinogens (ICPEMC), the American National Standards Institute (ANSI), the American Conference of Governmental Industrial Hygienists (ACGIH), the Oil Companies International Study Group for Conservation of Clean Air and Water - Europe (CONCAWE), and the International Council for the Exploration of the Sea (ICES). Other types of reviews are published by individual authors, but these reviews must themselves be evaluated for quality because a large number of reviews may be published for the popular chemicals with

varying quality of literature coverage and analytical expertise.

The user is considered to be the best judge of his own requirements for data reliability. Citations for the reports of the different agencies which review and evaluate data are, therefore, provided to the user so that he can select from the available secondary literature those documents in which he has the most confidence.

Secondary documents do not exist, however, for the great majority of chemical substances. The absence of citations in the data profiles to such review and/or evaluation for a particular substance is an indication that the data which is presented has not been evaluated by an expert panel and should, therefore, be used with caution. In such a case, experts acceptable to the user can be employed for hazard evaluation or the appropriate national or international agency can be petitioned to undertake the task.

1.3 DEVELOPMENT OF INSTRUCTIONS FOR DATA SELECTION AND PRESENTATION

Instructions have been developed by the IRPTC with the assistance of UN expert consultants for the purpose of facilitating data selection and presentation. They define, in as much detail as possible, exactly what data should be entered into the Register and allow individuals with basic training in biology, chemistry or other related sciences to extract data for the Register, without close supervision. They have been designed to be sufficiently structured so as to eliminate as many decisions on the part of the extractor as possible, but to be flexible enough so as not to exclude useful data. As data extraction increases, new situations will arise and will require attention. As a result, the instructions should be routinely monitored and revised by the IRPTC with the assistance of expert consultants to ensure that they reflect current expertise in the various subject areas.

There are several advantages to this approach. With a well established format and standardized instructions for data selection, data can be processed in widely separated geographic areas. The instructions provide a model for the extractor and the data prepared using this model can later be monitored by the IRPTC to assure that it is consistent with the design of the Register. The instructions also provide the user with a straight forward explanation of the rationale for the selection of the data in the Register. This will allow him to evaluate its reliability and make the best use of it for his own particular needs. Further, an abbreviated and standardized format enables the effective use of the Register for updating, i.e. for monitoring current publications for new information.

The process of defining the attributes is dynamic and reflects the information gained during a review of the literature for data extraction. When one first attempts to extract data from the literature, multiple decisions concerning the selection of data must be faced. Lists of attributes have traditionally been general in nature, leaving these decisions to the extractor. For example, microbial biodegradation

is one of the sub-divisions generally found in a typical list of data recommended for inclusion in a register designed for environmental hazard assessment. The topic and relevant literature do not, however, provide sufficient foundation for data extraction. The general categories of required data must first be outlined, e.g.

- source of microorganisms
- test conditions
- analytical technique
- quantity (% disappearance, % uptake, etc.)
- products
- quantity of products.

Although this framework provides some basis for data selection, it is not sufficient. Questions will arise immediately. For example, how specifically should one define the source of microorganisms and how many different sources should be included? Which of the multitude of test conditions reported should be entered, e.g. acclimation, aerobic/anaerobic, temperature. As the rate of biodegradation is measured in many different ways, what analytical techniques should be included in the Register, e.g. percent disappearance of original substance, biological oxygen demand, carbon dioxide evolution, chemical oxygen demand? How many and which products of biodegradation should be listed?

The above questions should not arise if the attributes are adequately defined as the terms recommended for describing the source of microorganisms, the test conditions and the analytical methods are listed in the instructions. Priorities for data selection are also given.

The instructions must address the problem of utilizing both the secondary and the primary literature. The secondary documents are extremely useful in that they provide a mechanism for dealing with the vast quantity of primary literature available for some chemicals. In order to avoid reviewing all data, particularly for the well studied chemicals, only that data which has been selected by a panel of experts for publication in a secondary document is considered. Generally there are several review documents prepared by UN, international or national groups of experts for the "popular" chemicals. It is expected that the use of this literature for data selection will both increase the quality of the data in the Register and reduce the task of literature review.

Although the available secondary documents are used by the IRPTC to facilitate literature selection, the data themselves are extracted from the primary literature where the information is more comprehensive. For the majority of the chemicals in the Register, primary literature will often be the only source of published information available. In fact, for a large number of chemicals, data selection will not be an issue as there is very little data available.

Primary literature is also essential for update of the Register. Although the secondary documents play an important role in data selection, they are never as current as the primary literature. Update should

be an ongoing process using both the primary literature and newly published secondary documents and should follow the general guidelines developed for initial data input to the Register.

Data are presented in the Register in an abbreviated format which can be understood with a minimum of reference assistance by a user who has taken a short time to become familiar with the data profiles. Although advances in modern computer technology make free-text entry of data possible for large numbers of substances, the primary advantage of presenting data in an abbreviated format is that it facilitates the task of data review for the user who is interested in an overview of the attribute characteristics of a substance or of one or more generic groups of substances.

Data are given letter abbreviation codes in order to facilitate their identification by both the user/reader and the extractor. Whenever possible, standard abbreviations are used, e.g. the UN International Standards Organization three digit letter codes for countries. Abbreviations are consistent throughout the Register and are suggestive of the term or concept which they represent.

One of the most important aspects of data extraction involves correctly associating the data with the substances. As a general rule, data are entered as reported. The exception to this occurs when the name used in the literature for a chemical is a synonym for an IRPTC substance entry. The data are then entered under the IRPTC prime chemical name.

Data are entered under a generic, rather than a more specific, heading only in the case that no further chemical identification can be made. For example, malathion may be identified in the literature by purity grade or it may simply be reported as malathion which would be entered under malathion (generic). Hydration states may or may not be identified in the literature. As a result, anhydrous lead acetate, lead acetate trihydrate and lead acetate (generic) including anhydrous as well as hydrated lead acetate are all necessary chemical substance entries in the Register.

It is important that variants of substances be identified and listed, although providing the facility for entering data on the precise chemical substance reported in the literature, increases the number of substance entries in the Register. In most cases, however, this task is relatively straight forward, e.g. a change in the water of hydration does not normally make a substance more or less hazardous and, as a result, the several variants due to water of hydration can easily be treated generically.

This is not, however, always possible as the variants may differ greatly in regard to one or more biological, chemical or physical characteristic. This is well illustrated by the difference between methyl n-butyl ketone, which produces peripheral neuropathy, and methyl iso-butyl ketone which does not. Beta naphthylamine produces bladder cancer in man whereas alpha naphthylamine has different activity characteristics; there are many other examples, as well,

of significant differences between closely related chemicals.

Generic grouping, therefore, must depend on the effect which the variants produce on man and the environment rather than on a similarity in chemical structure, although structural similarity may often result in similar effects enabling generic grouping for the purpose of the Register.

In the instructions that follow, the various concepts of building a chemical data register are described. In support of the instructions, sixty data profiles have been prepared to demonstrate their use. These instructions should help in resolving some of the difficulties inherent in working with data developed for chemicals by a scientific community with multiple and divergent purposes in mind. While such divergence makes the assembly of a data register difficult, some divergence of purpose for environmental research is essential in a world where what is known about the environment is considerably less than what is unknown.

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2. DATA SELECTION AND PRESENTATION INSTRUCTIONS

Although each section of the Register has its own particular needs, as far as data selection and presentation are concerned, there are several general guidelines which apply to the Register as a whole.

Recently published secondary literature is collected for each chemical substance; it is then reviewed, references are selected on the basis of the IRPTC Instructions and the primary literature is collected. Data are then extracted from those references for the Register. After the above process has been completed, the primary literature is searched retrospectively beginning with the most current articles and working back to the references cited in the secondary literature, i.e. the gap between the data reviewed in the secondary literature and the most recent data is covered. In the absence of secondary literature, the primary literature published in the past ten years is searched, priority being given to the most recent data unless otherwise stated in the Instructions.

As stated in the introductory material, the IRPTC enters data for individual substances, whenever they are presented as such, as well as for generic groups of substances when the data refers to the group or when the author has not explicitly defined the chemical to which the data refer.

Incomplete data which do not satisfy the requirements of a data line are not selected for entry when other more complete data are available. When, however, the incomplete data are found in a secondary document, the primary source is searched for the data necessary to complete the data line.

In general, results obtained from studies conducted under unusual environmental conditions are not entered; the conditions which are acceptable are specified in the individual sections of the instructions. If a statement is made in a review document, developed under the supervision of a committee of experts, to the effect that a particular study was poorly done and should not be considered, data from that study are not entered.

Data presentation follows the format for data profiles found on page 385 of this report. When data are not found for a particular category, the category heading is not included.

Data are entered using the abbreviations given in the individual sections of the Instructions and in the lists of abbreviations which follow the data profiles.

2.1 IDENTIFIERS AND PROPERTIES

This section contains information on the chemical identity, e.g. name of a compound, physical constants which can be obtained by unambiguous measurement and related chemical properties. These entries are useful for three different, distinct purposes.

Chemical substance identities, e.g. the chemical name and structural formula, clearly identify a compound as a unique chemical substance. Included are the Wiswesser Line Notation and commonly accepted standardized numbers such as the Chemical Abstracts Registry Number and numbers used by the U.S. National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances (RTECS). The structural formula and molecular weight are also useful identifiers which may, when compared with well studied chemicals, provide clues as to environmental behaviour and toxicity.

The chemical definition is of utmost importance in the identification of substances which are not specific chemical compounds. It may include the source of the substance or a general statement of constituents. Additives and impurities are also included as they can be of greater toxicologic significance than the prime substance.

The Register also includes a comprehensive list of synonyms which enables the rapid identification of a substance be it labelled by chemical name, common name, generic or trade name. In the future, all synonyms will be listed alphabetically in the print-out version of the Register with pointers to the name under which the information on that substance is entered.

The second distinct purpose of this section is to indicate possible hazard in storage, shipment or use of the chemical. Such data are, for instance, flash point and flammable limits. Hazard classifications developed by United Nations Organizations or other evaluative agencies are also included along with terms or phrases from the literature concerning reactivity, e.g. explosive, autoignites at 30°C, corrosive, emits highly toxic fumes when heated, and powerful oxidizer. Melting point, boiling point and density indicate whether the chemical will be present as solid, liquid or gas when accidentally spilled and whether it will float or sink in natural waterways.

Finally, certain physical parameters for a chemical are included primarily for the purpose of prediciting environmental fate. For example, the vapour pressure provides an indication of the relative tendency of a substance to volatize, the adsorption characteristics of a substance influence its transport, degradation and bioavailability. The partition coefficient provides presumptive evidence of the likelihood of a substance to be adsorbed to sediments and to bioconcentrate in organisms. The degree of water solubility of a substance often determines whether it will concentrate or be distributed more widely and thus have a higher probability of being attacked by microorganisms.

The following data are included:

- IRPTC name
- IRPTC Number (IRPTC NU)
- CAS Number (CAS NU)
- molecular formula (MOLFM)
- molecular weight (MOLWT)
- structural formula (STRFM)
- Wiswesser Line Notation (WLN)
- definition (DEF)
- synonyms (SYN)
- melting point (MP)
- flash point (FP)
- density (DEN)
- boiling point (BP)
- flammable limits (FL)
- relative vapour density (RVDEN)
- hazard classification (HAZ)
- vapour pressure (VP)
- adsorption coefficient (ADS)
- partition coefficient (PC)
- water solubility (AQSOL)
- additives (ADD)
- impurities (IMPUR)

Below is an example of a typical entry:

ACRYLONITRILE

IRPTC NU: 000017
CAS NU: 107-13-1 MOLFM: C3H3N MOLWT: 53.07
STRFM: NC-CH=CH2 WLN:
DEF:

SYN: ACRN * ACRYLNITRIL(DEU,NLD) * ACRYLON * ACRYLONITRILE(DOT) * ACRYLONITRILE MONOMER * AKRYLONITRYL(POL) * AN * CARBACRYL * CIANURO DI VINILE(ITA) * CYANOETHYLENE * CYANURE DE VINYLE(FRA) * ENT 54 * FUMIGRAIN * MILLER'S FUMIGRAIN * NC1-C50215 * NITRILE ACRILICO(ITA) * NITRILE ACRYLIQUE(FRA) * PROPENENITRIL * PROPENENITRILE * 2-PROPENENITRILE(CAS) * TL 314 * VCN * VENTOX * VINYL CYANIDE * AT 5250000(RTECS)

MP: -84°C FP: -4°C(c-cup),0°C(o-cup) DEN:0.81g/ml
BP: 78°C FL: 66-368g/m^3 RVDEN: 1.8
HAZ: UN CLASS 3, UN PACK I (inhibited)
VP: 11kPa,(83mmHg),20°C ADS:
PC: 0.12 AQSOL: 73.5g/l,20°C

ADD: HYDROQUINONE MONOMETHYL ETHER £IAR19 19,74(79)

IMPUR: ACETALDEHYDE * ACETIC ACID * ACETONE * ACETONITRILE * ACROLEIN * DIVINYLACETYLENE * HYDROGEN CYANIDE * IRON * METHYL VINYL KETONE * HYDROGEN PEROXIDE
NTISA* -,5(78) £IAR19 19,73(79)

2.1.1 IRPTC NAME

The IRPTC name is capitalized, underlined and appears as the first entry for each substance in the Register. It is taken directly from the NIOSH Registry of Toxic Effects of Chemical Substances (RTECS). The RTECS name is derived in part from the American Chemical Society Chemical Abstracts Service (CAS) Collective Index of Chemical Abstracts and may for certain substances be modified when a change facilitates the presentation of the chemical.

2.1.2 IRPTC NUMBER (abbreviated IRPTC NU)

These numbers are assigned to all IRPTC substance and synonym entries in alphabetical order as they are added to the Register. For the most part this is done by providing numbers for the substances listed in the EPA TSCA Inventory, the NIOSH-RTECS and other chemical inventories of substances in use. As a result of the fact that the numbers are not assigned sequentially, numbers are easily given to new chemical substances or synonyms.

The numbers must be listed in numerical order and must be correlated with the alphabetical ordering of the names in the printed version so that the reader can find, by the number, the correct substance for which there is chemical characteristic data. Using a reference number as a search mechanism greatly simplifies the task of visually identifying the correct substance in the Register.

If a substance name is changed, the new name becomes a synonym with its own number and is arranged in alphabetical sequence with a numerical pointer to the original name. For operational efficiency it is desirable to have on-line access to the latest alphabetical list in order to identify the numbers to be assigned.

2.1.3 CAS NUMBER (abbreviated CAS NU)

The Chemical Abstracts Service Registry number is a standard chemical identifier for chemicals and mixtures that is used in virtually all international identification systems to ensure adequate understanding when communicating with other agenices, industry, and the public. CAS numbers have been assigned to more than 5 million chemicals.

The CAS numbers are displayed in the Register with hyphens, e.g. 50-00-0, for clarity.

2.1.4 MOLECULAR FORMULA (abbreviated MOLFM)

The molecular formula designates the elemental composition of a substance and is ordered as follows: carbon, hydrogen, followed by all other elements ordered alphabetically. It can be obtained from many sources, e.g. CAS, RTECS, the Environmental Chemicals Data and Information Network (ECDIN) of the Commission of the European Communities. It is displayed with the numbers corresponding to the elements directly following the letters representing the elements.

The molecular formula can be used for sub-molecular searching, e.g. a search for all substances with three chlorine atoms can be executed.

2.1.5 MOLECULAR WEIGHT (abbreviated MOLWT)

The molecular weight is calculated from the molecular formula using standard weights and is rounded off to two significant figures.

2.1.6 STRUCTURAL FORMULA (abbreviated STRFM)

The structural formula is a two dimensional representation of the arrangememt of atoms and groups of atoms in a compound which can easily be generated from the Wiswesser Line Notation. At the present time, the structural formula is, however, taken from the secondary literature.

2.1.7 DEFINITION (abbreviated DEF)

When the composition of a substance is unknown, e.g. plant or animal extracts, the IRPTC name may be adapted from a literature source. A name derived in this manner will be accompanied by a narrative description of the substance, a general statement of constituents, or other helpful information as well as a reference to the source of information.

If a mixture consists of unidentified or variable components, it is often not possible to describe it precisely. In this case a generic name such as "tobacco tar" may have a CAS Registry Number that corresponds to it. When possible, the major components of the mixture are listed here.

Related substances which do not differ in a toxicologically significant way, e.g. salts which only differ in the number of molecules of water of hydration, may be grouped generically and an explanation of this grouping given under the definition. Substances with the same identification characteristics which can be separated only on the basis of their differing biological activities, e.g. products of different production processes, are also described here.

2.1.8 SYNONYMS (abbreviated SYN)

All synonyms of the compound including chemical names, trade names and abbreviations are entered here. Although registration numbers are an ideal way for computers to handle chemical identity, names will always be useful and necessary for human communications. Specific chemicals are generally known by several names. Some of these names have a historic basis, some are generic or trade names, and some are derived from various incompatible naming systems. An extreme example of multiple nomenclature is the substance polyethylene, which is known to have 932 synonyms*, the majority of which are trade names.

The synonyms are listed in alphabetical order and separated by asterisks. They are capitalised with the exception of prefixes and Greek letters. They are alphabetised in the following way: chemical names are arranged in alphabetical order, ignoring characters such as numbers, Greek letters, suffixes and prefixes indicating substituent positions, stereochemical or other structural features and other specifications. Numbers are ordered numerically after the names have been arranged alphabetically.

Prefixes are considered secondarily and are listed in the following order:

- prefixes such as para-, sym-, trans-, etc.
- Greek letters, e.g. alpha, beta
- chemical elements indicating positions, e.g. N,N'
- numbers indicating positions, e.g. 1,1'

Suffixes are considered after prefixes in the following order:

- numbers
- letters

Option:
Highlight, in some way, the common name, e.g. in the data profile - Succinic acid, mercapto-, diethyl ester, S-ester with O,O-dimethyl phosphorodithioate (95% purity grade) - the common name malathion could be underlined in the list of synonyms.

* CEQ(1978) The feasibility of a Standard Chemical Classification System and a Standard Chemical Substances Information System. A report to congress prepared pursuant to Section 25(b) of the Toxic Substances Control Act of 1976 (15 U.S.C. 2601) by the Council on Environmental Quality, Washington, D.C

Names or numbers used by the following organisations are indicated with the abbreviations shown below.

- The Chemical Abstracts Service Registry Name (CAS)
- The UN Transport of Dangerous Goods Reference Number (UN)
- The International Standards Organisation Name (ISO)
- The Commission of the European Communities Environmental Chemicals Data and Information Network (ECDIN)
- The US Coast Guard Chemical Hazard Response Information System Reference Number (CHRIS)
- The US Environmental Protection Agency Reference Number used to access the OHM-TADS data base (OHM-TADS)
- The National Cancer Institute, Carcinogenesis Bioassay Program Number (NCI)
- The U.S.National Institute for Occupational Safety and Health, Registry of Toxic Effects of Chemical Substances Number (RTECS)
- The U.S. Department of Transportation Name (DOT)

Identical names written with different spacing, e.g. methyl mercury chloride and methylmercurychloride and identical names written with different numbers of parentheses are not considered as synonyms. All possibilities, however, are entered into the Register for future sorting by a nomenclature expert. Non-English names are followed by the abbreviations for the major country which uses that language, e.g. for German names (DEU).

2.1.9 WISWESSER LINE NOTATION (abbreviated WLN)

The Wiswesser Line Notation is a unique and unambiguous representation of a chemical structure via a single character string using a standardised arrangement of 40 symbols (numerics, alphabetics, three special characters and blanks). It allows substructure searches for special retrieval of functional groups and substituents and therefore allows machine retrieval of entries by chemical characteristics. It may facilitate the study of the potential toxicity of a chemical substance on the basis of structural similarities among chemicals.

Unfortunately, this quasi-structural linear line notation is not a canonical notation; that is, the rules of WLN may lead to different notations for the same compound. As there are several WLN dialects it would be advisable for IRPTC to use WLN's already generated for another system, e.g. ECDIN WLN's (cross-bow dialect).

WLN's are very inexpensive to input into the Register compared to other attribute data and can be used to generate the structural

formula and to cross-check on the molecular formula.

2.1.10 MELTING POINT (abbreviated MP)

The melting point is the temperature at which a substance changes from the solid to the liquid state. It indicates at what temperature solid flammable substances liquify.

The decomposition point is the temperature at which a substance thermally degrades. It may indicate the transformation of the substance into forms (liquid or gas) more dangerous than the solid.

Sublimation occurs on heating, when substances pass directly from the solid to the vapour phase. It is designated by the abbreviation "sub" entered next to the temperature figure.

Melting point or range is expressed in degrees Celsius and is rounded off to the nearest whole number. Units other than Celsius (Centigrade) are converted. Conversions from Fahrenheit to Celsius and from Kelvin to Celsius are found on page 384.

The pressure is not entered with the melting point. When different melting points or ranges are found in the literature searched, the highest point is selected as it most likely represents the true melting point of the pure compound. If the highest point is 5°C or more above the other values found, the second highest point is entered along with the highest point.

Melting ranges are entered in the absence of data for melting points.

Decomposition is designated by the abbreviation "dec" and is understood to indicate that the substance decomposes at the temperature given which is at or before the melting point.

2.1.11 FLASH POINT (abbreviated FP)

The flash point is the lowest temperature at which vapours are given off in such quantities, from a liquid under a pressure of 101.3kPa, that they form an inflammable mixture with the air above the liquid.

Flash point is expressed in degrees Celsius and is rounded off to the nearest whole number. Units other than Celsius (Centigrade) are converted. Conversions from degrees Fahrenheit and Kelvin to degress Celsius are found on page 384.

The flash point can either be measured by open or closed cup, the former more closely resembling conditions encountered during handling and use and the latter giving a lower temperature. Both data from open cup (o-cup) and closed cup (c-cup) measurements are included and designated with the above abbreviations.

If more than one flash point is reported for the same method, the

lowest one is entered in the Register as it indicates potential hazard conditions at a lower temperature.

Data from the literature which are not accompanied by a designation as to which general method (open or closed cup) was employed, are only entered in the absence of data with such a designation.

2.1.12 DENSITY (abbreviated DEN)

Density is the weight of a liquid, solid or gas per unit volume of that substance, i.e. the mass in grams contained in 1 cubic centimetre (cm^3) of a substance at 20°C and 101.3kPa. A knowledge of the density of a substance allows one to determine whether a liquid or solid will sink or float in water or whether a gas will sink or rise in air.

Density is expressed as weight/volume and is rounded off to two significant figures.

The relative density (specific gravity) of a liquid or solid*, although it is the ratio between the density of that substance and water and therefore is dimensionless, can be expressed as weight/volume, as the density of water at 4°C to which these data relate is very nearly equal to 1 gram per millilitre (g/ml).

The density measured at the temperature closest to 20°C is taken in preference to other data. Measurements taken under temperatures outside the ambient temperature range of 15.6-32.2°C are not considered. Temperature is not included along with pressure in the Register. If two or more different figures are found in the literature searched, and if the measurements were taken under the same conditions, the most recent data are selected.

* Vapour density, which is related to the density of air, is not included here. It is entered under a separate attribute as the density of air at standard conditions is 0.0012930g/ml, and can not be equated numerically as in the case of water.

2.1.13 BOILING POINT (abbreviated as BP)

The boiling point is the temperature at which a liquid under standard atmospheric pressure (101.3kPa) changes from the liquid to the gaseous state. It is an indication of the volatility of a substance and in the case of a flammable liquid, it is one of the measures of hazard.

The distillation range in a separation process is the temperature at which the more volatile liquid of a mixture forms a vapour. When the Register entry is a mixture, a distillation range is often the only data found for this attribute.

The decomposition point is the temperature at which a substance thermally degrades.

Boiling point is expressed in degrees Celsius and is rounded off to the nearest whole number. Units other than Celsius (Centigrade) are converted. Conversions from Fahrenheit to Celsius and from Kelvin to Celsius are found on page 384.

Boiling points measured at pressures closest to 101.3kPa (760mmHg) are taken in preference to other data. Boiling points measured under pressures outside the range of 93-107kPa (720-800mmHg) are not entered. Pressure is not entered with the boiling temperature.

When pressure data are not given in the literature with temperature data for the boiling point, the assumption is made that the pressure during measurement was within the above "normal" range and the temperature data are entered in the Register.

When different boiling points are found in the literature for the same substance, the lowest is selected. If boiling ranges rather than boiling points are reported, they are entered. If the lowest figure in a range is lower than the point, the range is taken.

Distillation points/ranges are entered in place of boiling points in the absence of the latter.

Decomposition is designated by the abbreviation "dec" which indicates that the substance decomposes at or before the boiling point.

2.1.14 FLAMMABLE LIMITS (abbreviated FL)

Flammable limits denote the concentration range, of a vapour or gas in a mixture with air, at which the flammable or explosive mixture will ignite and continue burning on its own after ignition.

Flammable limits are expressed as weight/volume and rounded off to the nearest whole number. Percent by volume or ppm data are converted. Instructions for converting ppm and percent by volume to weight/volume are found on page 382.

The lowest and highest concentrations found are entered. Figures

from different sources are sometimes used, e.g. replacing one extreme of a range with another more extreme figure.

2.1.15 RELATIVE VAPOUR DENSITY (abbreviated RVDEN)

Relative vapour density is the ratio of the weight of a gas to the weight of an equal quantity of air. Air, the standard, is given the value of 1. Values greater than one indicate that the vapour or the gas will sink; values below one indicate that it will rise.

Relative vapour density is expressed without a unit and rounded off to two significant figures. The standard is always air. When density data are expressed as weight/volume they are entered under the attribute "Density". If two or more different figures are found in the literature searched, the figure from the most recent reference is selected.

2.1.16 HAZARD CLASSIFICATION (abbreviated HAZ)

Wherever the information is available, one or more hazard classifications developed by the various United Nations (UN) Organisations or other evaluative bodies are entered here.

The following UN evaluations will be used to categorize a substance:

- UN Transport of Dangerous Goods Classification Number (abbreviated UN CLASS). There are 9 classes, several of which are broken into divisions and sub-divisions. These classification systems are explained in the following document:

  United Nations (1976)
  Transport of Dangerous Goods, Recommendations prepared by the committee of Experts on the Transport of Dangerous Goods, New York

- UN Transport of Dangerous Goods Packaging Group

  There are three groups divided by the degree of danger they present as far as packaging is concerned:

  Group I (abbreviated UN PACK I) - very dangerous substances

  Group II (abbreviated UN PACK II) - substances presenting medium danger

  Group III (abbreviated UN PACK III) - substances presenting minor danger

- Inter-Governmental Maritime Consultative Organisations (IMCO) Pollution Category for Operational Discharge

  There are four categories included here:

  Category A (abbreviated IMCO A) - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify the application of stringent anti-pollution measures.

  Category B (abbreviated IMCO B) - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify the application of special anti-pollution measures.

  Category C (abbreviated IMCO C) - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a minor hazard to either marine resources or human health or cause minor harm to amenities or other legitimate uses of the sea and therefore require special operational conditions.

  Category D (abbreviated IMCO D) - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a recognizable hazard to either marine resources or human health or cause minimal harm to amenities or other legitimate uses of the sea and therefore require some attention in operational conditions.

When the substance has not been evaluated and categorised by one of the above groups, i.e. when the above classifications are not available, reactivity data found in the literature will be grouped in the Register into one of the three following categories:

- fire hazard (abbreviated fire)
  This includes "flammable", "explosive", "autoignition at 30°C" and similar information. When fire should not be fought with water, the abbreviation "NO H2O" will also be entered here.

- toxic fumes (abbreviated tox-fumes)
  This includes statements such as "emits highly toxic fumes when heated," "fumes corrosive to skin and mucous membranes" and other similar statements.

- chemically reactive (abbreviated chem-react)
  This includes statements such as "powerful oxidizer" and "vigorous reaction with oxidizing agents".

All data in the above three categories will be accompanied by a reference to the literature source.

2.1.17 VAPOUR PRESSURE (abbreviated VP)

The vapour pressure of a substance is the pressure in kPa which a vapour, in a closed container and in equilibrium with its solid or liquid form, exerts on the enclosing walls. It is a function of the substance and the temperature and if it reaches the prevailing atmospheric pressure the liquid boils.

The vapour pressure provides an indication of the relative tendency of a substance to volatilize and is therefore useful for predicting environmental fate.

Vapour pressure is expressed as kPa with (mm Hg) entered in parenthesis. All other reported units are converted. Conversions from Torr, mmHg (sometimes reported as mm), bar and atm to kPa, and conversions from kPa to mmHg are found on page 384. The data are entered as reported, i.e. not rounded off.

Vapour pressure measured under temperatures outside the range of 0-50°C are not entered. The measurement temperature is entered with the vapour pressure and the data with measurement temperatures nearest 20°C are taken in preference.

When measurement temperature data are not given in the literature with the pressure data, the pressure data are not entered in the Register.

When more than one value is found for vapour pressure, the most recent data are selected on the presumption that one figure is correct and the later author has corrected the former data.

2.1.18 ADSORPTION COEFFICIENT (abbreviated ADS)

Adsorption is the adherence of a substance to a surface.

The transport, degradation and bioavailability of a substance is greatly affected by its adsorption properties, e.g. adsorption of substances to soil surfaces reduces their concentration in solution and thus reduces the quantity of the substance which can readily undergo reactions.

Only those data from experiments using test protocols which have been defined in such a way as to completely describe the individual figure reported are included, e.g. the Freundlich Adsorption Coefficient with all test conditions specified. The results from tests which have not been adequately standardized and defined are entered under Environmental Fate Tests, section 2.7 of this report.

2.1.19 PARTITION COEFFICIENT (abbreviated PC)

The n-octanol/water partition coefficient is the ratio of a substance's solubility in octanol divided by its solubility in water at equilibrium. The n-octanol/water partitioning system provides an indication that the substance can be expected to bioconcentrate in aquatic and other living organisms. If a substance has a high partition coefficient, it is likely that it will bioconcentrate. If the partition coefficient is low, concentration is unlikely. In any case, the partition coefficient is generally considered to indicate the maximum bioconcentration factor, as metabolism and lack of transport across biological membranes may reduce actual bioconcentration in organisms significantly. Extensive accumulation testing with living systems may not be required for chemicals with low partition coefficients.

The partition coefficient is expressed as log 10 P and the figures are entered as reported, i.e. are not rounded off. It can be either measured or calculated. Experimental measured values are designated with "exp" and calculated with "cal". Experimental data is taken in preference to calculated data. If different figures are found, the most recent data are selected.

2.1.20 WATER SOLUBILITY (abbreviated AQSOL)

The solubility of a substance in water is the weight of the dissolved substance per volume water when the solution is at equilibrium with an excess of the substance. Under these conditions the solution is said to be saturated.

The degree of water solubility often determines the ultimate fate of the substance and its environmental significance, e.g. water soluble substances tend to be distributed more widely, to be less concentrated as a result, and to have a higher probability of being attacked by microorganisms.

Solubility is expressed in weight/volume of solution. The figures given are not rounded off but they may be converted to the most practical metric units. Conversions from ppm and weight % are found on page 383.

Solubility measured at temperatures closest to 20°C is given priority. Only solubility values measured at water temperatures of 15-35°C are included. Temperature is given along with solubility data.

If no temperature is found in the literature, the assumption is made that the measurement temperature was within the above range. In this case no figure for temperature will be included in the Register. Qualitative statements such as "cold water" are not entered. Solubility data will not be entered if qualitative statements such as "hot water" indicate that the temperature was outside the above range.

When more than one value is found for solubility, the most recent

data are selected on the presumption that one figure is correct and the latter author has corrected the former data. In this case the latter reference is cited. Qualitative statements such as "soluble", "very soluble", etc. are not included in the Register as specific data are necessary for environmental prediction.

Decomposition, designated by the abbreviation "dec" which indicates that the substance hydrolyzes on contact with water, is entered next to the solubility figure.

2.1.21 ADDITIVES (abbreviated ADD)

Included here are substances that are added to the primary substance. This data is only included if it is found in secondary review literature, i.e. is readily available. References are cited as described below.

2.1.22 IMPURITIES (abbreviated IMPUR)

Included here are impurities described in secondary review literature and not reported as uniquely associated with a particular production process. If the impurities are reported as associated with a particular production process, they will be listed under section 2.3, PRODUCTION PROCESS(ES). References are cited as described below.

2.1.23 PREPARATION OF REFERENCES

At the present time, the final entry of a data line, with the exception of RECOMMENDATIONS/LEGAL MECHANISMS where the IRPTC Register entry date is the final entry, is the reference from which the information was extracted. All references are given a unique six letter code which identifies periodicals and serial publications as well as individual published works. When available, CODENS prepared by the United States Chemical Abstracts Service* are used. When no CODEN can be found for a particular reference, the IRPTC prepares a "pseudocoden" which is identified as such by the inclusion of at least one asterisk following the acronym.

* Chemical Abstracts Service Source Index, 1907-1974 Cumulative, American Chemical Society Chemical Abstracts Service, Ohio State University, Columbus, Ohio 43210, 1975

The acronyms are constructed as follows:

When the document is produced or published by an organization, laboratory, research centre, etc., the initials of that body are taken. If these initials take less than the five available spaces, they are followed by the first letter or the recognized abbreviation for the chemical substance mentioned in the title of the document. If no specific substance is referred to, the initial of the author's last name is used.

When no organization is involved, the first three letters of the author's surname, followed by the initials of his christian name are used. When there is only one christian name, the first four letters of the surname followed by the one initial of the christian name are entered.

For working papers, conferences, colloquia, etc. the initials of the title of the document are taken, e.g. HDWPH* (Hardness of Drinking Water and Public Health). The sign # indicates an unpublished personal communication.

All references from which information is extracted must be publicly available, i.e. no classified documents are used for source information.

The volume number follows the code designation; in the case of a conference, annual report, etc. the volume number is replaced by the conference number, e.g. for 2nd Conference on Mosquito Suppression, a 2 would appear in place of a volume number. The page number, i.e. the first page for an article, and the page from which the information was extracted for a document, follows the volume number. The last two numbers indicate the year of publication and are enclosed in parenthesis.

In the case that the primary reference from which the data was extracted is known to have been cited in a secondary document which has been reviewed by a panel of experts, i.e. the data has a greater degree of reliability, the secondary document is cited in code form on the data line directly to the left of the code for the primary reference. The code for secondary documents cited in this manner can be distinguished by the fact that it begins with a pound (£) sign and is directly followed by the year of its publication in parenthesis.

These secondary literature references may also be listed as the sole reference in the case that the data was extracted from the secondary document itself. In that instance, they are not directly followed by the year of publication in parenthesis, but rather by the volume number, page number and finally the year of publication in parenthesis.

2.2 PRODUCTION/CONSUMPTION

This section provides information on the production and consumption of a chemical on a worldwide and/or regional basis. It can be used in combination with production processes and uses to estimate the likelihood of the chemical's entering the environment and the total quantities thus released in various geographic areas. Data given over a period of time for the same production area showing decreasing or increasing production trends may indicate a change in the environmental significance of the substance.

A data line includes the following entries:

- geographic area
- quantity
- year
- reference

An example of a typical entry is given below:

USA 66tt-p (78) CENEAR -,9(78)

USA = United States of America
tt-p = thousand tonnes produced
(78) = 1978
CENEAR = Chemical and Engineering News
-,9(78) = no volume, page 9, 1978

Geographic Area

The geographic area to which the data refers is entered in abbreviated form and the data are listed by world, region and country, and arranged in that order. Within each category, the data are ordered alphabetically. Abbreviations for geographic and political areas are listed on page 373-379 of this report. When there are several figures from the same reference for one geographic area, the area abbreviation is given only once followed by the different figures and the corresponding years.

When a summary of the production or consumption figures for several countries excludes a particular country or area, the main geographic area involved is given, followed by a dash, the abbreviation "ex" (for excluding) and the country or area excluded, e.g. ASIA-exSUN (Asia excluding the Union of Soviet Socialist Republics).

Figures which are reported with a particular qualification, e.g. for factories with 25 or more employees, are listed with the abbreviation "ni" for non inclusive. This designation follows the geographic area. The exceptions to this are the qualifications for non-agricultural uses (abbreviated nagr) and for agricultural uses (abbreviated agr) which are commonly reported for pesticides.

Quantity

Data are entered in thousands of metric tonnes (tt), metric tonnes (t) or in kilograms (kg) depending on which unit is most convenient. All other units are converted using conversions found on page 383 of this report. All tons, tonnes etc. are entered as metric tonnes. Data reported as short tons (.907 metric tonnes) or long tons (1.016 metric tonnes) could be converted but data are often reported in tons which could be long tons, short tons, UK tons (equal to long tons) or even, due to incorrect reporting, metric tonnes. In any case, production/consumption figures are only valid for order-of-magnitude comparison and the difference between the various tons, tonnes, etc. is not great.

Both production figures (abbreviated tt-p, t-p or kg-p) and consumption figures (abbreviated tt-c, t-c or kg-c) are included. Production figures are listed before consumption figures for identical geographic area and year.

The symbols for greater than (>) and less than (<) are used when the data are reported in this manner, e.g. less than 500 tonnes produced (< 500t-p). When the figures are reported to be estimates, they are entered but the fact that they are estimates is not recorded in the Register as all production and consumption figures can be considered to be estimates differing only in the level of confidence which can be placed in them.

Year

The last two numbers for the year, e.g. 79, are entered in parenthesis directly after the quantity produced. They are listed in reverse chronological order, i.e. the most recent date is entered first. All production figures for a particular area are listed followed by consumption figures, independent of the year. The rationale for the above approach is the fact that production figures and consumption figures are generally listed separately in the literature.

Reference

References are cited as described on page 29 of this report.

Data Selection

Data are entered for a particular area for three different years. The figures are selected so as to indicate trend, i.e. a figure ten years before the most recent year found is taken (or a figure as close to that time period as possible). The most current figure found is taken as well. When production has increased and then decreased (or vice versa) a middle high or low figure is also selected, otherwise the year closest to the middle of the range is taken.

World production and consumption figures are given priority, followed by

regional data; both categories are included when data are available. Data for the ten highest producing and consuming individual countries (going by the latest year and on the basis of quantity produced) are also included for both production and consumption when the information is found in a UN, international or national document. A certain degree of flexibility and judgement is necessary here as data are often not complete for all years and for all countries.

When both production and consumption figures are found, both are entered. When different figures are found in the secondary literature for either production or consumption for identical areas and years, the different figures are entered in the Register. When similar figures are found, figures from the most recent document are selected.

Qualitative data are not included. All figures are rounded off to the nearest whole number. Reported "total" production or consumption is assumed to be a world figure unless otherwise specified and is listed as such.

2.3 PRODUCTION PROCESS(ES)

Information on production methods is included as it may make explicit the potential human or environmental impact of a substance, e.g. local effects arising directly from the substance or the waste products of its manufacture, or distant effects resulting from contaminants or impurities introduced into the environment.

A chemical is often made by different production processes involving completely different synthetic routes. Such differences may result in workers being exposed to varying concentrations and/or different intermediate compounds. They may also result in different losses to the environment via wastes. Impurities present in the final product also largely depend on the type of production process and on the reactants used.

A data line includes the following entries:

- process
- impurities
- reference

An example of a typical entry is given below:

Reaction of arsenic trioxide with sodium carbonate or sodium hydroxide £IARC2 2,54(73)

£IARC2 = International Agency for Research on Cancer, Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Volume 2
2,54(73) = volume 2, page 54, 1973

Process

Had a comprehensive list of production processes been available and had it been possible to divide it into approximately 20 general categories for the purpose of abbreviation, it would have been adopted for use in the IRPTC Register. A search was made for such a list but the result was negative. Production processes are therefore entered in the Register as reported, without abbreviation.

Impurities

Included here are impurities associated with the production process and reported in the secondary review literature.

Reference

References are cited as described on page 29 of this report.

Data Selection

Data are selected from secondary, review documents, e.g. UN, international and government reports, which present the various characteristics of a particular substance. These documents often give a brief description of the relevant production process(es) and such data can therefore be obtained for the Register in a very cost-effective way.

It is not recommended that IRPTC select data on production processes from primary references because it is often difficult if not impossible to find the actual processes which are being used. As a result the information is generally incomplete, can also be misleading, and is not cost effective to obtain.

2.4 USE

The use of a chemical is a major determinant of human exposure and environmental load. The pattern of use indicates the groups of people in which possible toxic effects are likely to occur, e.g. workers in chemical industries or specific groups of consumers. This information is important from an epidemiological point of view for assessing hazards from chronic effects and for anticipating in what exposure group toxic effects may occur in the future.

Use also indicates the likelihood and type of environmental entry and the geographic area where entry is most likely to occur. A pesticide, for example, where the total quantity produced is deliberately applied to certain sections and geographic areas, constitutes an entirely different environmental hazard than a cement additive which will be locked into place for a long period of time.

The amounts used are also reported as they may aid in the quantitative assessment of both environmental entry and potential exposure of organisms.

A data line includes the following entries:

- use
- geographic area
- quantity

An example of a typical entry is given below:

plasticizers: FRA 220t(73); ITA 290t(73); NZL 9t(73); USA 20t(73)
£IAR18 18,54(78)

FRA	= France
ITA	= Italy
NZL	= New Zealand
USA	= United States of America
t	= tonnes
£IAR18	= International Agency for Research on Cancer, Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Volume 18
18,54(78)	= Volume 18, page 54, 1978

Use

Had an extensive and comprehensive list of chemical uses been available and had it been possible to divide it into 20-30 major use categories, it would have been adopted for use in the IRPTC Register. A search was made for such a list resulting in the information that no such list has ever been developed.

As a result, it is recommended that uses be grouped, whenever it is possible to do so, on the basis of the available data, but that they be entered as reported without abbreviation.

Geographic Area

The geographic area to which the use refers is entered, when reported, in abbreviated form and the data are listed alphabetically by world, region and country and arranged as such. Abbreviations for geographic area are listed on page 373-379 of this report.

Quantity

Data are entered in thousands of metric tonnes (tt), metric tonnes (t) or in kilograms (kg) depending on which unit is most convenient. All other units are converted using conversions found on page 383 of this report. For the purpose of this file all tons, tonnes, etc. are entered as metric tonnes.

Data may also be entered as percent (%) of the total amount produced for a particular year by a particular country.

Year

The last two numbers for the year, e.g. 79, are entered in parenthesis directly after the geographic area. Data are not ordered by year.

Reference

References are cited as described on page 29 of this report and are listed together in alphabetic order following all use data.

Data Selection

Data are selected from the secondary literature and the most current documents are given priority. General use categories are also given priority over specific uses.

2.5 PATHWAYS INTO THE ENVIRONMENT

The pathways of entry into the environment vary widely for different chemical compounds and range from natural products to totally synthetic compounds released into the environment only on an accidental, non-deliberate basis. The mode of release ranges from incidental to continuous and from specific point sources, e.g. stacks, waste water effluents, to diffuse release over large surface areas, e.g. highways, cities.

In principle, all chemicals ever produced, synthesized or formed by other mechanisms can enter the environment. The pathway of release, for synthetic compounds for instance, depends on the production process, the method of shipping and storage, the use of the compound and the ultimate disposal method.

Knowledge of the pathway by which the compound enters the environment for the first time and of the quantities so released gives an indication of where, e.g. in which environmental (sub) compartments and geographic areas, a chemical will initially be found.

The data line includes the following entries:

- pathway and receiving medium
- geographic area
- quantity
- time unit
- reference

Below is an example of a typical data line:

wst,ind CAN 4.1tt(72) £NRCAS -,19(78)

wst,ind = industrial waste
CAN = Canada
tt = thousand tonnes
(72) = 1972
£NRCAS = National Research Council of Canada, Effects of Arsenic on the Canadian Environment, 1978
-,19(78) = No volume, page 19, 1978

Pathway and Receiving Medium

Pathways and receiving media are entered using as many of the following abbreviations as necessary:

air = air, atmosphere
aq = aquatic, water
appli = deliberate application, e.g. spraying pesticides
dom = domestic, i.e. household and other private consumer wastes
erg = through energy production, also including heating and transportation such as automobile exhaust
frs = fresh (water)
geoph = geophysical modifications, i.e. natural occurrence mobilised by man, e.g. mining
ind = industrial
load = total environmental load
mar = marine
natur = natural production or occurrence
sed = sediment
soil = soil, e.g. landfills, deep injection well
spill = spills, accidents and uncontrolled dumping
tot = total (waste)
trans = environmental transformation of non-natural products
wst = waste

Geographic Area

The geographic area to which the data refer is entered using the abbreviations found on page 373-379 of this report.

Option:
The World Metereological Organisation Worldwide Grid Location Chart could be used for identifying areas more specifically.

Quantity

The quantity is given in the following metric units:

t = metric tonnes
tt = thousands of tonnes

Other units such as volume and non-metric units are converted as shown on page 383 of this report.

Time Unit

Cumulative figures will be indicated by a "to" in front of the year up to which the load is estimated. Other time units are abbreviated as follows:

D = day
H = hour
M = minute
Mo = month
Wk = week
Y = year

Trends are presented in the same data line by entering the figures for the earliest and the latest year.

Reference

References are cited as described on page 29 of this report.

Data Selection

Pathways are included when the amount per area is given.

Figures for total waste water, waste gases or solid waste are included in preference to figures for domestic and industrial waste or waste through energy production.

Figures for different areas are included for each pathway in the following priority order, giving preference to the larger areas:

- World figures are always included. If different figures are found, the most recent data are taken.
- Large geographic areas such as oceans, continents and groups of countries are all included. If different figures are found for one area, the most recent data are taken.
- Countries are only included if no data can be found for larger geographic areas. If so the three countries with the most recent data and the highest amount entering the environment are included.
- Small specific areas are only included if no data are found for countries. Not more than three areas are included in the following priority order: state or other subdivision, coast line, lake, river, city, industrial plant. The most recent data and the highest amount entering the environment are given priority.

Only figures giving total amount entering the environment are included, i.e. concentrations or amount per product quantity are not included.

If a trend in amount entering the environment is stated, figures for both the earliest and the latest year reported are included.

2.6 CONCENTRATIONS

This section contains information on the concentration (level) of a chemical in different environmental media, e.g. water, soil, air, sediment and organisms in different geographic areas. While information on production and use on the one hand and environmental fate tests on the other may provide information on possible exposure concentrations in different environmental sections, it is only the actual data on existing concentrations which allow the quantitative assessment of the potentially toxic effects of a chemical substance.

Actual concentrations in the environment generally form the basis for legislation and the information necessary for its enforcement.

Concentrations of chemicals in the workplace, in human tissues, milk and various foods, do not relate directly to the environment but do provide essential information on human exposure and toxicology.

A data line includes the following entries:

- medium
- geographic area
- concentration
- analytical method
- date of sampling
- reference

Below is an example of a typical entry:

food,fsh USA 0.23mg/kg wwt(av) £NRCCR(76)JAFCAU 21,69(73)

food	= food products
fsh	= fish
USA	= USA
wwt	= wet weight measurement
(av)	= concentration reported as average
£NRCCR	= National Research Council of Canada, Effects of Chromium in the Canadian Environment
JAFCAU	= Journal of Agricultural and Food Chemistry
21,69(73)	= Volume 21, page 69, 1973

There was no analytical method given in the above reference. If it were available it would follow the specification for wet weight measurment (wwt).

Medium and Specifications

The medium or material sampled is entered using a combination of the abbreviations and specifications found below:

air = air, atmosphere
ani = animal
aq = aquatic, water
biota = biota
bld = blood
brd = bird
crs = crustacea
drk = drinking
fat = fat (adipose) tissue
food = food products including beverages and not including organisms listed separately
frs = fresh (water)
fsh = fish
grnd = ground
hmn = human
inv = invertebrates other than those listed separately
lith = lithosphere
mam = mammals
mar = marine
mcr = microorganisms including bacteria, fungi, algae and plankton
mol = molluscs
part = particulate
plt = plant or plant cells
sed = sediment
sew = sewage water and sludge
soil = soil
srf = surface
strat = stratosphere
tiss = tissues
trr = terrestrial
urn = urine
ver = vertebrates other than those listed separately
wst = waste

Geographic Area

The geographic area from which the sample was taken is entered using the abbreviations for countries and for specifications found on pages 373-379 of this report.

Option:
For small specific areas, the WMO Worldwide Grid Location Number could be included along with the abbreviation for geographic area. This was considered but not put into effect as the data selection instructions give priority to world and country data whenever it is available and existing abbreviations are sufficient to identify these areas.

Concentrations

Data are presented as follows for the various materials sampled:

Air:

Data are entered in milligrams per cubic metre (mg/m^3); however, g/m^3, $\mu g/m^3$ and ng/m^3 are used when convenient. Concentrations expressed in pph, ppm, ppb or ppt (volume/volume) are converted as shown on page 382 of this report.

Water:

Data are entered in milligrams per litre (mg/l); however, g/l, µg/l and ng/l are used when convenient. Concentrations expressed in pph, ppm, ppb or ppt (weight/weight) are converted as shown on page 383 of this report.

Soil and Sediment:

Data are entered in milligrams per litre (mg/l) or per kilogram (mg/kg); When convenient, g, µg and ng are used instead of mg. All other units are converted as shown on page 383. For conversions from pph, ppm, ppb and ppt to mg/kg also see page 383 of this report.

Organisms:

Data are entered in milligrams per kilogram (mg/kg); however, g/kg, µg/kg and ng/kg are used when convenient. Concentrations expressed in pph, ppm, ppb and ppt (weight/weight) are converted as shown on page 383 of this report.

When concentrations are below the detection limit the abbreviation ND (not detectable) is used. If the information is reported, ND is followed by the detection limit, e.g. ND($<$ 1mg/l). Other specifications for concentrations are:

dwt = dry weight
lwt = lipid weight
wwt = wet weight

Analytical Method

The abbreviation for the analytical method used follows the concentration. Analytical methods are abbreviated as follows:

AA	= activation analysis
AAS	= atomic absorption spectroscopy
ASV	= anodic stripping voltametry
COLM	= colorimetry
EC-GC	= gas chromatography with electron capture detection
EP	= electrophoresis
FS	= fluorescence spectrophotometry
GC	= gas chromatography
GC-MS	= gas chromatography coupled with mass spectrometry
HPLC	= high pressure liquid chromatography
IR	= infra red spectrophotometry
MS	= mass spectrometry
NMR	= nuclear magnetic resonance spectroscopy
POLG	= polarography
pX	= ion specific electrode
RAD	= radiochemical method
TIT	= titration
TLC	= thin layer chromatography
UV	= ultra violet spectrophotometry
VIS	= visible spectrophotometry
XE	= X-ray emission spectroscopy
XF	= X-ray fluorescence spectroscopy
XRD	= X-ray diffraction

Option:
Select only those methods which are most commonly used to measure concentrations and eliminate the others.

Date of Sampling

The last two numbers, e.g. 79, for the year in which the sampling took place are entered in parenthesis directly after the analytical method. Average values are abbreviated "av" and entered in parenthesis following the analytical method and preceeding the year.

Reference

References are cited as described on page 29 of this report.

Data Selection

Priority is given to summary concentrations found in United Nations, international and national governmental documents containing information which has been reviewed by expert groups. Data for large geographic

areas, e.g. global, country, are selected for entry whenever they are available. These data should represent as many different large geographic areas as possible.

Concentrations are entered for air, water, food, soil, sediment and biota. Specifications for these media are included in order to better describe them but no attempt is made to collect data for all media with all possible specifications, e.g. data for concentrations of a substance in a small freshwater lake in France would not be included unless there were no data (estimations) for larger geographic areas such as France, Europe or the World.

2.7 ENVIRONMENTAL FATE TESTS

The hazard potential of a substance to a given living organism depends on both the intrinsic toxicity of that substance and on its concentration and length of exposure to the organism. Although the behaviour of new substances can, to a certain extent, be estimated from the environmental fate of similar known compounds and/or from physical and chemical parameters, experimental results from laboratory tests especially designed to predict the concentration of a substance in the various environmental (sub) compartments are often a necessary prerequisite for the prediction of potential exposure to organisms.

A chemical may enter the environment and be transformed into different substances, e.g. metabolites or phototransformation products, which have different environmental behaviour patterns and toxicological properties from the original substance. An example of such a conversion process with toxicological significance is microbial methylation of inorganic mercury.

A chemical or its transformation products, depending on the distribution and fate in air, water, soil or sediment, may become available for different organisms in various environmental (sub) compartments in different concentrations, depending on its environmental behaviour. For example, both evaporation and adsorption greatly affect the dispersal potential of a substance.

Two fundamental premises on which the environmental fate tests in the laboratory are based are that (1) the important distribution and disappearance processes can be studied independently in the laboratory and (2) the laboratory data can be extrapolated to the environmental conditions. Although in nature various transport and transformation processes take place concurrently, separating individual contributing processes into distinct tests allows parameters to be controlled and different chemicals to be compared.

The following individual types of predictive fate tests are included:

- biodegradation
- photodegradation
- hydrolysis
- adsorption
- evaporation
- loss (of the compound by a combination of processes)
- model ecosystem studies

Option:

> Oxidation could be included at a future date if a standard test method is developed, but at the present time no standard laboratory method is known to exist.

Desorption might also be included at a future date but at the present time it appears that it will not be a required test for toxic substance regulation and that data will not therefore become available on a routine basis. In order that the data be meaningful, a very extensive data line, e.g. the exact description of the adsorbent and the eluent as well as the adsorbed species, would be necessary.

2.7.1 BIODEGRADATION

Biodegradation of organic compounds is the main mechanism for removing chemicals, including synthetic products, from the environment. These reactions take place in wastewater treatment plants, surface water, soil and sediments. Microorganisms are the most important organisms to effect such degradation. Compounds which are not susceptible to biodegradation are often also stable to other degrading forces. These persistent or recalcitrant compounds can remain in the environment unchanged and are thus a special threat to man and other organisms. The two most important parameters in biodegradation testing are the speed or rate of degradation (biodegradation half-life) and the products formed; the latter are of particular significance if they are either stable, toxic or both. Techniques used in evaluating biodegradability vary widely and no single procedure can be used to test potential biodegradation of all substances in all environments. Pure cultures, mixed populations and adapted organisms obtained by enrichment cultures from various natural substrates are all commonly used for these tests.

A data line includes the following entries:

- source of microorganism
- test conditions
- analytical technique and quantity
- products and quantity produced
- reference

Below is an example of a typical data line:

aq,mar CO2 11%/3W -,-/- JAFCAU 15,148(67)

aq	= aquatic, water
mar	= marine
CO2	= carbon dioxide evolution
11%	= 11 percent of the theoretical CO2 production potential
3W	= 3 weeks
-,-/-	= no data for products, percent/time
JAFCAU	= Journal of Agricultural and Food Chemistry
15,148(67)	= Volume 15, page 148, 1967

Source of Microorganisms

The terms used to describe the source of microorganisms are listed below with abbreviations:

aq = aquatic, water
est = estuarine
frs = fresh (water)
lak = lake
mar = marine
rvr = river
sed = sediment
sew = sewage water and sludge
soil = soil

Test Conditions

The test conditions to be included are listed below with abbreviations:

a = anaerobic conditions
acc = acclimated or activated microorganisms, i.e. microorganisms that have been adapted to the compound
^{o}C = degrees Celsius (centigrade)
o = aerobic conditions
p = pure culture

Analytical Technique and Quantity

As biodegradation rates are measured in different ways, the analytical technique used is included and abbreviated as follows:

BIM = determination of biomass (increase in total number of organisms)
BOD = biological oxygen demand (the actual O2 uptake as a percentage of the theoretical O2 uptake)
CO2 = carbon dioxide evolution (the actual CO2 production as a percentage of the theoretical CO2 production)
COD = chemical oxygen demand (amount of oxygen required to oxidise the sample)
DIS = specific chemical analysis of the disappearance of the substrate (percent disappearance of original amount), e.g. die away test
DOC = dissolved organic carbon (percent loss of dissolved organic carbon - achieved by measuring the remaining dissolved organic carbon)
MET = specific chemical analysis of the total metabolites produced (percent produced of original amount of the substrate)

The quantity is generally given in % per time unit and % is expressed in many ways depending on the analytical method involved, e.g. % disappearance, % uptake, % produced, % required, % lost or % increase. The time unit is always included and abbreviated as follows:

D = day
H = hour
M = minute
Mo = month
Wk = week
Y = year

Products and Quantity Produced

The product(s) which are designated in the literature as "significant" or "important" are entered as reported. The quantity is expressed in percent per time unit, the units being the same as those used in the previous section. If the metabolites are not identified, i.e. no specific chemical name is given, they are excluded.

Reference

References are cited as described on page 29 of this report.

Data Selection

Priority is given to mixed cultures, including pure cultures only if no other data are available, and for metabolite identification.

The following three analytical techniques per source of microorganism are included: DIS, BOD and CO2. If more than one study uses the same analytical technique, the data should be selected for each technique as follows:

DIS - select data showing a loss closest to 50% in the shortest time
BOD - select data showing the highest BOD in the shortest time
CO2 - select data showing the highest CO2 evolution in the shortest time

If no data are available for the above methods, MET, COD, DOC or BIM data can be entered for each source of microorganism. If more than one study uses the same analytical technique, the data should be selected for each technique as follows:

MET - select data showing the highest percentage of total metabolites produced from the substrate
COD - select data showing the highest COD in the shortest time
DOC - select data showing the highest loss of dissolved organic carbon in the shortest time
BIM - select data showing the highest increase in bacterial biomass in the shortest time

With the exception of data from DIS which gives a rough guide to the shortest time for the disappearance of the substance, data for the other tests will give an indication of the greatest amount of degradation that might be expected.

In the event that more than one study using the same test method and similar test conditons gives similar results, data from the most recent study are taken.

If altered test conditions, e.g. temperature changes, give significantly different results, these results are also included.

2.7.2 PHOTODEGRADATION

The atmosphere is a large photochemical reactor and photochemically induced reactions of organic chemicals can occur in the gas phase, in the top water layers for dissolved species and on various interphases, e.g. adsorbed species on suspended particulate matter in air, water and soil. Photochemical fate testing attempts to simulate the behaviour of chemicals in such environmental systems under conditions of irradiation by sunlight. For this purpose the wavelength distribution at ground level ($\lambda \geq 290$nm) is commonly used although for special studies on the behaviour of chemicals in the stratosphere, high energy radiation ($\lambda \geq 215$nm) is employed. As with biodegradation, and for the same reasons, the rate of photoreaction is important as is a knowledge of the products formed.

Photoreactions can occur by direct absortion of light, by sensitization via energy transfer or by indirect processes. The former is the most simple case and the one which can be simulated most easily in the laboratory. Rate in this case depends solely on the rate of absorption of light and the quantum yield for each chemical substance.

The most common photochemical reaction of organic pollutants in the environment is photooxidation but hydrolysis, dehalogenation and some minor reactions are important for certain groups of substances.

The data line includes the following entries:

- medium
- test conditions
- quantity disappeared
- products and quantity produced
- reference

Below is an example of a typical data line:

aq,pH6,sun 50%/990H -,-/- BECTA6 13,707(75)

aq = aquatic, water
pH6 = pH of 6
sun = sunlight
50% = 50 percent disappearance, i.e. degradation of original susbstance
990H = 990 hours
-,-/- = no data for products, percent/time unit
BECTA6 = Bulletin of Environmental Contamination Toxicology
13,707(75) = Volume 13, page 707, 1975

Medium or Physical State

The terms used to describe the medium or physical state involved are listed and abbreviated below:

ads = adsorbed on solid surfaces
air = air (gaseous phase)
aq = aquatic, water
ors = organic solvents

Test Conditions

The test conditions to be included are listed below with abbreviations:

sun = sunlight, simulated or natural, and radiation intensity (unit to be included as reported)
strat = simulated stratospheric radiation and radiation intensity (unit to be included as reported)
pH = hydrogen ion concentration

Quantity Disappeared

This is expressed in % per time unit or included as reported. The following units are included:

D = day
H = hour
M = minute
Mo = month
Wk = week
Y = year

Products and Quantity Produced

Those product(s) reported as "significant" or "important" are entered as reported. The quantity is expressed in percent per time unit;

the time units are the same as those used in the previous section. If the products are not identified, i.e. if no specific chemical name is given, they are excluded.

Reference

References are cited as described on page 29 of this report.

Data Selection

Only data for natural or simulated sunlight, i.e. wavelengths above 290nm, are included. When it is stated that pyrex glass or a pyrex filter has been used, these data are also included. Data for natural or simulated stratospheric conditions, i.e. wavelengths above 215nm are also entered.

Data showing degradation closest to 50% in the shortest time period per medium are selected for inclusion. For air data, both sunlight and stratospheric conditions are included, as stated above. In the event that several studies using the same test medium and test conditions give similar results, data from the most recent study are taken.

Options:
Indicate if sensitizers are involved.
Indicate if active oxygen species are involved.

2.7.3 HYDROLYSIS

Hydrolysis of an organic compound is a reaction which usually results in the introduction of a hydroxyl function (derived from water), most commonly with concomitant loss of another group. Most hydrolyses are acid or base catalysed and as pH values in natural waters and in soils vary greatly, the hydrogen ion concentration is an important parameter in laboratory tests for hydrolysis. In these tests, the potential susceptibility of a chemical to hydrolysis is important as is the potential spectrum of products that may be transformed during hydrolysis. Since these reactions are usually considered to be relatively straight forward, there is a better chance for product identification here than in most other tests.

The data line includes the following entries:

- medium and test conditions
- quantity hydrolysed
- products and quantity produced
- reference

Below is an example of a typical data line:

aq,pH5-7 0%/12D -,-/- £NASDW(77)SSSAA8 33,259(69)

aq = aquatic, water
pH5-7 = pH range of 5-7
% = percent hydrolysed
D = days
-,-/- = no data for products, percent/time unit
£NASDW = National Academy of Sciences, Drinking Water and Health, 1977
SSSAA8 = Soil Science Society of America Proceedings
33,259(69) = Volume 33, page 259, 1969

Medium

The terms used to describe the media are listed below with abbreviations:

aq = aquatic, water
soil = soil
sed = sediment

Test Conditions

The terms used to describe the test conditons are listed below with abbreviations:

pH = hydrogen ion concentration
^{o}C = degrees Celsius (centigrade)

Quantity

The quantity hydrolysed is expressed in percent per time unit or included as reported. The time units, are always included and are abbreviated as follows:

D = day
H = hour
M = minute
Mo = month
Wk = week
Y = year

Products

Those product(s) reported as "significant" or "important" are entered as reported. The quantity produced is expressed in percent per time unit, the units being the same as those used in the previous section. If the products are not identified, i.e. no specific chemical name is given, they are excluded.

Reference

References are cited as described on page 29 of this report.

Data Selection

The data with an amount hydrolysed closest to 50%, in the shortest time, for each test medium are included. In the event that several studies using the same test medium and similar test conditions give similar results, data from the most recent study are taken.

If altered test conditions give significantly different results these are included, taking the study with the widest range of any of the above test conditons. Data are only selected from those studies published within the last ten years.

2.7.4 ADSORPTION

Adsorption (sorption) of chemicals from water to biotic and abiotic solids (microorganisms, particulate matter, soil or sediment) is probably the most important process to affect transport, degradation and bioavailability.

Adsorption, which reduces the concentration of a chemical in water, occurs by a number of mechanisms depending on the nature of the chemical and the adsorbent. For ions and water insoluble organic chemicals, ion exchange and hydrophobic bonding, respectively, are most important. In most natural systems bacteria are present in very low proportions relative to organic matter and other adsorbing species, however, data on biosorption are important because adsorption to microorganisms is often the first step of biomagnification. Laboratory tests for adsorptivity include measurement of adsorption equilibria most commonly described by the empirical Freundlich equation and by leaching (sorption/desorption) tests which include soil thin layer and soil column chromatography. Sorption/desoption behaviour of a chemical is important for assessing its potential for ground water contamination from pesticide application to soils or leaching from landfills.

The data line includes the following entries:

- medium or adsorbent
- test conditions
- test method and quantity
- reference

Below is an example of a typical data line:

Fe2O3.nH2O,18-23°C, pH7.7-8.2 -,47%/2D GCACAK 9,1(56)

Fe2O3.nH2O = the adsorbent
°C,pH = test conditions
% = percent substance adsorbed to adsorbent
D = days
GCACAK = Geochimica et Cosmochimca Acta
9,1(56) = Volume 9, page 1, 1956

Adsorbent

With the exception of microorganisms, the adsorbent is entered as reported.

mcr = microorganisms

In the case of soil and sediment the percent organic matter content is also specified.

% org = percent organic matter content

Test Conditions

The terms and abbreviations used to describe the test conditions to be entered are as follows:

% sal = percent salinity of the solution
pH = hydrogen ion concentration
°C = temperature

Test Method and Quantity

Test methods are abbreviated as follows:

BAT = batch or slurry method
CLM = column method
DIA = dialysis method
TLC = thin layer chromatographic method

Quantities are expressed in any of the following units:

K = Freundlich adsorption coefficient
Kd = distribution adsorption coefficient
mg/g = mg (or other weight unit) test compound adsorbed per gram adsorbent
mg/ml = mg (or other weight unit) test compound adsorbed per millilitre adsorbent
Rf = distance travelled by the test compound/distance travelled by solvent

Reference

References are cited as described on page 29 of this report.

Data Selection

If altered conditons give significantly different results these are included taking the study with the widest range of any of the above test conditons.

For each adsorbent, data from the latest study available, given in either K or Kd values, are included. The latest Rf value for each adsorbent is also entered. Data expressed in other units are included in the absence of K and Kd values.

2.7.5 EVAPORATION

The environmental distribution and transport of a chemical is strongly dependent on its volatilization behaviour. The rate at which organic compounds evaporate from soil and water bodies depends on several environmental factors such as temperature, wind speed and particle size. Vapour pressure is one of the most important properties controlling evaporation of the chemical compound.

Air-water transport is well studied for gases and volatile organic chemicals, however, even compounds with very low vapour pressures show significant evaporation rates if their solubility in water is also low (fugacity). Volatilisation rates can be calculated from the Henry's law constant, the partial pressure of the chemical and the mass transfer coefficient. An experimental procedure measures disappearance of the compound from solution carefully coupled with the reaeration rate of the degassed solution.

The data line includes the following entries:

- medium
- test conditions
- quantity evaporated
- reference

Below is an example of a hypothetical data line:

aq,20°C 10%/2D Reference

aq = aquatic, water
°C = degrees Celsius (centigrade)
% = percent evaporated
D = days

Medium

The terms used to describe the test medium are listed below with abbreviations:

soil = soil
aq = aquatic, water

Test Conditions

The test conditons to be included are listed below with abbreviations:

^{o}C = degrees Celsius (centigrade)

Options: include other conditions, e.g. % salinity, wind speed, atmospheric pressure.

Quantity Evaporated

The quantity evaporated is expressed as percent evaporation of the initial concentration per time unit or included as reported. The unit is always included; terms and abbreviations are listed below:

D = day
H = hour
M = minute
Mo = month
Wk = week
Y = year

Reference

References are cited as described on page 29 of this report.

Data Selection

The data with an amount closest to 50% evaporation in the shortest time period per medium are included. In the event that the same test medium and similar test conditions give similar results, data from the most recent study are taken.

If altered test conditions give significantly different results these are entered, taking the study with the widest range of any of the above test conditions.

2.7.6 LOSS

Laboratory studies where loss of a chemical cannot be attributed to a single process are included in this section. In many test situations several processes may operate concurrently but the rate of disappearance of the compound may still give useful information for hazard assessment. When a chemical compound is incubated in soil, for instance, the following processes may contribute to disappearance: evaporation, irreversible adsorption, chemical reaction and biodegradation. Often overall loss is all that can be measured with a natural system, e.g. the process of autoclaving soil (to exclude microbial action) may result in changes of soil structure and therefore in catalytic activity and adsorptive properties.

The data line includes the following entries:

- medium
- test conditions
- quantity lost
- products and quantity produced
- reference

Below is an example of a data line:

aq,28°C 9.3%/8D -,-/- JAFCAU 15,148(67)

aq	= aquatic, water
°C	= degrees Celsius (centigrade)
%	= percent disappearance
D	= days
-,-/-	= no data for products, percent/time unit
JAFCAU	= Journal of Agricultural and Food Chemistry
15,148(67)	= Volume 15, page 148, 1967

Medium

The terms used to describe the medium are listed below with abbreviations:

air	= air, gaseous phase
aq	= aquatic, water
est	= estuarine
frs	= fresh
mar	= marine
sed	= sediment
sew	= sewage water and sludge
soil	= soil

Test Conditions

The terms used to describe the test conditions are listed below with abbreviations:

pH = hydrogen ion concentration
^{o}C = degrees Celsius (centigrade)
% sal = percent salinity
% org = percent organic matter content

Option:

LOSS could be grouped with Model Ecosystem Studies as neither type of test is specific, i.e. more than one process is generally involved.

Quantity Lost

The quantity of a substance which has been lost, i.e. has disappeared, is expressed in percent disappearance per time unit or included as reported. Units are always included and the following abbreviations are used:

D = day
H = hour
M = minute
Mo = month
Wk = week
Y = year

Products and Quantity Produced

The "significant" and "important" products, i.e. those designated in the literature as such, are entered in the Register as reported. The quantity is expressed in percent per time unit, the units being the same as those used in the previous section. If the metabolites are not identified, i.e. no specific chemical name is given, they are excluded.

Reference

References are cited as described on page 29 of this report.

Data Selection

When loss is not attributed to a single process, the data resulting from such a study are included under this section.

The data with an amount of total loss closest to 50%, in the shortest time period, for each different medium are included. In the event that more than one study using the same medium and similar test conditions gives similar results, data from the most recent study are taken.

If altered test conditions give significantly different results these are also included, taking the study with the widest range of test conditions.

2.7.7 MODEL ECOSYSTEM STUDIES

Although no two ecosystems in the natural environment are exactly alike, attempts have been made to set up specific, limited ecosystems in the laboratory (model ecosystems, micro ecosystems, microcosms) to study the variety of phenomena which occur in natural ecosystems. The study of the fate of chemicals in such model ecosystems is appealing because these systems, in their basic functions, behave as a subsection of the actual environment. The fate parameters which can most easily be obtained from such model studies, e.g. the commonly used Metcalf System, are the biodegradability index and the ecological magnification values. The two main types of laboratory ecosystems are aquatic micro ecosystems designed to simulate ponds or lakes and terrestrial systems where, for instance, the fate of a pesticide on cropland may be studied. Since certain greenhouse tests, e.g. uptake of chemicals by plants, resemble ecosystem tests, these are also included in this section.

As a meaningful, abbreviated presentation of the results from these experiments would be difficult to achieve, the only data entered in this section are the type of model ecosystem involved and the reference.

The data line includes the following entries:

- type of model ecosystem
- reference

Below is an example of a typical data line:

trr JAFCAU 20,732(72)

trr = terrestrial model system including studies on plant uptake and metabolism
JAFCAU = Journal of Agricultural and Food Chemistry
20,732(72) = Volume 20, page 732, 1972

Type of Model Ecosystem

The terms used to describe the type of model ecosystem are listed and abbreviated below:

aq = aquatic model system
trr = terrestrial model system including studies on plant uptake and metabolism
aq-trr = mixed aquatic and terrestrial model system

Option: Include the number of species involved in the study.

Reference

References are cited as described on page 29 of this report.

Data Selection

The two latest studies found for each type of ecosystem are included.

2.8 ENVIRONMENTAL FATE

The "ultimate" fate of a chemical is determined by numerous physical and biological processes occuring in the environment.

This section contains information on the transport and transformation of a chemical compound in the environment rather than in the laboratory. It provides data on movement of chemicals within and between environmental compartments, e.g. transport in air, water-air exchange and troposphere-stratosphere exchange.

Data are included on "overall" fate including half-lives in environmental subcompartments, e.g. a lake, and "mass balance" values including specific geographic areas. Such information is only available for comparatively few compounds but it is useful on a broader scale to aid in the prediction of the fate of structurally related compounds. In addition to observation in the environment, experimental results from field studies are also included in this file.

While information from laboratory studies may provide a basis for predicting environmental fate, experimental results from field studies and observations report what has actually occurred in the environment and are therefore an essential part of a chemical's data profile.

The data line includes the following entries:

- interphase or subcompartment
- geographic area
- quantity/time
- reference

Below is an example of a typical entry:

air to grnd SWE,S 2t/Y £WHOPC 2,29(76)

air	= air, atmosphere
grnd	= ground
SWE, S	= Sweden, south
t	= tonnes
Y	= years
£WHOPC	= World Health Organization, Polychlorinated Biphenyls and Terphenyls, Environmental Health Criteria 2, 1976
2,29(76)	= Volume 2, page 29, 1976

Interphase or Subcompartment

Data show between which subcompartments the compound moves. They may also show its fate within one environmental subcompartment.

The environmental subcompartments and their abbreviations are as follows:

air = air, atmosphere, gaseous phase
aq = aquatic, water
biota = biota
food = food
grnd = ground
hmn = human
sed = sediment
soil = soil
strat = stratosphere
trop = troposphere

Specifications:

depth = depth
est = estuarine
frs = fresh
grnd = ground
lak = lake
loss = loss of the compound from one subcompartment
mar = marine
recv = amount received from all other subcompartments
rvr = river
srf = surface

When a substance moves between two subcompartments this is indicated by a "to" between the two proper abbreviations for the subcompartments, e.g. evaporation from soil to air will be written "soil to air".

Geographic Area

The geographic area includes world, continent, country, ocean and sea. The categories and abbreviations on page 373-379 of this report are applied here.

Field studies are indicated by the abbreviation "field", and spill data by the abbreviation "spill".

Quantity/Time

Included here is the quantity of the substance involved, entered in metric units or in percentage per time unit. When changes in concentrations are reported, all data other than quantity are included, e.g. concentrations in ground water after soil application are not included, but the pathway soil to ground water (aq,grnd) is included if no better quantitative data can be found.

The following abbreviations for weight units are used:

kg = kilograms
t = tonnes
tt = thousands of tonnes

The following abbreviations for time units are used:

D = day
H = hour
M = minute
Mo = month
Wk = week
Y = year

For specific years, the last two numbers, e.g. 72 are entered in parenthesis.

Conversions from pounds to tonnes, from litres to kilograms and from barrels to kilograms are found on page 383 of this report.

Reference

References are cited as described on page 29 of this report.

Data Selection

As very little data on environmental fate is available at the moment, all available data is extracted for entry in the Register. In the case that it becomes necessary to select data, field studies and data on spills should be given priority. When total world figures or estimates have been included in the literature they should also be selected. One field study, one spill report and the most recent example of total world figures or estimates should be included for each interphase or (sub) compartment.

2.9 BIOCONCENTRATION/CLEARANCE TIME/MAMMALIAN METABOLITES

Theoretically, toxicity of a given chemical compound does not depend on the exposure of an organism to a certain concentration (dose) but on the availablility of the compound or its metabolic conversion product to a receptor (target site). Chemobiokinetic studies consider the uptake, distribution, metabolic conversion and excretion of chemicals in organisms, i.e. all processes which are responsible for the concentration of a chemical or its conversion product in tissues, cells or subcellular units.

Much valuable information with regard to understanding toxicity can be obtained from chemobiokinetic studies; in certain cases prediction of toxic effects may be possible by the application of structure activity relationships and compartment equilibrium theories, saturable detoxification processes may be identified and valuable information for the design of toxicity tests may be obtained. With minor exceptions, however, inclusion of chemobiokinetic data in the Register is not recommended for the following reasons:

- for many chemicals and for many toxic effects the exact target site (receptor) is not yet known
- prediction of toxicity from chemobiokinetic data is still extremely theoretical and in most cases only feasible for related compounds, e.g. homologous series
- toxicity data "include" chemobiokinetic effects. Although they may not be specifically measured they are integrated in the overall toxicological picture
- chemobiokinetic data are only meaningful, and therefore justified for entry in the Register, if they are complete, i.e. the experimental conditions, etc. must be presented in detail. Such a presentation would, however, unbalance the other sections of the Register which are considerd to be extremely useful in a condensed form.

Prediction of toxicity from theoretical considerations and interrelationships is not one of the main aims of the Register. If such were the case, much more emphasis would need to be given to biochemical parameters indicative of toxicity, e.g. enzyme induction or macromolecular binding.

The bioconcentration coefficient and the clearance or depuration time for fish are, however, included. Fish and other aquatic organisms, because of their intimate contact with their ambient environment (water) and thus with contaminating chemicals (test substances), are the most likely organisms to concentrate substances in their tissue. Fish are therefore also very sensitive indicator organisms for other animals.

An important reason for including fish bioconcentration data in the Register is the requirement of the various Toxic Substances Laws for the inclusion of these data in overall hazard assessment. Considerable data of this sort will therefore be created in the future for use in the evaluation procedure. Mammalian metabolites are also included if they have been reported as significant.

2.9.1 BIOCONCENTRATION FACTOR

The bioconcentration factor is the concentration of a substance in an organism divided by its concentration in water at equilibrium.

In the most general definition, bioconcentration denotes the presence of a chemical substance in higher concentrations in an organism than in the direct environment or in its food. Bioconcentration becomes important when potentially harmful substances are involved and when the ratio organism/environment becomes higher than about 100 to 1,000. Such a ratio may result in toxic concentrations in the organism and can also supply abnormally high concentrations of a chemical pollutant to a predator organism which provides food for man.

Although different mechanisms for bioconcentration are known, the most important, with respect to new compounds to be tested for bioconcentration potential, is the partitioning of lipophilic compounds into the fatty phase of organisms, particularly fish and other aquatic species. The route of accumulation for most chemicals in aquatic species is predominantly via exchange with water, and fish are therefore excellent indicator organisms for the bioconcentration potential of chemical compounds.

A number of test systems are being used although flow through systems offering a constant concentration of a chemical are preferred.

The data line includes the following entries:

- test conditions
- water concentration
- organism
- bioconcentration factor and time
- calculation basis
- reference

Below is an example of a typical data line:

fsh flow, 2µmg/l 38-3,200/-,- £NRCAS(78)ACSSS* 7,97(75)

fsh	= fish
flow	= flow through method
mg/l	= milligrams per litre (water concentration)
38-3,200	= bioconcentration factor
-,-	= no data for time, no information concerning whether a steady state was reached, and no data concerning the calculation basis, i.e. dry, wet, or lipid weight
£NRCAS(78)	= National Research Council of Canada, Effects of Arsenic in the Canadian Environment, 1978
ACSSS*	= American Chemical Society Symposium Series 7, Chapter 7, 1975
7,97(75)	= Volume 7, page 97, 1975

Organism

The fish is the only organism considered and it is abbreviated as follows:

fsh = fish

Option:

If test protocols become established designating only certain fish for these measurements, these fish could be listed, abbreviations could be developed for them, and only these data could then be selected for entry in the Register. This would enable a much more accurate means of comparison of the different bioconcentration factors for the different substances in the Register.

Test Conditions

Test conditions are entered using the abbreviations listed below:

flow= flow through method
stat = static method

Water Concentration

Water concentration is given in milligrams per litre (mg/l). Conversions for other units are found on page 383 of this report.

Bioconcentration Factor and Time

The bioconcentration factor is presented as a number without a unit, and the time is added using the following abbreviations:.

D = day
H = hour
M = minute
Mo = month
ss = test carried out until a steady state was reached
Wk = week
Y = year

Calculation Basis

The basis for the calculation of the bioconcentration factor is entered as follows:

dwt = dry weight
wwt = wet weight
lwt = lipid weight

Reference

References are cited as described on page 29 of this report.

Data Selection

Priority is given to bioconcentration factors established by flow through testing methods rather than static. Only bioconcentration factors for the whole body of the fish are entered.

Bioconcentration factors calculated or reported on the basis of lipid weight are taken in preference to factors calculated on the basis of dry weight and wet weight. Only bioconcentration factors reported in the literature are entered, i.e. no calculations from other data are made for entry into the Register.

If available, the bioconcentration factor at the time when steady state has been reached is selected. If this is not known a bioconcentration factor at day 28 is selected. In the event that these data are not available, the bioconcentration factor after the longest exposure time is selected.

If different concentrations of a chemical in water have been used, the concentration which gives the highest bioconcentration factor is taken.

2.9.2 CLEARANCE TIME

The clearance or depuration time for aquatic organisms is the time (often expressed as half-life) required by an organism to clear a substance after being placed in clean water. Figures for clearance time as well as for the bioconcentration factor, when taken together, enable the user to make a rough comparison of the potential concentration of different chemicals in biota.

A data line includes the following entries:

- test conditions
- organism
- quantity cleared
- reference

Below is an example of a typical data line:

fsh,flow 75%/5D MBIOAJ 17,201(72)

fsh	= fish
flow	= flow through test method
%	= percent cleared
D	= day (time period involved)
MBIOAJ	= Marine Biology
17,201(72)	= Volume 17, page 20, 1972

Organism

The fish is the only organism considered and it is abbreviated as follows:

fsh = fish

Option:
If test protocols become established designating only certain fish for these measurements, these fish could be listed, abbreviations could be given, and only data for the particular species designated could then be entered. This would enable a much more accurate means of comparison of the different clearance rates for the different substances in the Register.

Test Conditions

The test conditions entered are abbreviated below:

flow= flow through method
stat = static method

Quantity Cleared

The quantity of a substance cleared is expressed as the percent of the original substance cleared per time unit. The units are always included and are abbreviated as follows:

D = day
H = hour
M = minute
Mo = month
Wk = week
Y = year

Data Selection

Only data for the clearance time for the whole body of a fish are selected. Priority is given to data for clearance time established by flow through rather than static test methods.

The data with a clearance closest to 50% in the shortest time are given. In the event that more than one study using the same test method gives similar results, priority is given to the most recent study.

2.9.3 MAMMALIAN METABOLITES

The rationale for including mammalian metabolites in the Register is that a comparison between human and other mammals may be useful when attempting to extrapolate from animal data to human data, e.g. toxicity data. These mammalian metabolites might also serve as pointers (cross-references) to data on other similar substances which can be used in the absence of information on the prime substance itself. Microbial metabolites are also included and are found under BIODEGRADATION on page 47 of this report.

A data line includes the following entries:

- organism
- metabolites
- reference

An example of a typical entry is given below:

rat methylmercury cystein; inorganic mercury;
protein-bound mercury £WHOF1(72)AEHLAU 22,568(71)

rat = rat
£WHOF1(72) = World Health Organization, Food Additive Series 4, 1972
22,568(71) = Volume 22, page 568, 1971

Organism

The mammals included are listed and abbreviated on page 75 of this report.

Metabolites

Included here are metabolites found in studies with mammals.

Reference

References are cited as described on page 29 of this report.

Data Selection

Metabolites are only entered in the case that they have been included in the secondary literature, e.g. United Nations, international or national documents prepared by expert groups, or that they have been reported in the primary literature as either important (from a hazard point of view) or significant (on the basis of the quantity produced).

2.10 MAMMALIAN TOXICITY ARRAY

The purpose of the array is to display the toxic effects associated with a chemical substance in relationship to the quantity of the substance reported to have caused the effect. This list of dose-effect relationships (ordered from lowest to highest dose) when available for a large number of substances, should enable the user to make a rough comparison of the relative toxicity of chemicals and also to recognise the type of problems that specific chemicals may cause when coming in contact with man. Included here is human as well as laboratory and domestic mammal data.

A data line includes the following entries:

- exposure concentration/dose
- exposure period
- route
- organism
- effect
- reference

Below is an example of a typical entry:

10mg/kg 9tDP ipr-mus REP:fnc FET:str £NASAS(77)AEHLAU 24,62(72)

mg/kg	= milligrams per kilogram body weight per day
9tDP	= ninth day of pregnancy
ipr	= intraperitoneal route
mus	= mouse
REP:fnc	= functional change(s) of the reproductive system
FET:str	= structural change(s) in the fetus
£NASAS(77)	= National Academy of Sciences, Arsenic, 1977
AEHLAU	= Archives of Environmental Health
24,62(72)	= Volume 24, page 62, 1972

Exposure Concentration/Dose

There are two lists of exposure data, i.e. two arrays, one for the amount per unit body weight per day and one for the amount per unit air volume. The two groups of data are separated as they are not easily compared. Each list is ordered from lowest to highest amount. Human cases or studies which do not have doses are included at the end of each list. The exposure time is not considered when ordering the dose, i.e. the dose rate rather than the total dose is entered in the Register.

Exposure per unit body weight per day:

Milligrams (mg) per kilogram (kg) are preferred as weight units; g/kg, µg/kg, ng/kg are used, however, when it is convenient to do so. All other units including units of volume are converted for uniformity. Conversions are found on page 380 of this report.

For those references in which the dose is reported to have been administered to an animal of unspecified weight or to a given number of animals in a group, e.g. feeding studies, without weight data, the weights of the respective animal species are assumed to be those listed on page 381, and the dose is listed on a per kilogram body weight basis. Assumptions for daily food and water intake are also given on page 381. These allow approximating doses for humans and species of experimental animals where the dose is originally reported as a concentration in food or water. The values presented are selections which are considered to be reasonable for the species and convenient for dose calculations. Data reported in the literature as mg/kg are assumed to be mg/kg body weight and are entered into the array as such.

Exposure amount per unit air volume:

Milligrams per cubic metre (mg/m^3) are the preferred units; g/m^3, $\mu g/m^3$, ng/m^3 are used, however, when it is convenient to do so. Volume measurements of dose, e.g. pph, ppm, ppb or ppt are converted to weight units by calculations found on page 382 of this report.

Option: Include both the dose rate and the total dose or estimated total dose.

Exposure Period

The exposure time is presented directly after the exposure concentration, using the following abbreviations:

ACC	= accidental exposure (human)
D	= day
xDP	= x days during pregnancy
GN	= generation
H	= hour
I	= intermittent
LT	= lifetime
M	= minute
Mo	= month
OCC	= occupational exposure
xtDP	= xth day of pregnancy
x	= times
Wk	= week
Y	= year

For example, 10mg/kg 3W,I indicates that ten milligrams per kilogram body weight per day were administered over a period of three weeks, intermittently in a number of separate discrete doses. When no "I" appears, the dose was continuous over the time administered, e.g. 24 hour inhalation exposures or seven day week feeding studies. Single dose is designated by 1x; for LD50 studies the exposure is assumed to be single dose (1x) if no other information is given in the literature.

Route

Abbreviations and definitions for the various routes of exposure are as follows:

dpn = dermal penetration, penetration of the gaseous substance through the skin without application
ial = intraaural, administration into the ear
iat = intraarterial, administration into the artery
ice = intracerebral, administration into the cerebrum
icv = intracervical, administration into the cervix
idr = intradermal, administration within the dermis by hypodermic needle
idu = intraduodenal, administration into the duodenum
ihl = inhalation, inhalation in chamber, by cannulation, or through mask
imp = implant, placed surgically within the body
ims = intramuscular, administration into the muscle by hypodermic needle
ipc = intraplacental, administration into the placenta
ipl = intrapleural, administration into the pleural cavity by hypodermic needle
ipr = intraperitoneal, administration into the peritoneal cavity
irn = intrarenal, administration into the kidney
isp = intraspinal, administration into the spinal canal
itr = intratracheal, administration into the trachea
ivg = intravaginal, administration into the vagina
ivn = intravenous, administration directly into the vein by hypodermic needle
ocu = ocular, administration directly onto the surface of the eye or into the conjunctival sac
orl = oral, per os, intragastric, feeding or introduction with drinking water
par = parenteral, administration into the body through the skin. Reference cited is not specific concerning the route used. Could be ipr, scu, ivn, ipl, ims, irn, or ice
rec = rectal, administration into the rectum or colon in the form of enema or suppository
scu = subcutaneous, administration under the skin
skn = skin, application to the skin, dermal, cutaneous
tpl = transplacental, exposure of foetus through the placenta

Option:

Reduce the number of routes, e.g. combine dpn, par and skn.

Organisms

Abbreviations for the organisms included in the array are as follows:

cat = cat
chd = child (1-13 Y)
ctl = cattle, horse
dog = dog
gor = gorilla
gpg = guinea pig
grb = gerbil
ham = hamster
hmn = human
inf = infant (0-1Y)
man = man (human male)
mky = monkey
mnk = mink
mus = mouse
pig = pig, young swine
rat = rat
rbt = rabbit
shp = sheep, goat
swn = swine
wmn = woman

Effect

Notations which indicate the ORGAN OR SYSTEM affected are listed and abbreviated below:

ANS = autonomic nervous system, the part of the nervous system controlling the involuntary (vegetative) functions of the body, e.g. control of smooth muscles
CNS = central nervous system, including brain, spinal cord and coverings and general nervous system
CVS = cardiovascular system, including heart and blood vessels using HRT for specific effects on the heart
END = endocrine system, i.e. the organs which secrete hormones which influence metabolism and other body processes, blood or lymph. Pancreas (PNC), spleen (HEM) and thymus (IMM) are excluded
EYE = eye
FET = fetus, including embryo
GIT = gastrointestinal tract, including salivary glands, esophagus, stomach, duodenum and intestines
HEM = haematological system, including blood, bone marrow and spleen
HRT = heart
IMM = immunological system, including the lymphatic system, thymus and immune related factors in blood
LVR = liver and gall bladder
MLT = multiple organs/systems, i.e. two or more organs or systems reported to have the same effect, e.g. neoplastic effect
PLT = two or more organs or systems involved which are listed above in the toxicology array
PNC = pancreas, including both endocrine and exocrine functions
PNS = peripheral nervous system, the nervous system outside the CNS, excluding sense organs, autonomic nervous system and somatic nervous system, i.e. peripheral nervous tissues
PUL = pulmonary system, including lungs, thorax, pleura and respiration (breathing)
REP = reproductive system, including reproductive organs, secondary sex characteristics and fertility
SKL = skeletal system, including bones, teeth and joints
SKN = skin and mucous membranes, including skin, mucous membranes, hair and nails
SNS = sense organs, including nose, ear, eye and taste (EYE is used for specific effects on the eye alone)
SON = somatic nervous system, the part of the nervous system that controls voluntary responses to stimuli; also including skeletal muscles
UNS = unspecified organ or system
URS = urinary system, including kidneys, ureter, bladder and urine

Notations which indicate the EFFECT follow the notations for organ or system; their abbreviations are listed below:

act = activity change, i.e. changed rate
all = allergic effects
bcm = biochemical changes - enzyme stimulation or inhibition, changes in chemical composition or levels, changes in metabolism
bhv = behavioural effects
car = carcinogenic effects - only if clearly defined as such by the author, i.e. "production of malignant tumours"
cng = miscellaneous changes - not applicable to our categories
cor = corrosive effects
crc = changes in circulation other than pressure, including haemorrhage, thrombosis and hyperaemia
dth = death
emr = early mortality
end = endocrine, hormonal effects
exo = exocrine effects
fnc = functional changes
gen = genetic changes - if not clearly defined as mutagenic by the author
ifl = inflammation
imm = immunological effects
irr = irritant effects
LC50 = lethal concentration 50 percent - concentration calculated to kill 50% of a defined experimental population
LCLo = lowest lethal concentration found
LD50 = lethal dose 50 percent - dose calculated to kill 50% of a defined experimental population
LDLo = lowest lethal dose found
mlt = multiple effects - more than two effects per organ or system
msc = muscular effects
mut = mutagenic effects - only if clearly defined as such by the author
nef = no effects reported
NEL = no effect level
neo = neoplastic effects - production of tumours not clearly defined as carcinogenic by the author
neu = neural effects
prs = pressure changes
psy = psychotropic effects - effects of chemicals on mental function
rep = reproductive effects
ret = retardation - delayed development, growth retardation
siz = size change or weight change
sns = changes in sensation
str = structural changes
TCLo = lowest toxic concentration found
TDLo = lowest toxic dose found
ter = teratogenic effects - only if clearly defined as such by the author
trt = clinical treatment of poisoning cases, to indicate that more severe effects probably would have occurred without treatment
uns = effects not specified by the author

The abbreviations on the two preceeding pages are generally used together although effects may be listed separately when they cannot be related to a specific organ or system, e.g. death, weight loss.

The abbreviations for the organ or system are capitalised and appear directly before the abbreviations for the effects which are in lower case. A colon appears between the organ and the effect.

If the number of organs/systems exceeds five entries on a particular data line, no effects are given. In this case only the organs/systems are listed. When two or more organs, however, are reported to have the same effects, the effects are listed and the organs are grouped under the abbreviation MLT for multiple organs.

In order to conserve space, no more than one organ or system per data line can be a repetition of an organ or system which appeared above in the array, i.e. was listed at a lower dose along with the effects which were produced. Rather than repeating organs or systems, the abbreviation PLT (previously listed organ/system) is entered; no effects follow the designation PLT. PLT is only needed when there is a study which lists one or more new systems as well as two or more previously listed systems. If there is only one previously listed system it is given its regular abbreviation as the abbreviation PLT would not conserve space. The rationale for the above is as follows: it is desirable to list the new system with the effects reported but it is not useful to give the previously listed systems and the effects caused by a higher dose to those systems.

Only two effects per organ or system are indicated, if more than two effects are found, the designation mlt (multiple) is entered.

Reference

References are cited as described on page 29 of this report.

Data Selection

Data selection is done in such a way as to show which organs/systems are affected by a substance and at what doses these effects first occur in man (if data are available) or in experimental laboratory mammals.

There are two lists in the array, one reporting exposures in milligrams per kilogram body weight per day (mg/kg) and the other reporting exposure in milligrams per cubic metre (mg/m^3).

In the first list, oral routes are given priority over other routes. For each organ/system, the lowest oral dose reported to have caused an effect on that system in man is entered along with the lowest oral dose to have caused an effect on an experimental laboratory mammal.

For LD50's the lowest oral dose reported for a rat is given as well as the lowest oral dose for any other experimental laboratory mammal. In the absence of rat data, the two lowest doses reported for experimental mammals are given.

If the substance is normally used as a drug and administered to humans by intravenous, intramuscular or other parenteral routes, the lowest dose found to cause an effect by the appropriate route is entered along with the lowest dose from oral data.

The lowest dose reported to cause death resulting from dermal application is also included if it is reported in milligrams per kilogram body weight. The data are not included when they are reported in other units.

The no-effect level is included when reported as such in an evaluated, secondary document, e.g. the WHO/FAO Evaluations of Some Pesticide Residues in Food. The highest dose reported not to cause an effect in a particular study is only included when it has been presented as a no-effect level in an evaluated document.

In the second list (reporting exposures in milligrams per cubic metre) inhalation and dermal penetration, i.e. penetration through the skin by a substance in the gaseous state, are the only routes included.

For each organ/system, the lowest concentration reported to have caused an effect by inhalation on that system in humans is entered along with the lowest concentration by that route to have caused an effect on experimental laboratory mammals. The same procedure applies to dermal penetration.

For LC50's the lowest concentration reported for a rat is given along with the lowest concentration reported for other experimental laboratory mammals.

Human data is included in both arrays even if the information available is only sufficient to fill a part of a data line. If no dose is available, the data which is most complete for each organ/system affected is selected.

Data which have been considered in a United Nations, international or national secondary document and rejected because of inadequacy, are not entered in the Register. When an experiment has been done under abnormal conditions, e.g. high temperature or high altitude, the data are also excluded.

2.11 SPECIAL TOXICITY STUDIES

The following categories of special studies are included:

- carcinogenicity
- mutagenicity
- neurotoxicity/behaviour
- potentiation
- primary irritation
- reproduction
- sensitization
- teratogenicity

Both positive and negative toxicology data from studies designed to produce a particular effect, i.e. special studies, are included. Effects which are not included in the mammalian toxicity array due to the need there for uniform presentation of data, e.g. potentiation, are also included here.

The purpose of this section of the Register is to give the user an idea of the research which has been done on the toxicology of a particular substance and to report both positive and negative results. Under each special study category, evaluations made by expert groups and obtained from secondary documents as well as experimental results from both the primary and secondary literature are entered.

2.11.1 CARCINOGENICITY

Included here are evaluations and experimental results from studies designed to determine whether a substance produces malignant tumours.

When a positive or negative evaluation has been made by a group of experts, e.g. representing a United Nations, international or national organisation, it is included along with the experimental results.

A data line in the instance that an evaluation has been made includes the following entries:

- evaluation
- reference

Below is an example of a typical entry:

eval: There is experimental evidence of a carcinogenic effect of some polychlorinated biphenyls in rodents. The epidemiological data provide suggestive evidence of a relationship between exposure to polychlorinated biphenyls and the development of malignant melanoma. Efforts should be made to obtain both confirmatory experimental and epidemiological evidence; in particular, continuing follow-up of survivors of the Yusho episode is necessary. In the meantime, for pratical purposes, polychlorinated biphenyls should be regarded as if they were carcinogenic to humans.

Almost without exception, polychlorinated biphenyls contain various levels of polychlorinated dibenzofurans as contaminants, and the polychlorinated biphenyls responsible for the Yusho episode in Japan were found to contain an unusually high level of polychlorinated dibenzofurans. It is not known if and to what extent polychlorinated dibenzofurans play a role in the observed carcinogenic effects of polychlorinated biphenyls.

£IAR18 18,84(78)

eval = evaluation
£IAR18 = International Agency for Research on Cancer, Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans, Volume 18
18,84(78) = Volume 18, page 84, 1978

Evaluation

Evaluations are entered as reported. In the case that no evaluation was made but a summary of what occurred was given, e.g. sarcomas at implantation sites in rats, this information is entered as reported.

Option:
Develop an abbreviated way of presenting the evaluations, e.g. pos-ani (positive animal carcinogen). It is extremely difficult to interpret the evaluations as positive, negative or inconclusive for animals or for man and for that reason a code has not been suggested for use at this stage.

Reference

References are cited as described on page 29 of this report.

Experimental results are also entered; a data line includes the following entries:

- organism
- route
- exposure concentration/dose
- exposure period
- effect
- reference

Below is an example of a typical entry:

dog-orl 0.25-6.25mg/kg 2Y nef £NRCAS(78)JTEHD6 1(6),1003(76)

dog	= dog
orl	= oral
mg/kg	= milligrams per kilogram body weight per day
2Y	= two years
nef	= no carcinogenic effect reported
£NRCAS	= National Research Council of Canada, Effects of Arsenic on the Canadian Environment, 1978
JTEHD6	= Journal of Toxicology and Environmental Health
1(6),1003(76)	= Volume 1(6), page 1003, 1976

Organism

Abbreviations for organisms which may be used in any of the special studies are listed below:

brd	= bird, any laboratory bird reported but not otherwise identified
cat	= cat
chd	= child (1-13Y)
ckn	= chicken
ctl	= cattle, horse
dck	= duck
dog	= dog
gor	= gorilla
gpg	= guinea pig
grb	= gerbil
ham	= hamster
hmn	= human
inf	= infant (0-1Y)
man	= man (human male)
mky	= monkey
mnk	= mink
mus	= mouse
pgn	= pigeon
pig	= pig, young swine
qal	= quail
rat	= rat
rbt	= rabbit
shp	= sheep, goat
sql	= squirrel
swn	= swine
trk	= turkey
usp	= unspecified species
wmn	= woman

If it is reported that a susceptible strain was used in the study, this is indicated by the prefix s- preceeding the abbreviation for the organism, e.g. s-rat.

Route

Routes are given as abbreviated on page 74 of this report.

Exposure Concentration/Dose

The concentration/dose is given in mg/m^3 or mg/kg body weight per day. Conversions for other units are found on pages 380 and 382.

Exposure Period

The exposure period is entered as described on page 73 of this report.

Effect

The effect is based on the author's conclusions and is entered using the categories and abbreviations found on pages 76 and 77 of this report. If the author has not drawn a conclusion, the abbreviation "inc" (inconclusive) is used. If it is reported that no effect was observed, the abbreviation "nef" (no effect reported) is used.

Reference

References are cited as described on page 29 of this report.

Data Selection

In order to be selected for entry, evaluations must be generated by expert panels, e.g. representing United Nations, international, non and governmental organizations. Evaluations prepared by individual or joint authors without the review of an expert panel, are not included.

The experimental results from special studies designed to elicit a particular effect are also entered.

The three latest studies with positive results are selected for three different experimental mammals.

For studies with negative results, i.e. where the study did not result in the production of the particular effect, the same amount of data is included and the same selection criteria are followed as for studies with positive results.

2.11.2 MUTAGENICITY

Included here are evaluations and experimental studies designed to determine whether a substance is mutagenic, i.e. produces heritable changes in genes.

When a positive or negative evaluation has been made by a group of experts, e.g. representing a United Nations, international or national organisation, it is included along with the experimental results.

A data line in the instance that an evaluation has been made will be handled as shown on page 80 for carcinogenicity.

Experimental results are entered as follows:

- organism
- route
- exposure concentration/dose
- exposure period
- test results
- reference

Below is an example of a typical entry:

ham-ipr 500mg/kg 1x CHR:nef 20PZAB 3,424(78)

ham	= hamster
ipr	= intraperitoneal
mg/kg	= milligrams per kilogram body weight per day
1x	= one time
CHR:nef	= no chromosome change found
20PZAB	= Carcinogenesis
3,424(78)	= Volume 3, page 424, 1978

Organism

Organisms are abbreviated as on page 82 of this report. If it is reported that a susceptible strain was used in the study, this is indicated by the prefix s- preceeding the abbreviation for the organism, e.g. s-rat.

Route

Routes are given using abbreviations found on page 74 of this report.

Exposure Concentration/Dose

The concentration is given in mg/m^3 and the dose is given in mg/kg body weight per day. Conversions for other units are found on pages 380 and 382 of this report.

Exposure Period

The exposure period is abbreviated as on page 73 of this report.

Test Results

These results are based on the conclusions of the author; abbreviations are as follows:

CHR = chromosome test
DNA = DNA test
PHN = phenotypic test
inc = inconclusive
nef = no (mutagenic) effects reported
cng = change

Reference

References are cited as described on page 29 of this report.

Experimental results can also be entered as follows when cell cultures, microorganisms, Drosphila, etc. are involved:

- test sytem or organism
- test results
- reference

Below is an example of a typical entry:

hcc CHR £NASAS(77)MUREAV 16,322(72)

hcc = human cell culture
CHR = chromosome change observed
£NASAS = National Academy of Sciences, a Report of the Committee on Medical and Biologic Effects of Environmental Pollutants, 1977
15,89(76) = Volume 15, page 89, 1976
MUREAV = Mutation Research
16,322(72) = Volume 16, page 322, 1972

Test System or Organism

Abbreviations for test systems or organisms are listed below:

cc = cell culture
hcc = human cell culture
ins = insects
mcc = mammalian cell culture
mcr = microorganisms

Test Results

The test results are based on the conclusion of the author and are abbreviated as follows:

CHR = chromosome test
DNA = DNA test
PHN = phenotypic test
inc = inconclusive results
nef = no (mutagenic) effects reported
cng = change

Reference

References are cited as described on page 29 of this report.

Data Selection

The literature is searched retrospectively in an attempt to find at least two examples of positive results under each of the following three major categories:

1. DNA Change
   Increased/decreased DNA repair
   DNA damage, e.g. increase in single strands
   Reaction with DNA

2. Chromosome Change
   Chromosome and chromatial aberrations determined by cytogenetic analysis
   Sister chromatial exchange
   Heritable translocation
   Effects determined by micronucleus test

3. Phenotype Change
   Revertants
   Forward mutations
   Gene conversion
   Recombination
   Sperm morphology changes
   Effects determined by dominant lethal assay

Entries should be distributed as evenly as possible among the various organisms or test systems.

For studies with negative results, i.e. where the study does not result in the production of the particular effect, the same quantity of data is included and the same selection criteria are followed as for studies with positive results.

2.11.3 NEUROTOXICITY/BEHAVIOUR

Included here are evaluations and experimental results from studies designed to determine whether a substance is destructive to nerve tissues or effects decision dependent performance.

When a positive or negative evaluation has been made by a group of experts, e.g. representing a United Nations, international or national organization, it is included along with the experimental results.

A data line in the instance that an evaluation has been made will be handled as shown on page 80 for carcinogenicity.

Experimental results are entered as follows:

- organism
- route
- exposure concentration/dose
- exposure period
- effect
- reference

Below is an example of a typical entry:

rat-scu 4.1mg/kg,1x PNS:str £CECCD(78)JNENAD 26,498(67)

rat	= rat
scu	= subcutaneous
mg/kg	= milligrams per kilogram body weight per day
1x	= single exposure
PNS	= peripheral nervous system
str	= structural change(s)
£CECCD(78)	= Commission of the European Communities, Criteria (Dose/Effect Relationships) for Cadmium, 1978
JNENAD	= Journal of Neuropathology and Experimental Neurology
26,498(67)	= Volume 26, page 498, 1967

Organism

Organisms are abbreviated as on page 82 of this report. If it is reported that a susceptible strain was used in the study, this information is indicated by the prefix s- preceeding the abbreviation for the organism, e.g. s-rat.

Route

Routes are abbreviated as on page 74 of this report.

Exposure Concentration/Dose

The dose is given in mg/kg body weight per day and the exposure concentration in mg/m^3. Conversions for other units are found on pages 380 and 382 of this report.

Exposure Period

The exposure period is abbreviated as indicated on page 73 of this report.

Effect

The effect is based on the author's conclusions and is entered using the categories and abbreviations found on pages 76 and 77 of this report. If the author has not drawn a conclusion, the abbreviation "inc" (inconclusive) is used. If it is reported that no effect was observed, the abbreviation "nef" (no effect reported) is used.

Reference

References are cited as described on page 29 of this report.

Data Selection

In order to be selected for entry, evaluations must be generated by expert panels, e.g. representing United Nations, international or national governmental organizations. Evaluations prepared by individual or joint authors, without the review of an expert panel, are not included.

Experimental results from special studies designed to elicit a particular effect are also entered.

The five latest studies with positive results are selected.

For studies with negative results, i.e. when the study did not result in the production of a neurotoxic effect, the same amount of data is included and the five latest studies are also selected.

2.11.4 POTENTIATION

Included here are experimental results from studies especially designed to determine whether the toxic effects caused by the primary compound are increased in combination with widely used drugs and chemicals.

A data line includes the following entries:

- organism
- chemical or drug
- reference

Below is an example of a data line:

mus smoke CECNE* -,8(76)

mus = mouse
CECNE* = Commission of the European Communities, Noxious Effects of Dangerous Substances in the Aquatic Environment, 1976
-,8(76) = No Volume number, page 8, 1976

Organism

The test organism is abbreviated as shown on pages 82, 97 and 101 of this report.

Chemical or Drug

The chemicals/drugs involved are entered as reported.

Reference

References are cited as described on page 29 of this report.

Data Selection

The results from the latest study showing potentiation by a chemical/drug are included. If there are contradictory results from another recent study, these data are also included.

2.11.5 PRIMARY IRRITATION

Included here are experimental results from studies designed to determine whether a substance is irritating or corrosive to the skin and/or mucous membranes.

A data line includes the following entries:

- organism
- effect
- reference

Below is an example of a data line:

rbt-ocu EYE:fnc,crc £NSHCA(76)GISAAA 32,29(67)

rbt	= rabbit
ocu	= ocular administration
EYE	= eye
fnc	= functional changes
crc	= changes in circulation
£NSHCA(76)	= National Institute for Occupational Safety and Health, Criteria for a Recommended Standard....Occupational Exposure to Carbaryl, 1976
GISAAA	= Gigiena i Sanitariya
32,29(67)	= Volume 32, page 29, 1967

Organism

The organism to which the effect refers is abbreviated on page 82 of this report.

Effect

The effect is given as reported. The abbreviations for organ and system found on page 76 of this report and the abbreviations for effects found on page 77 are used.

Reference

References are cited as described on page 29 of this report.

Data Selection

The three latest studies reporting positive results are selected for three different species including humans and experimental laboratory mammals.

For studies with negative results, i.e. when the study did not result in the production of the particular effect, the same selection criteria are followed.

2.11.6 REPRODUCTION

Included here are evaluations and experimental results from studies designed to determine whether a substance effects the reproductive system.

When a positive or negative evaluation has been made by a group of experts, e.g. representing a United Nations, international or national organization, it is included along with experimental results from special reproduction studies.

A data line in the instance that an evaluation has been made will be handled as shown on page 80 for carcinogenicity.

Experimental results are entered as follows:

- organism
- route
- exposure concentration/dose
- exposure period
- effect
- reference

Below is an example of a typical entry:

rat-orl 240mg/kg,10W FET:siz,dth £NSHMA(76)NATUAS 192,464(61)

rat	= rat
orl	= oral route
mg/kg	= milligrams per kilogram body weight per day
10W	= 10 weeks exposure
FET	= fetus
siz	= size change or weight change
dth	= death
£NSHMA(76)	= U.S. National Institute for Occupational Safety and Health, Criteria for a Recommended Standard...Occupational Exposure to Malathion, 1976
NATUAS	= Nature
192,464)61)	= Volume 192, page 464, 1961

Organism

Organisms are abbreviated as on page 82 of this report. If it is reported that a susceptible strain was used in the study, this information is indicated by the prefix s- preceeding the abbreviation for the organism, e.g. s-rat.

Route

Routes are given as abbreviated on page 74 of this report.

Exposure Concentration/Dose

The dose is given in mg/kg body weight per day and the exposure in mg/m^3. Conversions for other units are found on pages 380 and 382 of this report.

Exposure Period

Abbreviations for exposure period are found on page 73 of this report.

Effect

The effect is based on the author's conclusions and is entered using the categories and abbreviations found on pages 76 and 77 of this report. If the author has not drawn a conclusion, the abbreviation "inc" (inconclusive) is used. If it is reported that no reproductive effect was observed, the abbreviation "nef" (no effect reported) is used.

Reference

References are cited as described on page 29 of this report.

Data Selection

In order to be selected for entry, evaluations must be generated by expert panels, e.g. representing United Nations, international or national governmental organizations. Evaluations prepared by individual or joint authors without the review of an expert panel, are not included.

Experimental results from special studies designed to elicit a reproductive effect are also entered.

The three latest studies with positive results are selected for three different experimental mammals.

For studies with negative results, i.e. where the study did not result in the production of the particular effect, the same selection criteria are followed.

2.11.7 SENSITIZATION

Included here are experimental results from studies designed to determine whether a substance sensitizes an organism, e.g. causes an allergic reaction.

A data line includes the following entries:

- organism
- effect
- reference

Below is an example of a typical entry:

rbt-idr SKN:all £NSHCA(76)JAFCAU 9,3(61)

rbt	= rabbit
idr	= intradermal
SKN	= skin and mucous membranes
all	= allergic effects
£NSHCA(76)	= National Institute for Occupational Safety and Health, Criteria for a Recommended Standard...Occupational Exposure to Carbaryl, 1976
JAFCAU	= Journal of Agricultural and Food Chemistry
9,30(61)	= Volume 9, page 30, 1961

Organism

The organism to which the effect refers is abbreviated as shown on page 82 of this report.

Effect

The effect is given as reported using the categories and abbreviations found on pages 76 and 77 of this report.

Reference

References are cited as described on page 29 of this report.

Data Selection

The three latest studies with positive results are selected, for three different species, i.e. humans and experimental laboratory mammals.

For studies with negative results, i.e. when the study did not result in the production of the particular effect, the same selection criteria are followed.

2.11.8 TERATOGENICITY

Included here are evaluations or experimental results from studies designed to determine whether a substance produces congenital malformations.

When a positive or negative evaluation has been made it is included here along with experimental results from teratogenicity studies.

A data line in the instance that an evaluation has been made will be handled as shown on page 80 for carcinogenicity.

Experimental results are entered as follows:

- organism
- route
- exposure concentration/dose
- exposure period
- effect
- reference

Below is an example of a typical entry:

rat-ipr 900mg/kg, 1x,11tDP FET:nef £NASDW(77)AEHLAU 16,805(68)

rat	= rat
ipr	= intraperitoneal
mg/kg	= milligrams per kilogram body weight per day
1x	= single exposure
11tDP	= eleventh day of pregnancy
FET	= fetus
nef	= no teratogenic effect reported
£NASDW(77)	= U.S. National Academy of Sciences, Drinking Water and Health, 1977
AEHLAU	= Archives of Environmental Health
16,805(68)	= Volume 16, page 805, 1968

Organism

Organisms are abbreviatied as on page 82 of this report. If it is reported that a susceptible strain was used in the study, this information is indicated by the prefix s- preceeding the abbreviation for the organism, e.g. s-rat.

Route

Routes are given as abbreviated on page 74 of this report.

Exposure Concentration/Dose

The dose is given in mg/kg body weight per day, and the exposure concentration in mg/m^3. Conversions for other units are found on pages 380 and 382 of this report.

Exposure Period

Abbreviations for exposure period are found on page 73 of this report.

Effect

The effect is based on the author's conclusions and is entered using the categories and abbreviations found on pages 76 and 77 of this report. If the author has not drawn a conclusion, the abbreviation "inc" (inconclusive) is used. If it is reported that no teratogenic effect was observed, the abbreviation "nef" (no effect reported) is used.

Reference

References are cited as described on page 29 of this report.

Data Selection

In order to be selected for entry in the Register, evaluations must be generated by expert panels, e.g. representing United Nations, international or national governmental organizations. Evaluations prepared by individual or joint authors, without the review of an expert panel, are not included.

Experimental results from special studies designed to elicit a teratogenic effect are entered.

The three latest studies with positive results are selected for three different experimental mammals.

For studies with negative results, i.e. where the study did not result in the production of the particular effect, the same selection criteria are followed.

2.12 EFFECTS ON ORGANISMS IN THE ENVIRONMENT

The purpose of this data is to give the user an idea of the toxicity of a chemical to marine and terrestrial organisms and to ecosystems in relation to other chemicals, i.e. its "relative toxicity". The particular effects which the chemical has been reported to have caused on the environment are also highlighted, giving a partial survey of the research that has been done in the field for a particular chemical. This survey is not comprehensive for "popular chemicals," but it should be relatively complete for lesser studied substances.

Both positive and negative data are included. All AQUATIC TOXICITY data are grouped together and all other environmental toxicity data, i.e. that which is not included under either aquatic toxicity or toxicity related to man, are grouped together under the heading, TERRESTRIAL TOXICITY. The heading, EFFECTS ON ORGANISMS IN THE ENVIRONMENT, is not used in the profiles.

2.12.1 AQUATIC TOXICITY

A data line includes the following entries:

- organism or ecosystem
- exposure concentration
- exposure period
- route of exposure (when applicable)
- effect
- reference

Below is an example of a typical data line:

fsh,frs 25.6mg/l 96H LC50 £NRCAS(77)TAFSAI 95,289(66)

fsh,frs = freshwater fish
mg/l = milligrams per litre
H = hours
LC50 = lethal concentration with 50 percent kill
£NRCAS(77) = National Research Council of Canada, Arsenic
TAFSAI = Trans American Fisheries Society
95,289(66) = Volume 95, page 289, 1966

Although LC50 is not an effect as such, it is entered in place of the actual effect, i.e. death, as it gives the user more information.

Organism or Ecosystem

The terms used to describe the organism or ecosystem are listed and abbreviated as follows:

brd = bird
com = community
crs = crustacea
fsh = fish
ins = insects
inv = invertebrates other than those listed separately
mam = mammals
mcr = microorganisms including algae and plankton
mol = molluscs
plt = plants
pop = population
ver = vertebrates other than those listed separately
wor = worms

Specifications:
egg = eggs
emb = embryo
est = estuarine
frs = fresh (water)
juv = juvenile including newly hatched, immature
lar = larvae
mar = marine
pad = pre-adult including fry, sporel
sew = sewage water or sludge

There is no specification for adult; when other life stages are not specified, the organism is understood to be an adult.

Exposure Concentration

The amount of exposure per unit water volume is entered in milligrams per litre (mg/l) or mg/kg diet; g/l, µg/l or ng/l are also used when it is convenient to do so. Other units, e.g. ppt, ppm, are converted to mg/l using conversions found on page 383 of this report.

Data are ordered from the lowest to the highest concentration.

Exposure Period

The exposure time is presented directly after the exposure concentration using the following abbreviations:

D = day
GN = generation
H = hour
I = intermittent exposure
LT = lifetime
M = minute
Mo = month
Wk = week
x = times
Y = year

Route of Exposure

In the case that it is necessary to give the route of exposure, e.g. when the substance is other than in the water, see TERRESTRIAL TOXICITY, page 103.

Effect (descriptive notations of the location and type of effect)

Notations which indicate the ORGAN OR SYSTEM affected are as follows:

ANS = autonomic nervous system, the part of the nervous system controlling the involuntary (vegetative) functions of the body, e.g. control of smooth muscles
CNS = central nervous system, including brain, spinal cord and coverings and general nervous system
CVS = cardiovascular system, including heart and blood vessels
END = endocrine system, i.e. the organs which secrete hormones which influence metabolism and other body processes, blood or lymph. Pancreas (PNC), spleen (HEM) and thymus (IMM) are excluded.
EYE = eye
FET = fetus, also including embryo and neonate
GIT = gastrointestinal tract, including salivary glands, esophagus, stomach, duodenum and intestines
HEM = haematological system, including blood, bone marrow and spleen
HRT = heart
IMM = immunological system, including the lymphatic system, thymus and immune related factors in blood
LVR = liver and gall bladder
MLT = multiple organs, i.e. two or more organs reported to have the same effect, e.g. neoplastic effect
PNC = pancreas, including both endocrine and exocrine functions
PNS = peripheral nervous system, the nervous system outside the CNS, excluding sense organs, autonomic nervous system and somatic nervous system, i.e. peripheral nervous tissues
PUL = pulmonary system, including lungs, thorax, pleura and respiration (breathing)
REP = reproductive system, including reproductive organs, secondary sex characteristics and fertility
SKL = skeletal system, including bones, teeth and joints
SKN = skin and mucous membranes, including skin, mucous membranes, hair and nails
SNS = sense organs, including nose, ear, eye and taste, using EYE for specific eye effects
SON = somatic nervous system, the part of the nervous system that controls voluntary responses to stimuli, also including skeletal muscles
UNS = unspecified tissue, organ or system
URS = urinary system, including kidneys, ureter, bladder and urine

Notations which indicate the type of EFFECT are as follows:

act = activity change, i.e. changed rate
all = allergic effects
bcm = biochemical changes - enzyme stimulation or inhibition, changes in chemical composition or levels, changes in metabolism
bhv = behavioural effects
car = carcinogenic effects clearly defined as such by the author, i.e. "production of malignant tumours"
cel = cellular changes
cng = miscellaneous changes not listed separately
cor = corrosive effects
crc = changes, other than pressure, in circulation, including haemorrhage, thrombosis and hyperaemia
dth = death
emr = early mortality
end = endocrine, hormonal effects
exo = exocrine effects
fnc = functional changes
gen = genetic changes not clearly defined as mutagenic by the author
ifl = inflammation
imm = immunological effects
irr = irritant effects
LCn = lethal concentration n% kill, i.e. the percentage kill is added, e.g. LC100
LC50 = lethal concentration 50 percent - concentration calculated to kill 50% of a defined experimental population (=TLm)
LCLo = lowest lethal concentration found
LD50 = lethal dose 50 percent - dose calculated to kill 50% of a defined experimental population (=TLm)
LDLo = lowest lethal dose found
mlt = multiple effects - more than two effects per organ or system
msc = muscular effects
mut = mutagenic effects clearly defined as such by the author
nef = no effects reported
neo = neoplastic effects - production of tumours not clearly defined as malign by the author
neu = neural effects
olp = organoleptic effects
osm = osmotic changes, including changes in ionic content or in salt or water balance
oxy = oxygen consumption - increased or decreased
pop = population changes
prs = pressure changes
rep = reproductive effects
res = change in respiration rate
ret = retardation - delayed development, growth retardation
siz = size change or weight change
str = structural changes
TCLo = lowest toxic concentration found
TDLo = lowest toxic dose found
ter = teratogenic effects clearly defined as such by the author
uns = unspecified effects

Abbreviations for organs or systems and for effects are generally entered together; the abbreviations for the organ or system are capitalised and placed directly before the abbreviations for the effects which are in the lower case. A colon appears between the organ or system and the effect.

Effects are listed without an indication of the organ or system when they cannot be related to a specific organ or system, e.g. death, weight loss.

If more than three organs or systems are affected, the designation MLT (multiple organs) is used as long as the study is not a study on a special organ or system, e.g. the reproductive system resulting in other side effects on other organs or systems. In the latter case, an abbreviation for the studied organ or system will proceed MLT.

Only two effects per organ or system are indicated; if more than two effects are found, the designation mlt (multiple) is entered.

Option:
Reduce the number of organs/systems and of effects in order to include only those which are considered to be the "most important" for environmental hazard assessment.

Reference

References are cited as described on page 29 of this report.

Data Selection

Data are selected in such a way as to show which effects are caused by a substance and at what concentrations/doses these effects first occur in aquatic organisms.

If data are available, up to four data lines are entered for each effect. Data are searched retrospectively and the first four organisms found (with their reported specifications) are selected per effect regardless of the concentrations, routes or other test conditions.

In a single study, if a range of concentrations is used to cause a single effect, the lowest concentration required to produce the effect is selected.

2.12.2 TERRESTRIAL TOXICITY

A data line includes the following entries:

- organism or ecosystem
- exposure concentration/dose
- exposure period
- route of exposure
- effect
- reference

Below is an example of a data line:

brd 1,750mg/kg diet 6D dth(50%) £NASAS(77)SCIEAS, 199,130(64)

brd = bird
mg/kg diet = milligrams per kilogram diet
D = day
dth = death
£NASAS(77) = US National Academy of Sciences, Arsenic, 1977
SCIEAS = coden for SCIENCE
199,130(64) = Volume 199, page 130, 1964

Organism or Ecosystem

The organism or ecosystem to which the effect refers is abbreviated as shown below:

amp = amphibians
brd = bird
com = community
crs = crustacea
ins = insects
inv = invertebrates other than those listed separately
mam = mammals
mcr = microorganisms
mol = molluscs
plt = plants
pop = population
rept = reptiles
ver = vertebrates other than those listed separately
wor = worms

Specifications:

egg = eggs
emb = embryo
juv = juvenile
lar = larvae
pad = pre-adult

There is no specification for adult; when other life stages are not specified, the organism is understood to be an adult.

Exposure Concentration

Data are reported in two groups according to the unit of measurement.

Amount of exposure per unit body weight:

Milligrams (mg) per kilogram (kg) body weight per day are the preferred unit for animals; g/kg, µg/kg, ng/kg are used, however, when it is practical to do so. Conversions for pph (%), ppm, ppb and ppt in diets to mg/kg bw are found on page 380. Data reported in ppt are only included when they are specified as either US trillion or parts per thousand. Data reported in the literature as mg/kg are assumed to be mg/kg bw and are entered as such. Data reported in other ways, e.g.

- mg
- mg/l
- % solution
- mole/litre
- mg/kg diet (when no conversion factors are available)
- mg/kg soil (ppm in soil)
- mg/kg medium (ppm in medium)

are included only in the absence of other data and are entered as reported. As much as possible, data are ordered from lowest to highest concentration/dose.

Amount of exposure per unit air volume:

Milligrams per cubic metre (mg/m^3) are the preferred units; g/m^3, $\mu g/m^3$, ng/m^3 are used, however, when it is practical to do so. Volume/volume concentrations, e.g. pph, ppm, ppb or ppt are converted to weight units by calculations found on page 382. Data are ordered from lowest to highest concentration/dose.

Exposure Period

See Aquatic Toxicity, page 97.

Route of Exposure

Abbreviations and definitions for the various routes of exposure are listed below:

dpn = dermal penetration, penetration of the gaseous substance through the skin without application
idr = intradermal, administration within the dermis by hypodermic needle
ihl = inhalation
ims = intramuscular, administration into the muscle by hypodermic needle
ivn = intravenous, administration directly into the vein by hypodermic needle
ocu = ocular, administration directly onto the surface of the eye or into the conjunctival sac
orl = oral, per os, intragastric, feeding or introduction with drinking water
par = parenteral, administration into the body through the skin. Reference cited is not specific concerning the route used. Could be intraperitoneal, subcutaneous, intravenous, intrapleural, intramuscular, intrarenal, or intracerebral
rec = rectal, administration into the rectum or colon in the form of enema or suppository
skn = skin, application to the skin, dermal, cutaneous

Option:
Reduce the number of routes to include only those which are considered to be the "most important".

Effect

See Aquatic Toxicity, pages 98 and 99.

Reference

References are cited as described on page 29 of this report.

Data Selection

Data selection is done in such a way as to show which effects are caused by a substance and at what concentration/doses these effects first occur in terrestrial organims, i.e. those which are not considered to be aquatic.

In the case that studies involve routes other than inhalation, data in which oral administration is reported are given priority in order that comparisons can be made among substances in the Register and their relative toxicity ascertained. When no oral inhalation data

resulting in a particular effect is found, studies in which other routes are involved are used for the purpose of demonstrating a particular effect. When inhalation, dermal penetration and oral data are available, they are all included for each effect.

Up to four data lines are entered for each effect. If data are available, four different organisms are selected for these data lines. The first four organisms found (with the reported specifications) are selected per effect regardless of the concentrations involved.

2.13 SAMPLING/PREPARATION/ANALYSIS

Included here are sampling methods for air, water, soil and sediment as well as animal and plant tissues. Priority is given to those methods which have been validated by collaborative or ring testing.

Knowledge of good, reproducible and accurate analytical methodologies is essential for obtaining reliable identification and concentration data which in turn are necessary for the evaluation of possible toxic effects of a chemical and for its subsequent legal control in the environment.

There are two format possibilities in this section due to the manner in which the data are presented in the literature. Data are either grouped together under Sampling/Preparation/Analysis, or under Sampling/Preparation depending on the extent of their coverage.

Experimental details are not included here but information necessary to select a method, e.g. detection limit and sample size, are included.

2.13.1 SAMPLING/PREPARATION/ANALYSIS

This presentation is used when the literature source gives a detailed description and discussion of the sampling, preparation and analysis of a substance, generally in a particular medium.

A data line in this presentation includes the following entries:

- medium
- analytical method
- detection limit
- sample size
- reference

Below is an example of a data line with this presentation:

air-GC Det: 40mg/m^3(samp-20 l) £NSHAM 2,250(77)

air	= air
GC	= gas chromatography
Det	= lower limit of detection
mg/m^3	= milligrams per cubic metre
(samp-20 l)	= sample size of twenty litres is required
£NSHAM	= US National Institute for Occupational Safety and Health, Manual of Analytical Methods, 2nd Edition
2,250(77)	= Volume 2, page 250, 1977

Medium

The medium and its specifications are entered using the abbreviations listed below:

air = air
ani = animal
aq = aquatic, water
bld = blood
part = particulates
plt = plant
sed = sediment
soil = soil
tiss = tissue
urn = urine

Analytical Method

The analytical method used follows the medium on the data line. Abbreviations for analytical methods are as follows:

AA = activation analysis
AAS = atomic absorption spectroscopy
ASV = anodic stripping voltametry
COLM = colorimetry
EC-GC = gas chromatography with electron capture detection
EP = electrophoresis
FS = fluorescence spectrophotometry
GC = gas chromatography
GC-MS = gas chromatography coupled with mass spectrometry
HPLC = high pressure liquid chromatography
IR = infra red spectrophotometry
MS = mass spectrometry
POLG = polarography
pX = ion specific electrode
NMR = nuclear magnetic resonance spectroscopy
RAD = radiochemical method
TIT = titration
TLC = thin layer chromatography
UV = ultra violet spectrophotometry
VIS = visible spectrophotometry
XE = X-ray emission spectroscopy
XF = X-ray fluorescence spectroscopy
XRD = X-ray diffraction

Detection Limit

The detection limit, i.e. the lowest amount of a substance that can be detected by the sampling and analytical methods involved, is listed in the most convenient metric units. Conversions from other units are made as outlined on pages 382 and 383 of this report.

Sample Size

The sample size refers to the quantity of a sample that is required for the particular detection range of the method.

Reference

References are cited as described on page 29 of this report.

Data Selection

One reference is included for each medium. Data are selected from collections of collaboratively tested methods whenever possible and only literature with comprehensive coverage of a method is cited. Priority is given to sources which describe sampling, clean-up and analysis together for a particular substance and medium.

When no collaboratively tested method is available in the secondary literature collections of sampling and analytical methods, other secondary literature will be used to select primary references which give extensive information on a particular sampling and analytical method.

Primary literature is only used in the absence of data from the secondary literature. The most recent reference in the primary literature which gives a comprehensive coverage of sampling, clean-up and analysis is then entered for each medium.

2.13.2 SAMPLING/PREPARATION

This format is only used in the absence of other more complete data, i.e. which include sampling, preparation and analysis together.

The purpose of this format is to reference detailed descriptions of sampling and preparation methods for the various media. If the sampling and preparation method is specific for a particular analytical method, the latter is identified.

A data line in this presentation format includes the following entries:

- medium
- analytical method
- reference

Below is an example of a data line with this presentation:

aq-AAS £NSHAM 3,1092(77)

aq	= aquatic, water
AAS	= Atomic Absorption Spectroscopy Analysis, i.e. the sampling and preparation method is a preparation for AAS
£NASAM	= US National Institute for Occupational Safety and Health, Manual of Analytical Methods, Second Edition
3,1092(77)	= volume 3, page 1092, 1977

Medium

See Sampling/Preparation/Analysis on page 106 of this report.

Analytical Method

The analytical method follows the medium. Abbreviations for analytical methods are found on page 106 of this report.

References

References are cited as described on page 29 of this report.

Data Selection

In the absence of data for Sampling/Preparation/Analysis, i.e. when the analytical method is not included with the description of the sampling and clean-up method, this format is used.

Priority is given to collaboratively tested methods. Other secondary literature is used as a data selection mechanism in the absence of a collection of collaboratively tested methods.

The most recent data for a method is taken from the primary literature when there is no secondary information available.

2.14 SPILLS

This information is useful for planning responses to future spills, for developing safety assessments, and for minimizing ecological damage.

References to secondary documents prepared by expert committees on the subject of spills are entered here. When these documents are available, a short free-text description of their contents is included with the reference in order to define their scope of coverage.

References are also given to other documents which cover the subject, e.g. text books, review articles.

Option:
Include the names and addresses of organisations which collect spill data, e.g. the Harwell Chemical Emergency Centre of the United Kingdom, and which have data available for a particular substance.

2.15 TREATMENT OF POISONING

The purpose of this section is to inform the user of the existence of monographs, reviews, reports or other collections of data which enumerate, for a particular substance, the symptoms for the diagnosis of the acute and/or chronic intoxication of man as well as the available medical countermeasures for that intoxication. The only information included is a short free-text description of the contents of a data source and the reference from which the relevant data can be obtained.

Included are references to evaluated information concerning diagnosis, prognosis and treatment of both acute and long term poisoning. Although this information is not available for the vast majority of substances, when publications recommended by state or national governments, international bodies or United Nations Organisations are in existence, they are cited here.

Option:
Names and addresses of organisations which collect this data, e.g. the "Federation mondiale des Associations des Centres de Toxicologie clinique et des Centres Anti-Poisons", and which have data available for a particular substance, could be included in order to direct the user to other sources of information.

2.16 REMOVAL

This section includes a brief description of the main methods of removal when these methods are summarized in secondary review documents such as UN, international and national government reports. These data are useful in the identification of proven methods for the safe, efficient and economical removal of chemical compounds which are no longer needed or wanted. Removal methods include recycling and regeneration procedures and methods for ultimate disposal or destruction such as incineration, landfill and chemical decomposition.

A data line includes the following entries:

- removal process(es)
- reference

An example of a typical entry is given below:

recycling and reuse, long term storage
landfill in very light clay soil $nasAs -,60(77)

£NASAS = US National Academy of Sciences, Arsenic, 1977
-,60(77) = no volume, page 60, 1977

Removal Process(es)

Included here are disposal, destruction and recycling methods.

Reference

References are cited as described on page 29 of this report.

Data Selection

Data are selected from secondary review documents, such as UN, international and national government reports, which present the various chemical and biological characteristics of a particular substance. These documents often give a brief description of removal methods and such data can therefore be obtained for the Register in a very cost-effective way.

Where there is a regulation which stipulates the need for a particular disposal or destruction method, or which prohibits the use of particular methods, the regulation is entered under RECOMMENDATIONS/LEGAL MECHANISMS, e.g.

- international agreements which prevent disposal of oil by dumping from ships
- CEC directives for dumping of waste products into the sea
- regulations concerning the disposal of used products, e.g. used lubricants
- other regulations concerning:
  dumping
  detoxication, neutralisation, dewatering
  incineration
  emulsion treatment
  acid sludge cracking
  regeneration of solvents
  de-oiling
  land fill
  chemical transformation.

2.17 RECOMMENDATIONS/LEGAL MECHANISMS

National and international recommendations and legal mechanisms which concern the control of a substance in air, water, drinking water, wastes, soil, sediments, animal and plant tissues, food and beverages, drugs, consumer goods including cosmetics and toiletries, agriculture and animal husbandry are also highlighted. This, therefore, forms a legal profile of a substance which enables rapid access to the control mechanisms of many nations. Differences among legislation become obvious, unnecessary duplicative effort by legislators can be avoided, special interest groups such as importers and exporters are assisted, gaps in chemical legislation are identified and model legislation which is particularly useful for countries which have recently become industrialized, is provided.

A data line includes the following entries:

- geographic area or organization
- type of mechanism
- subject of mechanism
- description of mechanism
- levels with specified analytical method
- effectivity date (date when control mechanism took, or will take effect)
- reference

Option:
Divide the data according to the subject of the mechanism, e.g. emissions, immissions, transport.

Below is an example of a typical entry:

USA REG aq,drk-MPC:0.05mg/l AAS Eff:24 Jun(77)
FEREAC 40,59570(75) RED Nov(79)

USA	= United States of America
REG	= regulation
aq	= water
drk	= drinking
MPC	= maximum permissible concentrations
AAS	= atomic absorption spectroscopy
Eff	= effectivity date
24,Jun(77)	= 24 June, 1977
FEREAC	= Federal Register
40,59570(75)	= Volume 40, page 59570, 1975
RED	= IRPTC Register entry date
Nov(79)	= November 1979

Geographic Area or Organization

Countries and international organisations are abbreviated as follows and listed in the following order:

FAO = Food and Agriculture Organization of the United Nations
WHO = World Health Organization of the United Nations
EEC = European Economic Community
DEU = Germany, Federal Republic of
GBR = United Kingdom
JPN = Japan
SUN = Union of Soviet Socialist Republics
SWE = Sweden
USA = United States of America

Option:
Include legislation from other countries.

Type of Mechanism

REG = regulations and standards which are legally binding
REC = recommendations and guidelines which are not legally binding

Subject of the Mechanism

The following categories are used to describe the subject controlled. If the subject does not fit any of these categories, a free-text description is entered.

aq = water
air = air
occ = occupational environment
hmn = human
ani = animal
plt = plant
soil = soil
sed = sediment
cgd = consumer goods
fuel = fuel
rmv = removal
trnsp = transport

Specifications:

drk = drinking, e.g. drinking water standards
emi = emissions (into), e.g. water, air, soil or sediment discharge requirements
food = food, e.g. acceptable human food concentrations, acceptable daily intake, acceptable concentrations in animal food
imi = immissions (in), e.g. water, air, soil or sediment quality standards
occ = occupational, e.g. occupational air standards
tiss = tissue, e.g. acceptable tissue concentrations for humans, tolerable tissue concentrations in plants and animals
use = use and handling, e.g. restrictions on use and handling, authorisations for handling, restricted use of pesticides on animals or plants, restrictions on use or marketing of goods, restrictions on use of fuels, restrictions of use on soil

Additional specifications:

agr = agricultural
frs = fresh
grnd = ground
ind = industrial
mar = marine
part = particulate
sel = selected
sew = sewage
srf = surface

Description of the Mechanism

The following abbreviations are used to describe how the subject is controlled:

ADI = acceptable daily intake
AL = acceptable or tolerable limit
ARL = acceptable or tolerable residue limit
AWI = acceptable or tolerable weekly intake
C = ceiling value
HQ = harmful quantity
MAC = maximum allowable concentration
MAK = maximum worksite concentration (Maximale Arbeitsplatz-Konzentration)
ML = maximum limit
MPC = maximum permissible concentration
MRL = maximum residue limit
MTC = maximum tolerable or acceptable concentration
PL = permissible or allowable limit
PRO = prohibition
RSTR = restriction
STEL = short term exposure limit
TLV = threshold limit value
TRK = technical reference concentration (technische Richtkonzentration)
TWA = time weighted average
WARN = warning

Levels with Specified Analytical Method

All units are entered as reported with metric units entered in parenthesis following other units for the purpose of comparison. When there are multiple levels in a specific legal mechanism, e.g. different levels for many special food products, these multiple levels are not entered. The description "limits" is entered in their place to indicate that there are many levels given in the reference. The user can then check the reference for details.

Analytical methods

When a particular analytical method is specified in the regulation, it is entered using the following abbreviations:

AA	= activation analysis
AAS	= atomic absorption spectroscopy
ASV	= anodic stripping voltametry
COLM	= colorimetry
EC-GC	= gas chromatography with electron capture detection
EP	= electrophoresis
FS	= fluorescence spectrophotometry
GC	= gas chromatography
GC-MS	= gas chromatography coupled with mass spectrophotometry
HPLC	= high pressure liquid chromatography
IR	= infra red spectrophotometry
MS	= mass spectrometry
NMR	= nuclear magnetic resonance spectroscopy
POLG	= polarography
pX	= ion specific electrode
RAD	= radiochemical method
TIT	= titration
TLC	= thin layer chromatography
UV	= ultra violet spectrophotometry
VIS	= visible spectrophotometry
XE	= X-ray emission spectroscopy
XF	= X-ray fluorescence spectroscopy
XRD	= X-ray diffraction

Effectivity Date (abbreviated Eff)

The effectivity date is the date when the control mechanism took (or will take) effect. The day, month and year are entered in that order, e.g. Eff: 2 Feb(79).

Months are abbreviated as follows:

Jan	=	January
Feb	=	February
Mar	=	March
Apr	=	April
May	=	May
Jun	=	June
Jul	=	July
Aug	=	August
Sep	=	September
Oct	=	October
Nov	=	November
Dec	=	December

Reference and Date of Register Entry or Update

References are cited as described on page 29 of this report.

The IRPTC Register entry date (abbreviated RED) follows the reference, e.g. RED Sep(79). This entry is changed whenever the data line is updated or checked by the IRPTC to assure its accuracy.

Data Selection

Regulations and recommendations from the organizations and countries listed under Geographic Area or Organization are the only data included. At the present time there are no other data selection criteria, i.e. all other legal mechanisms involving the chemicals in the profiles are entered.

Option:
Develop more extensive selection criteria in order that the IRPTC Chemical Data Profiles do not become biased towards legal data.

3. IRPTC CHEMICAL DATA PROFILES

3.1 ARSENIC

3.1.1 ARSENIC (generic)

IRPTC NU: 000001
DEF: Arsenic and arsenic compounds (specific compound not defined)

PRODUCTION/CONSUMPTION

WLD	50.1tt-p(73)	58.1tt-p(68)	52.5tt-p(64)	
USA	2.1tt-p(73)	1.4tt-p(68)	2.6tt-p(64)	
				£NASAS -,28(77)

PATHWAYS INTO THE ENVIRONMENT

wst to aq,mar	USA,Wcst,sbd	12.2t/Y	SCCWR* -,-(76)
wst,ind	CAN	4tt(72)	£NRCAS -,19(78)
natur to aq	WLD	7.2tt/Y	£NRCAS(78)SCIEAS 173,233(71)
natur to aq	WLD	45tt/Y	£NRCAS -,22(78)
wst,erg to air	WLD	0.7tt/Y	£NRCAS(78)SCIEAS 173,233(71)

CONCENTRATIONS

aq,mar	USA,SEcst	0.62-1.16µg/l(76)	24NPAY 7,39(78)
aq,mar	USA,SEcst	5µg/l AA	BECTA6 21,53(79)
aq,mar	FRA,Wcst	1µg/l AA	JRACBN 27,353(75)
aq,mar	FRA,Scst	0.48µg/l	JRACBN 27,353(75)
aq,est	GBR,NEcst	0-360mg/l AAS(77)	MPNBAZ 10,170(79)
aq	WLD,bkg	<10µg/l	£NRCAS -,20(78)
aq,mar	WLD,bkg	2-3µg/l	£EPAQC -,14(76)
aq,drk	USA	<0.1mg/l	£EPAQC(76)JAWWA5 62,670(70)
aq,frs	USA,rvr,lak	<0.01mg/l	ACSSS* 7,97(75)
air,mar	USA,SEcst	0.16-6.3ng/m^3(76)	24NPAY 7,39(78)
air	WLD,bkg	0.005-0.1µg/m^3	£NRCAS -,20(78)
soil	WLD	400-900mg/kg	£NRCAS -,21(78)
soil	WLD,bkg	<15mg/l	£NRCAS -,20(78)
sed,est	GBR,SWcst	768mg/kg dwt COLM	MPNBAZ 7,147(76)
sed,mar	USA,SEcst	5µg/l AA	BECTA6 21,53(79)
food	WLD,bkg	<0.1mg/l	£NRCAS -,20(78)
lith	WLD,bkg	0.2-15mg/kg	£NRCAS -,20(78)
ani,tiss	-	<0.3mg/kg wwt	£NRCAS -,24(78)
fsh,mar	MEDs,NE	142mg/kg dwt RAD(73-74)	ESTHAG 12(6),723(78)
crs,mar	USA,SEcst	2.0mg/kg wwt AA	BECTA6 21,53(79)
crs,mar	GBR,NE	22.3mg/kg wwt AAS(75-76)	ICESR* E:38,-(77)
mol,mar	MEDs	5.0mg/kg wwt(av)	OCMAN* 3,253(78)
mol,mar	YUG	15µg/kg(77)	GFCMR* 3,-(78)
mol,mar	USA,SEcst	2.39mg/kg wwt AA	BECTA6 21,53(79)
plt,mar	JPN	79.0mg/kg dwt(74)	SDKHAK 25,67(76)
mcr,mar	GRC,cst	3.1mg/kg dwt AA(74)	CERBO* -,63(77)
inv,mar	USA,SEcst	1.12mg/kg wwt AA	BECTA6 21,53(79)

ENVIRONMENTAL FATE

air to aq,mar	Ns	460t/Y(74-76)	MSCOM* 5,175(79)
aq,rvr to aq,mar	NLD	1000t/Y	ICESR* E:17,-(76)

BIOCONCENTRATION FACTOR

fsh	-,2µg/l	38-3200/-,-	£NRCAS(78)ACSSS* 7,97(75)

MAMMALIAN TOXICITY ARRAY

-	-	- man	GIT:fnc	HEM,SKN:str CNS:cng	BLOOAW 53(5),820(79)

AQUATIC TOXICITY

inv,mar	0.4mg/l	96H	ret	PSMBAG 24,9(77)
mcr,mar	5mg/l	1H	bcm	MPNBAZ 10,170(79)

SAMPLING/PREPARATION/ANALYSIS

air-AAS	Det: 2µg/m^3(samp 30 l)	£NSHAM 1,139(77)
urn-AAS	Det: 1µg/l(samp 25 ml)	£NSHAM 1,139(77)
air-COLM	Det: 10µg/m^3(samp 30 l)	£NSHAM 1,140(77)
urn-COLM	Det: 10µg/l(samp 25 l)	£NSHAM 1,140(77)
air-AAS	Det: 10µg/m^3	£NSHAM 1,173(77)
air-ASV	Det: 0.5µg/m^3(samp 100 l)	£NSHAM 1,188(77)
bld-ASV	Det: 16ng/ml(samp 1 ml)	£NSHAM 1,192(77)
urn-ASV	Det: 16µg/l(samp 1 ml)	£NSHAM 1,196(77)
air-AAS	Det: 198µg/m^3(samp 85 l)	£NSHAM 3,S309(77)

RECOMMENDATIONS/LEGAL MECHANISMS

DEU	REC	air:occ - TRK:0.2mg/m^3	DFSK** -,45(79)	RED Nov(79)
DEU	REC	occ:carcinogenic substances found in the workplace	DFSK** -,40(79)	RED Nov(79)
GBR	-	air:emi - limits	EPAWA* -,111(74)	RED Nov(79)
JPN	REG	aq:imi - ML:0.05ppm	EAJLR* -,-(76)	RED Nov(79)
JPN	REG	aq:emi - PL:0.5mg As/l Eff:(71)	EAJLR* -,-(76)	RED Nov(79)
SUN	-	air:imi - 3µg As/m^3(24H)	EPAWA* -,17(74)	RED Nov(79)
SWE	REC	poisonous substance Eff: 22 Dec(78)	STNAF* 5,-(78)	RED Nov(79)
USA	REG	aq:drk - MPC:0.05mg/l AAS Eff: 24 Jun(77)	FEREAC 40,59570(75)	RED Nov(79)
USA	REG	aq:drk(bottled) - MPC:0.05mg/l	FEREAC 42,14325(77)	RED Nov(79)
USA	REC	aq:(for irrigation of crops)- 100>g/l	£EPAQC -,17(76)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:0.5mg As/m^3	ACGIH* -,10(79)	RED Nov(79)

3.1.2 ARSENIOUS ACID, MONO-SODIUM SALT

IRPTC NU: 000002
CAS NU: 7784-46-5 MOLFM: $NaAsO_2$ MOLWT: 129.91

SYN: ARSENIOUS ACID SODIUM SALT * ARSENITE DE SODIUM(FRA) * ATLAS A * CHEM PELS C * KILL-ALL * PENITE * SODIUM ARSENITE * SODIUM METAARSENITE * CG3675000(RTECS)

DEN: 1.87g/ml
HAZ: UN CLASS 6.1

PRODUCTION/CONSUMPTION

USA 2tt-c(54) £IARC2 2,54(73)

PRODUCTION PROCESS(ES)

Reaction of arsenic trioxide with sodium carbonate or sodium hydroxide £IARC2 2,54(73)

USES

baits and livestock dip
non-selective herbicide
rodenticide
desiccant
aquatic weed killer
pesticide
corrosion inhibitor
ant control
wood preservation
pigment usage
high preservation
textile dyeing

£IARC2 2,55(73) £NASAS -,34(77)

ENVIRONMENTAL FATE

soil to 60cm depth field 100%/3Y £NRCAS(78)CPLSAY 52(4),583(72)

MAMMALIAN TOXICITY ARRAY

0.63mg/kg	LT	orl-rat	LVR:str		£IARC2(73)CNREA8 29,892(69)
1.1mg/kg	-	orl-mus	REP:cng		£NASAS(77)AEHLAU 23,102(71)
1.1mg/kg	-	orl-mus	emr		£NASAS(77)JONUAI 92,245(67)
5mg/kg	1x	orl-hmn	LDLo		27ZTAP 3,128(69)
5.47mg/kg	-	orl-rat	ret		£NASAS(77)TXAPA9 10,132(67)
10mg/kg	9tDP	ipr-mus	REP:fnc	FET:str	£NASAS(77)AEHLAU 24,62(72)
10.9mg/kg	-	orl-rat	LVR:siz		£NASAS(77)TXAPA9 10,132(67)
10.9mg/kg	2Y	orl-dog	siz,emr		£IARC2(73)TXAPA9 10,132(67)
41mg/kg	1x	orl-rat	LD50		27ZTAP 3,128(69)
-	-	skn-hmn	PNS:ifl		£NSHPB -,308(76)

CARCINOGENICITY

rat-orl	21.6mg/kg	2Y	nef	£IARC2(73)TXAPA9 10,132(67)
mus-orl	1.73mg/kg	LT	nef	£IARC2(73)CNREA8 29,892(69)
rat-orl	0.63mg/kg	LT	LVR:str	£IARC2(73)CNREA8 29,892(69)
dog-orl	0.25-6.25mg/kg	2Y	nef	£NRCAS(78)JTEHD6 1(6),1003(76)

eval: "Adequate oral studies on..... sodium arsenite in the rat gave negative results" £IARC2 2,68(73)

eval: "There is evidence from clinical observations and occupational and population studies that inorganic arsenic is a skin carcinogen in man. There is a characteristic sequence of skin effects of chronic exposure to arsenic that involves hyperpigmentation initially, then hyperkeratosis (keratosis) and finally skin cancer. This sequence has been observed under a variety of circumstances involving chronic exposure: ---- chemical workers manufactured sodium arsenite for use as a sheep dip"
£NASAS -,206(77)

MUTAGENICITY

hcc	CHR:cng	£NASAS(77)MUREAV 16,322(72)
mcr	DNA:cng	£NASDW(77)ICEAS* -,-(76)
mcc	DNA:nef	CNREA8 39(3),704(79)

AQUATIC TOXICITY

mol,mar	2.0mg/l	72H	oxy	£NASAS(77)MPNBAZ 4,185(73)
alg	7.0mg/l	-	str	£NRCAS(78)TAFSAI 94,371(65)
ins	7.0mg/l	-	pop	£NRCAS(78)TAFSAI 95,289(66)
mol,emb,mar	7.5mg/l	48H	LC50	£NASAS(77)MBIOAJ 18,162(73)
mcr	14.0mg/l	-	dth	£NRCAS(78)SOHLD* -,-(68)
fsh,frs	25.6mg/l	96H	LC50	£NASAS(77)TAFSAI 95,289(66)

TERRESTRIAL TOXICITY

brd	565.25mg/kg	1x	LD50	£NASAS(77)DWRCP* 84,-(70)
brd	875mg/kg diet	32D	dth(50%)	£NRCAS(77)USDI1* -,-(64)
mam,pad	1615mg/diet	1x	dth	£NRCAS(77)16MWC* -,-(54)
brd	1750mg/kg diet	6D	dth(50%)	£NRCAS(77)USDI1* -,-(64)

REMOVAL

recycling and reuse
long term storage
land fill in very light clay soil
£NASAS -,60(77)

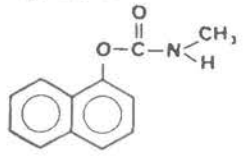
RECOMMENDATIONS/LEGAL MECHANISMS

USA	REG	aq:emi - HQ:454kg/24H	FEREAC 43,10489(78) RED Nov(79)
USA	REG	hmn:food(agr) - limits	FEREAC 38,14829(73) RED Nov(79)
USA	REG	hazardous substance Eff: 12 Jun(78)	FEREAC 43,10489(78) RED Nov(79)

3.2 BIOCIDES

3.2.1 CARBAMIC ACID, METHYL-, 1-NAPHTHYL ESTER

IRPTC NU: 000003
CAS NU: 63-25-2 MOLFM: C12H11NO2 MOLWT: 201.24
STRFM:



£IAR12 12,37(76)

SYN: ARYLAM * ATOXAN * CAPROLIN * CARBARYL * CARBARYL(DOT) * CARBATOX * CARBATOX 60 * CARBATOX 75 * CARPOLIN * COMPOUND 7744 * CRAG SEVIN * DENAPON * DICARBAM * ENT 23,969 * EXPERIMENTAL INSECTICIDE 7744 * FC59500(RTECS) * GAMONIL * GERMAIN'S * HEXAVIN * KARBARYL(POL) * KARBASPRAY * KARBATOX * KARBOSEP * N-METHYLCARBAMATE DE 1-NAPHTYLE(FRA) * METHYLCARBAMATE 1-NAPHTHALENOL(CAS) * METHYLCARBAMATE 1-NAPHTHOL * METHYLCARBAMIC ACID,1-NAPHTHYL ESTER * N-METHYLCARBAMIC ACID, 1-NAPHTYL ESTER * N-METHYL-1-NAFTYLCARBAMAAT(NLD) * N-METHYL-1-NAPHTHYL-CARBAMAT(DEU) * N-METHYL-alpha-NAPHTHYLCARBAMATE * N-METHYL-1-NAPHTHYL CARBAMATE * N-METHYL-alpha-NAPHTHYLURETHAN * N-METIL-1-NAFTILCARBAMMATO(ITA) * NAC * alpha-NAFTYL-N-METHYLKARBAMAT(CSK) * 1-NAPHTHOL N-METHYLCARBAMATE * 1-NAPHTYL ESTER METHYLCARBAMIC ACID * 1-NAPHTHYL METHYLCARBAMATE * 1-NAPHYTHYL N-METHYLCARBAMATE * alpha-NAPHTHYL N-METHYLCARBAMATE * OMS-29 * PANAM * RAVYON * SEPTENE * SEVIDOL * SEVIMOL * 1-NAPHTYL N-METHYLCARBAMATE * SEVIN * SOK * TRICARNAM * UC-7744 * UNION CARBIDE 7,744

MP: 142°C FP: 193°C o-cup DEN:1.2g/ml
FL: 20.3g/m^3
VP: 5.4 x 10^{-6}kPa(4.1 x 10^{-5}mmHg) 25°C
AQSOL: 40mg/l(30°C)

IMPUR: BIS(NAPHTYLCARBAMATE) * METHYLAMINE * METHYLAMINE HCL * alpha-NAPHTHOL * beta-NAPHTHOL * beta-NAPHTHOL METHYLCARBAMATE * 1-NAPHTHYL-4-DIMETHYL-AMINOBENZOATE * WATER

DOLPM* -,Ca-9(-)

PRODUCTION/CONSUMPTION

USA 20tt-p(76) 24tt-p(72) 25tt-p(71)
DEU 5-10tt-p/Y

USA 12tt-c(72)

£IAR12 12,38(76) £NASPA 1,-(76) EPAPP* -,-(74) EPAWP* 5,-(72)

PRODUCTION PROCESS(ES)

Reaction of phosgene with 1-naphthol followed by reaction with methylamine	£NASDW(77)AROPAW 41,572(49)
Reaction of 1-naphthol with methyl isocyanate	£IAR12(76)EPAPP* -,-(74)

USES

insecticide
acaricide
molluscicide

£IAR12 12,38(76)

CONCENTRATIONS

aq,frs	NLD,rvr	0.2µg/l (72)	STEVA8 1,253(72)
food,plt	USA,sbd	6µg/kg(71)	PEMJAA 8,110(74)
food,plt	USA,sbd	0.5mg/kg(71)	PEMJAA 8,110(74)
food,plt	USA,sbd	20µg/kg(72)	PEMJAA 9,94(75)
food,plt	USA	0.5mg/kg(74)	FDABF* -,-(77)
food,plt	USA	11µg/kg(av)(65-69)	PEMJAA 5,73(71)

BIODEGRADATION

aq,mar		-,-/-	water soluble products	0-10%/7D	BECTA6 13,666(75)
aq,mar	CO2	11%/3Wk		-,-/-	JAFCAU 15,148(67)
soil	CO2	2.2%/32D		-,-/-	JAFCAU 20,975(72)
soil-p		-,-/-	1-naphthol	-/-	SBIOAH 3,337(71)

PHOTODEGRADATION

- ,sun	- / -	1-naphthol;methylisocyanate-/-	ANYAA9 160,82(69)

HYDROLYSIS

aq,8°C	-/-	1-naphthol 10%/28D	JAFCAU 15,148(67)
aq,20°C	-/-	1-naphthol 43%/17D	JAFCAU 15,148(67)
aq,pH8	99%/9D	-,-/-	WATRAG 5,1191(71)
aq,pH8,17°C	50%/115.2H	-,-/-	JAFCAU 15,148(67)
aq,pH8,20°C	50%/84H	-,-/-	JAFCAU 15,148(67)
aq,pH8,28°C	50%/24H	-,-/-	JAFCAU 15,148(67)

ADSORPTION

soil	-,-/-	JEVQAA 5,91(76)

LOSS

aq,28°C	93%/8D	-,-/-	JAFCAU 15,148(67)
aq,3.5°C	9%/8D	-,-/-	JAFCAU 15,148(67)
soil	50%/8D	-,-/-	JAFCAU 13,235(65)
soil	100%/40D	-,-/-	JAFCAU 13,235(65)
aq,frs	95%/1Wk	-,-/-	ESTHAG 5,541(71)

MODEL ECOSYSTEM STUDIES

trr	JAFCAU 20,732(72)
trr	JAFCAU 20,608(72)
aq	JAFCAU 15,148(67)

ENVIRONMENTAL FATE

soil to aq,grnd	field	0.14%/-	JAFCAU 22,860(74)
soil loss	field	94%/16Mo	JEVQAA 5,91(76)

CLEARANCE TIME

fsh,stat 100%/24H	TOMWA* 547,37(66)

MAMMALIAN METABOLITES

- 1-naphthol-N-hydroxymethyl carbamate; 1-naphthol; 3,4-dihydro-3,4-dihydroxy carbaryl; 5,6-dihydro-5,6-dihydroxy carbaryl; 4-hydroxycarbaryl; 5-hydroxycarbaryl
  DOLPM* -,Ca-47(-)

rat S-(4-hydroxy-1-naphthyl)-cysteine; S-(5-hydroxy-1-naphthyl)-cysteine
AJBSAM 24,535(71)

rat,pig,dog,hmn,mky,gpg,shp 5,6-dihydro dihydroxy carbaryl glucuronide; hydroxycarbaryl glucuronide; 1-naphthyl glucuronide; hydroxycarbaryl sulfate; 1-naphthyl sulfate
DOLPM* -,Ca-52(-)

rat,gpg 1-naphthyl methylcarbamate N-glucuronide £NSHCA -,179(76)

rat,gpg,mky,pig,shp,dog,hmn 1-napthyl methylimido-carbonate-O-glucuronide
£NSHCA -,179(76)

rat,gpg,mky,pig,shp,hmn 4-(methylcarbamoyloxy)-1-naphthyl glucuronide
£NSHCA -,179(76)

rat,gpg,mky,shp 4-(methylcarbamoyloxy)-1-naphthyl sulfate £NSHCA -,179(76)

MAMMALIAN TOXICITY ARRAY

0.06mg/kg	-	- -hmn	NEL	£FAOP3 -,147(75)
0.12mg/kg	6Wk	orl-man	URS:fnc	£NSHCA(76)CTOXAO 1,265(68)
0.23mg/kg	8Wk	orl-rbt	IMM:fnc,str	TXAPA9 32(3),587(75)
0.56mg/kg	1x	ipr-rat	SON:bhv	£NSHCA(76)CTOXAO 6,97(73)
0.7mg/kg	3.5Mo	orl-mus	END:fnc	£FAOP3(75)GISAAA 8,119(70)
0.76mg/kg	11Mo	orl-rbt	HEM:bcm ANS:bcm	£FAOP3(75)FATOAO 33(2),219(70)
2mg/kg	4GN	orl-rat	REP:fnc,str	£NSHCA(76)VPITAR 30,42(71)
2.8mg/kg	1x	orl-hmn	SKN:fnc,sns,trt	£NSHCA(76)XPHBAO 476,44(63)
6.25mg/kg	62DP	orl-dog	FET:ter,dth	£NSHCA(76)TXAPA9 13,392(68)
7.6mg/kg	11Mo	orl-rbt	LVR:bcm	£FAOP3(75)FATOAO 33(2),219(70)
8.6mg/kg	12x,4Wk	ipr-mus	PUL:neo	£IAR12(76)CNREA8 29,2184(69)
10mg/kg	-	orl-rat	NEL	£FAOP3 -,147(75)
18mg/kg	2Y	orl-rat	LVR,URS:str-siz	£NASDW -,646(77)
20mg/kg	50D	orl-rat	SON:bhv CNS:cng,fnc ANS:bcm	TXAPA9 27,465(74)
50mg/kg	1x	orl-hmn	LDLo	27ZTAP 3,127(69)
89mg/kg	1x	orl-rat	LD50	ITIIT* -,-(75)
280mg/kg	1x	orl-gpg	LD50	PCOC** -,192(66)
4000mg/kg	1x	skn-rat	LD50	TXAPA9 2,88(60)
5700mg/kg	1x	orl-man	CNS,PUL:str MLT:crc,dth	£NSHCA(76)ATXKA8 24,309(69)
-	1x,ACC	orl-man	GIT,ANS,SNS:fnc SKN:cng,trt	£NSHCA(76)IAANBS 26,50(70)
-	1x,ACC	orl-man	GIT:fnc EYE:irr SON:msc,sns,trt	£NSHCA(76)IAANBS 26,50(70)
-	1x,ACC	orl-chd	EYE,GIT,CNS:fnc	£WHOP1(67)JOCMA7 4,507(62)
2mg/m^3	3DI	ihl-hmn	ANS:bcm	£NSHCA(76)GISAAA 32,29(67)
20mg/m^3	6H	ihl-cat	ANS:bcm	£NSHCA(76)GISAAA 32,29(67)
390mg/m^3	4H	ihl-gpg	SNS:irr PUL:crc	£NSHCA(76)JAFCAU 9,30(61)

CARCINOGENICITY

mus-orl	4.64mg/kg	18Mo	nef	£NSHCA(76)JNCIAM 42,1101(69)
rat-orl	19.8mg/kg	2Y	nef	£IAR12(76)VPITAR 29,71(70)
mus-ipr	20mg/kg	12x,4Wk	PUL:neo	CNREA8 29,2184(69)
rat-imp	20mg/kg	22Mo	nef	£IAR12(76)VPITAR 29,71(70)
rat-orl	30mg/kg	22Mo	UNS:neo	JAFCAU 9,30(61)
mus-scu	57mg/kg	5MoI	nef	£IAR12(76)JAFCAU 9,30(61)

eval: "In one study in rats with relatively low survival rates, carbaryl produced sarcomas following its oral but not after its subcutaneous administration. In one study in mice by oral administration, no carcinogenic effect was observed. The available data do not allow an evlauation of the carcinogenicity of carbaryl to be made."

£IAR12 12,47(76)

"Not positive - Data acceptable, testing adequate results judged negative for tumour induction in at least two species"

£DHEWP -,469(69)

MUTAGENICITY

mus-par	20mg/kg 20D	CHR:nef	BECTA6 14,205(75)
rat-orl	100mg/kg 224D	PHN:nef	£IAR12(76)TXAPA9 26,621(73)
mus-orl	1000mg/kg 5x	PHN:nef	£NSHCA(76)TXAPA9 23,288(72)
mcr	PHN:nef		JAFCAU 24,560(76)
ins	CHR,PHN:cng		CUSCAM 41,855(72)
hcc	CHR:cng		£IAR12(76)BEBMAE 73,91(72)

NEUROTOXICITY/BEHAVIOUR

rat-ipr	0.56mg/kg 1x	SON:bhv			£NSHCA(76)CTOXAO 6,97(73)
mky-orl	1.0mg/kg 18Mo	inc			£NSHCA(76)TXAPA9 19,147(71)
rat-scu	10mg/kg 2Wk,2x	SON:bhv			£NSHCA(76)PHBHA4 9,459(72)
pig-ivn	20mg/kg 1x	SON:msc	CNS:fnc	PNS:fnc	£NSHCA(76)PICLA* -,45(73)
rat-orl	20mg/kg 50D	SON:bhv	CNS:cng,fnc	ANS:bcm	TXAPA9 27,465(74)
ckn-scu	2000mg/kg 1x	SON,msc			£NSHCA(76)JAFCAU 9,30(61)

POTENTIATION

rat	dioxathion
rat	malathion
rat	dichlorofenthion ("Mobilawn")
rat	parathion
rat	diazinon

TXAPA9 10,586(76)

PRIMARY IRRITATION

rbt-ocu	EYE:fnc,crc	£NSHCA(76)GISAAA 32,29(67)
rbt-skn	SKN:nef	£NSHCA(76)JAFCAU 9,30(61)

REPRODUCTION

rat-orl	2mg/kg 4GN	REP:str,fnc	FET:dth		£NSHCA(76)VPITAR 30,42(71)
mus-orl	34mg/kg -	REP:end			ENVRAL 7,381(74)
mky-orl	40mg/kg 18-40DP	REP:nef			£FAOP3(75)AMCPT* -,-(73)
rat-orl	100mg/kg 3GN	REP:fnc	FET:dth		£NSHCA(76)TXAPA9 26,621(73)
mus-orl	400mg/kg 3GN	REP:nef			JANSAG 37,243(73)
rat- -	200mg/kg 90DI	REP:nef			ENVRAL 12,161(76)

SENSITIZATION

rbt-idr	SKN:all	£NSHCA(76)JAFCAU 9,30(61)

TERATOGENICITY

dog-orl	6.25mg/kg DP	FET:str	£NSHCA(76)TXAPA9 13,392(68)
mky-orl	20mg/kg 20-38DP	FET:nef	£NSHCA(76)UCTR** -,-(75)
mus-orl	100mg/kg 6-14DP	FET:str	BIORC* -,-(69)
rat-orl	200mg/kg P	FET:str,dth	AXVMAW 29,607(75)
gpg-orl	200mg/kg 10-24DP	FET:nef	£NSHCA(76)TXAPA9 26,621(73)
gpg-orl	300mg/kg 1xP	FET:str	£NSHCA(76)TXAPA9 15,152(69)

AQUATIC TOXICITY

crs	1µg/l	24H	LC50	PNJME* 55,-(78)
crs,lar,mar	3.2µg/l	25D	ret	OUBUC* -,56(70)
fsh	10µg/l	2Wk	ret	TAFSAI 104,135(75)
crs,lar,mar	10µg/l	96H	LC50	OUBUC* -,56(70)
fsh,emb,mar	10µg/l	-	SKM:str	BMDBL* 15,24(75)
fsh,juv	0.1mg/l	5Mo	LVR:str	TAFSAI 90,264(61)
mol,lar	0.33mg/l	10D	ret	EPASP* -,-(75)
fsh	0.68mg/l	9Mo	rep	JFRBAK 29,583(72)
fsh	0.745mg/l	96H	LC50	TAFSAI 99,20(75)
fsh,juv	1.0mg/l	96H	LC50	CAFGAX 60,128(74)
plt	1mg/l	-	ret	WSWOAC 116,172(69)
mcr	1.0mg/l	4H	rep	CFWSW* 167,11(63)
fsh	1.33mg/l	15H	ANS:bcm	PRMBP* -,93(77)
mol,juv,mar	1.8mg/l	15D	ret	OUBUT* -,54(68)
mol,juv,mar	3.85mg/l	96H	LC50	OUBUT* -,54(68)
fsh	5mg/l	2H	bhv	TOMWA* 547,37(66)
mol,egg	5mg/l	-	dth(100%)	CFREAK 23,8(61)
fsh,emb	10mg/l	4.5D	FET:str	TJADAB 10,263(74)
mol	10.3mg/l	96H	fnc	EPASP* -,-(75)
mol	15mg/l	96H	str	MBIOAJ 28,11(74)

TERRESTRIAL TOXICITY

mcr	1mg/kg	-		ret	AMAHA5 19,97(72)
ins	4.5mg/kg diet	-	-	dth(50%)	AECTCV 1,362(73)
brd	56mg/kg	1x	oral	LC50	TXAPA9 21,315(72)
brd	-	-	-	LVR:bcm	CBPBB8 44,1137(73)
mcr	-	-		bcm	JEVQAA 5,15(76)

SAMPLING/PREPARATION/ANALYSIS

air-COLM	Det: 1.96mg/m^3	£NSHAM 3,3273(77)

TREATMENT OF POISONING

£NSHCA -,165(76)

RECOMMENDATIONS/LEGAL MECHANISMS

FAO/WHO	REC	hmn:food(sel) - MRL:limits		£FAOP4 -,84(77) RED Nov(79)
DEU	REC	air:occ - MAK:5mg/m^3		DFSK** -,18(79) RED Nov(79)
SUN	REG	air:occ - MAC: 1mg/m^3	Eff: 1 Jan(77)	£ILOOE -,65(77) RED Nov(79)
USA	REG	aq:emi - HQ 45.4kg/24H	Eff:12 Jun(78)	FEREAC 43,10489(78) RED Nov(79)
USA	REG	air:occ - TWA:5mg/m^3		FEREAC 39,23540(74) RED Nov(79)
USA	REC	air:occ - TLV-TWA:5mg/m^3		ACGIH* -,12(79) RED Nov(79)
USA	REG	air:occ - TLV-STEL:10mg/m^3		ACGIH* -,12(79) RED Nov(79)
USA	REG	hmn:food(agr) - limits		FEREAC 40,17841(75) RED Nov(79)
USA	REG	hazardous substance	Eff:12 Jun(78)	FEREAC 43,10489(78) RED Nov(79)

3.3 CADMIUM

3.3.1 CADMIUM (generic)

IRPTC NU: 000004
DEF: Cadmium and cadmium compounds (specific compound not defined)

SYN: Cadmium compounds * EV0260000(RTECS)

PRODUCTION/CONSUMPTION

WLD	17000t-p(73)	16500t-p(70)	
WLD	16524t-p(72)	17333t-p(69)	13566t-p(67)
WLD	124207t-p(60-69)	74999t-p(50-59)	
EEC	3415t-p(72)	3042t-p(69)	2246t-p(67)
BEL	1279t-p(73)	947t-p(71)	949t-c(67)
DEU	1221t-p(73)	982t-p(71)	792t-p(69)
ESP	556t-p(60-69)	72t-p(50-59)	
FRA	606t-p(73)	579t-p(71)	523t-p(69)
GBR	314t-p(73)	262t-p(71)	245t-p(69)
ITA	449t-p(77)	435t-p(76)	395t-p(75)
ITA	397t-p(73)	350t-p(71)	422t-p(69)
NLD	31t-p(73)	123t-p(71)	111t-p(69)
USA	3360t-p(73)		
USA	3760t-p(72)	5736t-p(69)	3046t-p(67)
YUG	718t-p(60-69)	84t-p(50-59)	
WLD	17813t-c(73)	15000t-c(71)	18222t-c(69)
EEC	5868t-c(72)	6087t-c(69)	4579t-c(67)
BEL	1357t-c(73)	703t-c(71)	676t-c(69)
DEU	2183t-c(73)	1788t-c(71)	2298t-c(69)
DNK	20t-c(72)	24t-c(70)	22t-c(67)
FRA	1150t-c(73)	969t-c(71)	1190t-c(69)
GBR	1563t-c(73)	15000t-c(71)	18222t-c(69)
ITA	430t-c(73)	320t-c(71)	350t-c(69)
NLD	94t-c(72)	72t-c(70)	32t-c(67)
USA	5391t-c(72)	6832t-c(69)	5252t-c(67)

CECCD* -,20(77) £CECCD -,17(78) CECME* -,62(77) £IAR11 11,44(76)

USES

metal plating
plastics stabilizers
pigments
batteries
alloys
fungicides
control rods for nuclear reactors
fluorescent lamps
phosphors for TV tubes
luminescent dials
photography
lithography
engraving
curing rubber

£CECCD(78)NDPFAI 22,164(71) £CECCD(78)ATENBP 7,353(73) £IAR11 11,44(76)

PATHWAYS INTO THE ENVIRONMENT

load	USA	2.5-3.6tt(68)	ORNLC* -,61(73)
wst to air	USA	1.5tt(68)	EVHPAZ 7,253(74)
natur	USA	5tt/Y	EPACD* 4,242(78)
wst to aq	USA,cty	120kg/D	JWPFA5 46(12),2653(74)
wst to aq	USA,SW,cst	55.4t(74)	SCCWR* -,19(76)
wst to aq	USA,SW,cst	45t(76)	SCCWR* -,19(76)
wst to aq	USA	1316000tt/10Y	EVHPAZ 28,5(79)
wst to air	USA	745000tt/10Y	EVHPAZ 28,5(79)
wst to soil	USA	58103000tt/10Y	EVHPAZ 28,5(79)

CONCENTRATIONS

aq,mar	WLD	50ng/l(av)	£CECCD(78)RREVAH 48,1(73)
aq,mar	WLD	0.14µg/l(av)	£NRCCD -,26(79)
aq,mar	BALs	0.12mg/l AAS(75)	24NPAY 6,155(78)
aq,mar	ARCo	<0.1mg/l AAS(76)	NOAAR* 8,199(78)
aq,mar	NOR,cst	0.5-3.1µg/l AAS(76)	JEMBAM 37,27(79)
aq,mar	LBN,cst	0.01-0.03mg/l AAS(77)	HYDRB8 63,105(79)
aq,mar	USA,SEcst	1.17mg/l AA	BECTA6 21,53(79)
aq,mar	MEDs	2.8µg/l ASV(75)	MPNBAZ 9,71(78)
aq,mar	MEDs,NE	21-79ng/l ASV(75)	ZANCA8 282,357(76)
aq,est	GBR,NEcst	0.7mg/l AAS(77)	MPNBAZ 10,170(79)
aq,est	USA,Wcst	0.24µg/l AAS(76)	ESTHAG 13,425(79)
aq	WLD,cty	10µg/l	£IAR11(76)CCCDE* -,-(74)
aq,frs	WLD	0.3µg/l(av)	£NRCCD -,26(79)
aq,frs	USA,lak,rvr	1-10µg/l	£CECCD(78)ORNLC* -,-(73)
aq,frs	EEC,rvr	0-1.2µg/l	£CECCD(78)BOUQJ* -,-(73)
aq,frs	EEC,rvr,pol	0-10µg/l	£CECCD(78)BOUQJ* -,-(73)
aq,grnd	WLD	0.05µg/l(av)	£NRCCD -,26(79)
aq,drk	WLD	5µg/l	£CECCD -,40(78)
aq,drk	EEC	1.1µg/l(av)	£CECCD(78)HDWPH* -,-(75)

air,mar	BEL,cst	1-12ng/m^3 XE(72-77)	ATENBP 13,267(79)
air	WLD,rur	0.1-43ng/m^3	£CECCD -,29(78)
air	WLD,cty	2-700ng/m^3	£CECCD -,29(78)
air	WLD,ind	0.01-5µg/m^3	£CECCD -,29(78)
soil	WLD	0.07mg/kg(av)	£NRCCD -,24(79)
soil	WLD	0.4mg/kg(av)	EVHPAZ 7,253(74)
soil	USA,sbd,ind	660-770µg/kg(av)	ESTHAG 6(6),560(72)
soil	USA,sbd,rur	570µg/kg(av)	ESTHAG 6(6),560(72)
soil	USA,sbd,cty	410µg/kg(av)	ESTHAG 6(6),560(72)
sed,mar	BERs,N	<0.1mg/kg AAS(76)	NOAAR* 8,199(78)
sed,mar	USA,NWcst	0.25mg/kg AAS	NOAAR* 8,199(78)
sed,mar	USA,SEcst	1.88mg/kg wwt AA	BECTA6 21,53(79)
sed,mar	USA,SWcst	80mg/kg dwt AAS(75)	SCCWR* -,63(77)
sed,mar	FRA,Scst	0.18mg/kg(76-77)	RVOMAY 47,91(77)
sed	ISR,rvr	0-123mg/kg	ENVPAF 6(4),281(74)
sed	USA,N,lak	2.1-4.6mg/kg(av)	ESTHAG 8(2),165(74)
sed	BALsE	0.17-1.9mg/kg	EQSFAP 2,230(73)
sed	USA,W,cst	0.5mg/kg(av)	DLLBL* -,37(74)
food,plt	WLD	10-100µg/kg	£IAR11(76)CCCDE* -,-(74)
food,plt	JPN,pol	0.1-1mg/kg	£IAR11(76)CCCDE* -,-(74)
food,ani	WLD	10µg/kg wwt	£IAR11(76)CCCDE* -,-(74)
food,ani,tiss	WLD	1mg/kg wwt	£IAR11(76)CCCDE* -,-(74)
hmn,bld	WLD	<0.01mg/l	EPACD* 4,129(78)
hmn	USA	15-30mg/70kg	EPACD* 4,131(78)
hmn	GBR,SWE	15-20mg/70kg	EPACD* 4,131(78)
hmn	JPN	40-80mg/70kg	EPACD* 4,131(78)
ani,trr	-	0.001-50mg/kg wwt	£NRCCD -,28(79)
plt,trr	-	0.001-6.6mg/kg wwt	£NRCCD -,28(79)
brd	USA	<5-240µg/kg(71)	PEMJAA 7(1),67(73)
mam,mar	BERs	<0.3-108.7mg/kg dwt(77)	NOAAR* 8,199(78)
mam,mar	MEDs,W	0.001-28.73mg/kg wwt AA	AIOM** 54,5(78)
fsh,mar	USA,NWcst	<0.13mg/kg dwt(77)	NOAAR* 8,199(78)
fsh,mar	MEDs,W	0.06-0.66mg/kg wwt AA	AIOM** 54,5(78)
fsh,mar	ISR,cst	0.33mg/kg dwt AAS(74)	ESTHAG 11,265(77)
fsh,mar	MEDs,NE	0.34mg/kg wwt(74-75)	RVOMAY 49,41(78)
mol,mar	SWE,cst	0.6-7.6mg/kg dwt AAS(77)	ENVPAF 18,31(79)
mol,mar	MEDs,C	0.28mg/kg dwt AAS(76)	BSIBAC 53,471(77)
mol,mar	BERs	4.0-7.3mg/kg dwt(76)	NOAAR* 8,199(78)
mol,mar	USA,NWcst	2.5-10.3mg/kg dwt(76)	NOARR* 8,199(78)
mol,est	USA,rvr	0.16mg/kg wwt(75)	WAPLAC 9,225(78)
crs,mar	USA,NWcst	<0.05-0.1mg/kg dwt(77)	NOAAR* 8,199(78)
crs,mar	BERs	<1.3-3.8mg/kg dwt(76)	NOAAR* 8,199(78)
crs,mar	USA,SEcst	1.19mg/kg wwt AA	BECTA6 21,53(79)
crs,mar	MEDs,W	0.06-0.66mg/kg wwt AA	AIOM** 54,5(78)
crs,mar	MEDs,NE	0.54mg/kg wwt(75-76)	RVOMAY 49,41(78)
plt,mar	LBN,cst	<0.4-2.6mg/kg dwt AAS(77)	HYDRB8 63,105(79)
plt,mar	USA,NWcst	2.3-4.3mg/kg dwt(76)	NOAAR* 8,199(78)
plt,mar	BERs	3.1-6.4mg/kg dwt(76)	NOARR* 8,199(78)
mcr,mar	MEDs,N	0.15-2.2mg/kg ASV(75)	ZANCA8 282,357(76)
inv,mar	USA,SEcst	1.75mg/kg wwt AA	BECTA6 21,53(79)
plt,mar	-	0.1-2.0mg/kg wwt	£NRCCD -,28(79)
ani,mar	-	0.001-38mg/kg wwt	£NRCCD -,28(79)

ADSORPTION

solution of humic acids	-,358µmole/l	ORNLB* -,176(74)
sediment,10.1% org,pH7.45,0% sal	-,500mg/kg dwt/72H	BECTA6 21,763(79)
sediment,0% org,pH8.1	-,90%/96H	JOSJP* 30,216(74)
sediment,100% org,pH8.1,0% sal	-,35%/96H	JOSJP* 30,216(74)

MODEL ECOSYSTEM STUDIES

aq	WOICD* -,1(73)
aq	NOAAR* 8,199(78)
aq,trr	ESTHAG 13,546(79)
trr	£NRCCD(79)ENVPAF 4,7(73)

ENVIRONMENTAL FATE

air to aq	Ns	230t/Y	£GESAM 2,-(76)
air to aq	Ns	390t/Y(74-76)	MSCOM* 5,175(79)
aq,frs to aq,mar	USA,SEcst	3t/Y	GCACAK 40,573(76)
soil to aq,mar	USA,SEcst	0.7t/Y	GCACAK 40,573(76)
aq,mar to sed	USA,SEcst	10.7t/Y	GCACAK 40,573(76)
aq,rvr to aq,mar	SLWg	120t/Y	ICESR* E:25,-(77)
soil,loss	field	50%/1.98-11Y	21OWA5 7,117(74)
biota to soil	field	- / -	ORNLM* -,75(75)
biota to soil	field	0.1%/2Mo	AEMBAP 40,125(73)
soil to aq	field	4.5%/27D	AEMBAP 40,125(73)
food to hmn	CAN	50-98µg/D	£NRCCD -,93(79)
food to hmn	USA	60µg/D	£NRCCD -,95(79)
food to hmn	JPN	47-59µg/D	£NRCCD -,95(79)
food to hmn	DEU	48µg/D	£NRCCD(79)AHBAAM 153(6),490(69)

BIOCONCENTRATION FACTOR

fsh	flow,0.15mg/l	10.5/2Wk wwt	NOARV* -,41(77)
fsh	stat, 13mg/l	25.4/180D wwt	CBPBB8 61C,177(78)
fsh	stat, 0.5mg/l	88/3D dwt	AMBOS* 5,-(77)

MAMMALIAN METABOLITES

- metallothionein-bound cadmium	EPACD* -,134(78)

MAMMALIAN TOXICITY ARRAY

1.2mg/kg	12Wk	orl-rat	LVR,URS:bcm	EVHPAZ 28,115(79)
3mg/kg	10D	orl-rat	SON:bhv	JONUAI 109(5),767(79)
-	OCC	- -hmn	SKN:cng-sns	UGLAAD 141(16),1105(79)
-	OCC	- -hmn	URS:fnc,bcm	EVHPAZ 28,137(79)
-	OCC	- -hmn	URS,PUL:cng-dth	EVHPAZ 28,199(79)
1.5mg/m^3	14YI	ihl-hmn	UNS:car	ANYAA9 -,256(77)

CARCINOGENICITY

eval: "Available studies indicate that occupational exposure to cadmium in some forms (possible the oxide) increases the risk of prostate cancer in man. In addition, one suggests an increased risk of respiratory tract cancer."

£IAR11 11,64(76)

NEUROTOXICITY/BEHAVIOUR

rat-orl	3mg/kg	10D	SON:bhv	JONUAI 109(5),767(79)

TERATOGENICITY

rat-ivn	1.25mg/kg	1x,9-15tDP	FET:ter,bcm	EVHPAZ 28,245(79)

AQUATIC TOXICITY

crs	0.7µg/l	-	rep		JFRBAK 29,1691(72)
fsh,frs	1µg/l	21D	REP:end		£NRCCD(79)BIREBV 11,429(74)
fsh,juv	2.5µg/l	30D	PUL:oxy		CPSCAL 18,353(77)
crs	2.6µg/l	-	bhv		EPAWQ* -,-(73)
fsh,est	5µg/l	9Wk	HEM:bcm,osm	SON:bcm	AMBOS* 5,-(77)
mcr	5µg/l	17D	ret		COREAF 282,633(76)
mcr	6.1µg/l	-	bcm		£NRCCD(79)BECTA6 12,442(74)
crs	6.4µg/l	23D	ret,rep		BECTA6 19,80(78)
fsh	7.5µg/l	70D	SKL:str		£NRCCD(79)AMBOCX 4,166(75)
mol,frs	10µg/l	28D	LC50		£NRCCD(79)ENVPAF 15,195(78)
fsh	10µg/l	60D	bcm		PRMBP* -,209(77)
plt	10µg/l	-	ret,str,bcm		£NRCCD(79)WPRC** 7,59(72)
mcr	50µg/l	17D	dth		MBIOAJ 42,17(77)
crs	65µg/l	48H	LC50		JFRBAK 29,1691(72)
crs	75µg/l	10D	str		PRMBP* -,131(77)
crs,mar	90µg/l	96H	LC50		JFRBAK 35,1366(78)
mcr,frs	650µg/l	-	dth		WATRAG 8,7(74)
plt,mar	0.1mg/l	-	ret		ECMSC6 7,531(78)
fsh,mar	0.15mg/l	2Wk	SKN:irr		NOARV* -,41(77)
crs,juv,mar	0.32mg/l	96H	LC50		BECTA6 21,74(79)
mol,mar	1.25mg/l	1H	SON:act		JOSK** 13,35(78)
mol,mar	1.86mg/l	1H	LC50		JOSK** 13,35(78)
mol	2.5mg/l	96H	LC50		AECTCV 6(2/3),315(77)
mol,lar	6mg/l	24H	LC50		GFCMR* 3,-(78)
fsh,emb	10mg/l	-	FET:str		JFIBA9 11,49(77)
crs,egg	10mg/l	3Wk	bcm		ICESR* E:43,-(77)
fsh	22mg/l	96H	LC50		AECTCV 6(2/3),315(77)
fsh	27mg/l	-	LVR:bcm		EPAWQ* -,-(73)
fsh	50mg/l	-	GIT,URS,PUL:str		EPAWQ* -,-(73)
mcr,sew	142mg/l	-	oxy		EPAWQ* -,-(73)

TERRESTRIAL TOXICITY

plt	10µg/l	-	-	ret			JEVQAA 1(3),288(72)
plt	0.5mg/l	-	-	ret,dth			WPRC** -,59(72)
plt	0.83mg/l	-	-	bcm,ret			BECTA6 9(2),100(73)
plt	2.5mg/kg	-	-	ret			IIEQ** -,69(74)
brd	6.6mg/kg	1x	ims	REP:str			JONUAI 104(3),323(74)
plt	10mg/l	-	-	str			PHPLAI 26,310(72)
mcr	10mg/kg	-	-	ret			£NRCCD(79)EVHPAZ 10,263(75)
brd	75mg/kg	diet 6Wk	orl	REP:ret	HEM:ret,str	HRT:str	JONUAI 104(3),323(74)
mcr	100mg/kg	-	-	bcm			£NRCCD(79)EVHPAZ 4,103(73)

SAMPLING/PREPARATION/ANALYSIS

air-AAS	Det: 0.001µg/ml	£NSHAM 1,173(77)
air-ASV	Det: 8ng	£NSHAM 1,191(77)
bld-ASV	Det: 2ng/ml(samp 1ml)	£NSHAM 1,223(77)
urn-ASV	Det: 1µg/l(samp 1ml)	£NSHAM 1,224(77)

RECOMMENDATIONS/LEGAL MECHANISMS

FAO/WHO	REC	hmn:	- AWI:400-500µg	£WHOF1 -,57(72)	RED Nov(79)
DEU	REC	air:occ	- MAK:0.05mg/m^3	DFSK** -,18(79)	RED Nov(79)
GBR	-	air:emi	- 0.017 grains/ft^3(38.9mg/m^3)	EPAWA* -,111(74)	RED Nov(79)
JPN	REG	aq:imi	- ML:0.01ppm	EAJLR* -,-(76)	RED Nov(79)
JPN	REG	aq:emi	- PL:0.1mg Cd/l	EAJLR* -,-(76)	RED Nov(79)
JPN	REG	air:emi(sel ind)	- MPC:1.0mmg/m^3	EAJLR* -,-(76)	RED Nov(79)
SWE	REC	air:occ	- ML-TWA:0.05mgCd/m^3	£ILOOE -,61(77)	RED Nov(79)
USA	REC	aq:imi	- limits	£EPAQC -,27(76)	RED Nov(79)
USA	REG	aq:drk	- MPC:0.01mg/l AAS Eff: 24 Jun(77)	FEREAC 40,59570(75)	RED Nov(79)
USA	REG	aq:drk(bottled)	- MPC:0.01mg/l	FEREAC 42,14325(77)	RED Nov(79)
USA	REC	air:occ	- TLV-TWA:0.05mg Cd/m^3	ACGIH* -,11(79)	RED Nov(79)
USA	REC	air:occ	- TLV-STEL:0.2mg Cd/m^3	ACGIH* -,11(79)	RED Nov(79)

3.3.2 CADMIUM CHLORIDE

IRPTC NU: 000005
CAS NU: 10108-64-2 MOLFM: CdCl2 MOLWT: 183.30
WLN: CDG2

SYN: CADDY * CADEX(CAN) * CADMIUM DICHLORIDE * DICHLOROCADMIUM * KADMIUM CHLORID(DEU) * L.T.F. LIQUID TURF FUNGICIDE(CAN) * EV0175000(RTECS) * NATIONAL CHEMSEARCH C-A-D(CAN) * POLYGRAM-C TURF FUNGICIDE(CAN) * 000456 0 (ECDIN)

MP: 568°C DEN: 4.05g/ml,25°C
BP: 960°C
AQSOL: 1.4kg/l,20°C

IMPUR: IRON * COPPER

PRODUCTION PROCESS(ES)

Reaction of cadmium metal with hydrochloric acid £IAR11 11,45(76)

USES

pesticide
photographic materials
phosphors
dyeing
printing of textiles
thermoionic emission coatings for electronic vacuum tubes
lubricant ingredient
in manufacture of special mirrors
in vacuum tube industry
in manufacture of cadmium yellow
ingredient in fungicides
in galvanoplasty
ice-nucleating agent
in analysis of sulfides

£IAR11 11,46(76) £NRCCD -,42(79)

MAMMALIAN METABOLITES

mus cadmium-thionein £NSHCD(76)ARPAAQ 99,192(75)

MAMMALIAN TOXICITY ARRAY

91.5µg/kg 1x	itr-rat	PUL:bcm	BCPCA6 28(3),381(79)
0.2mg/kg 335D	orl-rat	LVR:bcm	RRBCAD 7,299(70)
0.33mg/kg 1x(7DP)	scu-mus	FET:str,dth	£CECCD(78)INHEAO 11,127(73)
0.63mg/kg 1Y	orl-rat	HEM:prs CVS,URS:str	EXMPA6 10,81(69b)
0.75mg/kg 6Mo	orl-rat	SKL:cng HEM:str	£NSHCD(76)JPETAB 72,15(41)
0.85mg/kg 4x	scu-rat	SKN:neo	£IARC1(72)ARPAAQ 83,494(67)
1.0mg/kg 45D	ipr-rat	END:siz,bcm	£NSHCD(76)FEPRA7 35,75(76)
1.4mg/kg 1x	scu-rat	REP:str	£NSHCD(76)ANREAK 149,135(64)
2.0mg/kg 55Wk	orl-mky	URS:bcm	EVHPAZ 28,223(79)
2.0mg/kg 7D	scu-rat	PNC:end	£CECCD(78)JPETAB 195,58(75)
2.9mg/kg 6Mo	orl-dog	SKL:bcm	JENPT* 2(4),1151(79)
4.1mg/kg 1x	scu-rat	PNS:str,crc	EXPEAM 22,261(66)
5mg/kg 1x	orl-mus	LD50	£CECCD -,68(78)
10mg/kg 6Mo	orl-rat	SKL:bcm,siz HEM:bcm GIT:fnc	TXAPA9 46(3),625(78)
16mg/kg 54Wk	orl-rbt	SON:bhv PLT:siz	£NSHCD(76)TXAPA9 31,4(75)
33mg/kg 70D	orl-rbt	IMM:fnc	£CECCD(78)AJVRAH 34,1457(73)
88mg/kg 1x	orl-rat	LD50	£CECCD -,68(78)
0.05mg/m^3 7D	ihl-rat	PUL:imm	£CECCD(78)BAUHP* -,-(76)
0.2mg/m^3 66D	ihl-rat	PUL:mlt - siz,dth	£CECCD(78)BAUHP* -,-(76)
8mg/m^3 30M	ihl-dog	LC90	£CECCD -,71(78)

CARCINOGENICITY

rat-scu	5.5g/kg	1x	SKN,REP:neo	£CECCD(78)JNCIAM 51,891(73)
rat-scu	3.7mg/kg	1x	SKN,REP:neo	£IAR11(76)ONCOBS 26,53(72)

eval: "Single or repeated subcutaneous injections of several inorganic cadmium compounds (cadmium chloride...) result in the development of local sarcomas in rats."
"Interstitial-cell tumours of the testis were observed following testicular atrophy in rats and mice given subcutaneous injections of soluble cadmium salts (...cadmium chloride). The pituitary glands of these animals showed castration changes."
"Oral studies in mice and rats were inadequate for evaluation."
£IAR11 11,64(76)

MUTAGENICITY

mus-ipr	1.75mg/kg	-	CHR,PHN:nef	£NSHCD(76)TXAPA9 23,288(72)
ins	DNA,CHR,PHN:nef			CCCDE* -,133(76)
mcc	CHR:nef			NTISC* -,4(76)

NEUROTOXICITY/BEHAVIOUR

rat-scu	4.1mg/kg	1x	PNS:str	£CECCD(78)JNENAD 26,498(67)

REPRODUCTION

ham-scu	7mg/kg	1x	REP:siz,end	BIREBV 19(4),886(79)
rat-par	4.6mg/kg	-	REP:bcm	£CECCD(78)RCOCB8 12,695(75)
mus-ipr	2mg/kg	1x	REP:nef	£CECCD(78)MUREAV 30,365(75)
mus-scu	0.4mg/kg	6MoI	REP:siz,fnc	£CECCD(78)JRPFA4 45,165(75)
rat-orl	3.6µg/kg	4GN	REP:nef	£NSHCD(76)EQSFAP -,-(76)
mus-orl	2mg/kg	DP	FET:ret	AEHLAU 33(1),36(79)

eval: see carcinogenicity

TERATOGENICITY

mus-orl	38.4mg/kg	6-15tDP	FET:ter	£CECCD -,114(78)
rat-ipr	2.5mg/kg	1xP	FET:ter	£CECCD(78)6IHM** -,-(76)

AQUATIC TOXICITY

crs	0.28µg/l	-	rep	£NRCCD(79)JFRBAK 29,1691(72)

TERRESTRIAL TOXICITY

brd	0.5mg/kg 1x	scu	REP:str	IJEBA6 11,108(73)
mcr	6mg/l		ret	JEVQAA 2(3),353(73)
plt	91mg/l		str,osm	AFPSAU 25,121(70)
plt	91mg/l		bcm	BBRCA9 50(4),1120(73)

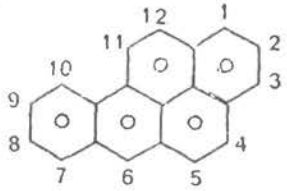
RECOMMENDATIONS/LEGAL MECHANISMS

SWE	REC	poisonous substance	Eff: 22 Dec(78)	STNAF* 5,-(78)	RED Nov(79)
USA	REG	aq:emi - HQ:45.4kg/24H	Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)
USA	REG	hazardous substance	Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)

3.4 CARCINOGENS

3.4.1 BENZO(a)PYRENE

IRPTC NU: 000006
CAS NU: 50-32-8 MOLFM: C20H12 MOLWT: 252.32
STRFM:



£IARC3 3,91(73)

SYN: 3,4-BENZOPIRENE(ITA) * 3,4-BENZOPYRENE * 1,2-BENZOPYRENE(3) * BENZPYRENE * 3,4-BENZPYREN(DEU) * 3,4-BENZPYRENE * 1,2-BENZPYRENE * 3,4-BENZYPYRENE * BP * B(a)P * 3,4-BP * DJ3675000(RTECS)

MP: 179°C DEN: 1.35g/ml
BP: 475°C
AQSOL: 0.012mg/l

PATHWAYS INTO THE ENVIRONMENT

geoph to aq,mar	WLD	10-20t/Y	PSNBS* -,-(74)
wst to air	USA	639-792t(72)	£EPPPO -,A-1(75)

CONCENTRATIONS

aq,drk	WLD	0.1-23.4µg/m^3	£IARC3(73)BWHOA6 43,479(70)
aq	WLD	0.6-114µg/m^3	£IARC3(73)BWHOA6 43,479(70)
aq,mar	JPN,cst	0.004-5.5µg/l	JOSJP* 32,175(76)
air	USA,EUR,cty	0.03-104µg/1000m^3	£IARC3 3,95(73)
air	AUS,cty	2.5-6.5µg/1000m^3	£IARC3(73)IAPWAR 7,753(63)
air	ZAF,cty	16-146µg/1000m^3	£IARC3(73)AIHAAP 26,520(65)
soil	DEU,USA,FRA,ISL,rur	0-127µg/kg	£IARC3 3,99(73)
soil	SUN,FRA,cty	0-939µg/kg	£IARC3 3,99(73)
soil	ISL,cty	785µg/kg	£IARC3 3,99(73)
sed,mar	MALTA,cst	0.12-1.9mg/kg dwt GC(75)	ENVPAF 16,17(78)
sed,mar	JPN,cst	0.04-43mg/kg dwt XF(74)	JOSJP* 32,175(76)
food,ani	WLD	0.02-14.6µg/kg	£IARC3 3,100(73)
food,fsh	WLD	2.1µg/kg	£IARC3 3,100(73)
food,plt	WLD	0.1-62µg/kg	£IARC3 3,101(73)
mol,mar	USA,Wcst	0.1-30.2µg/kg FL	PFEPH* -,421(77)
mol,mar	USA,Wcst	8.2µg/kg wwt	MPNBAZ 7,231(76)

BIODEGRADATION

soil	-,53-82%/8D	-,-/-	WATRAG 9,331(75)

ADSORPTION

estuarine sediment	-,71%/3H	PCPOS* -,611(77)

LOSS

aq,mar	52%/1D	-,-/-	OKNOAR 16(3),259(76)
aq	80-95%/35-40D	-,-/-	CCECAU 4,69(74)

BIOCONCENTRATION FACTOR

fsh	stat,0.1µg/l	61/35D,-	OKNOAR 16(3),259(76)

CLEARANCE TIME

fsh,-	75%/5D	MBIOAJ 17,201(72)

MAMMALIAN METABOLITES

mus	1,2-dihydroxy-1,2-dihydrobenzo(a)pyrene; 9,10-dihyroxy-9,10-dihydrobenzo(a)pyrene; 6-hydroxybenzo(a)pyrene; 3-hydroxybenzo(a)pyrene; 1,6-dihydroxybenzo(a)pyrene; 3,6-dihydroxybenzo(a)pyrene; benzo(a)pyrene-1,6-dione; benzo(a)pyrene-3,6-dione	£NASPO(72)BCPCA6 19,285(70)
-	benzo(a)pyrene-7,8-diol-9,8-epoxide	CAR3L* 3,-(78)
mus	11-hydroxybenzo(a)-pyrene benzo(a)pyrene-7,8-dihydrodiol	CAR3S* 3,-(78)

MAMMALIAN TOXICITY ARRAY

0.48mg/kg	1x	orl-mus	GIT:neo	£IARC3(73)NATUAS 189,164(61)
50mg/kg	1x	par-ham	PUL:str	£EPAAH(76)24UTAD 3(3),135(66
50mg/kg	1x	scu-rat	LD50	£NSHAF -,201(77)
80mg/kg	11-15tDP	ipr-mus	FET:car	£IARC3(73)PSEBAA 135,84(70)
500mg/kg	1x	orl-rat	REP:neo	£IARC3(73)SCIEAS 137,257(62)
1000mg/kg	P	orl-rat	FET:ter	£NSHAF(77) -,201(77)
2µg/m^3	20Y	ihl-hmn	MLT:car,dth	20PYAB 3,-(78)
3µg/m^3	5Y	ihl-hmn	PUL:ifl,car,dth	£NASPO(72)BJIMAG 22,13(65)
10mg/m^3	1YI	ihl-rat	PUL:car	£IARC3(73)XAESAN 18,321(70)

CARCINOGENICITY

eval: "B(a)P has produced tumours in all of the nine species for which data are reported following different administrations including oral, skin and intratracheal routes. It has both a local and a systemic carcinogenic effect. In sub-human primates, there is convincing evidence of the ability of B(a)P to produce local sarcomas following repeated subcutaneous injections and lung carcinomas following intratracheal instillations. It is also an initiator of skin carcinogenesis in mice, and it is carcinogenic in single-dose experiments and following prenatal exposure."
"No epidemiological studies on the significance of B(a)P exposure to man are available, and the studies reported in section 3.3 are insufficient to prove that B(a)P is carcinogenic for man. However, coal-tar and other materials which are known to be carcinogenic to man may contain B(a)P. The substance has also been detected in other environmental situations."

£IARC3 3,115(73)

MUTAGENICITY

ham-ipr	40mg/kg	1x	CHR:cng	20PYAB 3,425(78)
ham-ipr	500mg/kg	1x	CHR:nef	20PYAB 3,424(78)
mus- -	-	-	PHN:cng	£NSHAF(77)NATUAS 219,385(68)
mcr	PHN:cng			£NSHAF(77)MUREAV 31,97(75)
mcr	CHR:cng			£NASDW(77)PNASA6 72,5135(75)
ins	PHN:cng			£NSHAF(77)HEREAY -,201(49)
hcc	DNA:cng			CNREA8 39(3),1083(79)
mcc	PHN:cng			CNREA8 39(3),2538(79)

POTENTIATION

mus	smoke	CECDS* -,8-14(76)
mus	dodecane	CECDS* -,8-14(76)

TERATOGENICITY

mus-orl	200mg/kg	LT	FET:nef	£NSHAF(77)JNCIAM 34,297(73)
mus-orl	200mg/kg	P	inc	£NASDW(77)EXPEAM 20,224(64)

AQUATIC TOXICITY

mcr	5µg/l	12D	rep	BJSSF* 43,507(77)
wor,mar	1.0mg/l	96H	nef	MPNBAZ 9,220(78)
mcr	1.0mg/l	1H	siz	MPNBAZ 5(12),185(74)
mol,egg	5.0mg/l	3H	rep,str	AEEXAH 3,267(74)

RECOMMENDATIONS/LEGAL MECHANISMS

SUN	REG	air:occ - MAC:0.00015mg/m^3 Eff:1 Jan(77)	£ILOOE -,49(77) RED Nov(79)
SUN	-	carcinogenic	£ILOOE -,49(77) RED Nov(79)
USA	REC	occ:industrial substance suspect of carcinogenic potential for man	ACGIH* -,40(79) RED Nov(79)

3.5 CHROMIUM

3.5.1 CHROMIUM (generic)

IRPTC NU: 000007
DEF: Chromium and its compounds (specific compound not defined)

PATHWAYS INTO THE ENVIRONMENT

natur to aq	WLD	32tt/Y	£NRCCR(76)SCIEAS 173,233(71)
wst,ind to air	USA	16.5tt(70)	GCACI* -,33(73)
wst aq to aq	USA,NE,cty	220t/Y	JWPFA5 46,2653(74)
wst to aq	USA,SWsbd	576t/Y	SCCWR* -,-(77)

CONCENTRATIONS

aq,frs	USA,rvr,pol	<38µg/l	JWPFA5 45,1573(73)
aq	USA	9.7µg/l(av)	USDI2* -,28(67)
aq,mar	-	0.5-0.25µg/l	CCHEC* 3,763(73)
aq,frs	CAN,rvr	<25µg/l(>99%)	£NRCCR -,33(76)
aq,frs	CAN,lak	1µg/l(av)	£NRCCR -,36(76)
aq,grnd	NLD	<0.5-2µg/l	£NRCCR(76)GEMIAA 53,157(74)
aq,frs	CAN,bkg	1µg/l	£NRCCR -,36(76)
aq,part	USA,rvr	199mg/kg(av)	£NRCCR(76)ESTHAG 1,940(67)
aq,mar	BERs	0.04-140µg/l GC	NOAAR* 8,372(78)
aq,mar	USA,NWcst	0.06-7.6µg/l GC(75)	NOAAR* 8,372(78)
aq,mar	ARCo	2µg/l GC(76)	NOAAR* 8,372(78)
aq,mar	USA,SEcst	0.11mg/l AA	BECTA6 21,53(79)
aq,frs,part	USA,NW	93-120mg/kg XF(77)	NOAQR* 3,32(78)
air,mar	BEL,cst	5-24ng/m^3 XE(72-77)	ATENBP 13,267(79)
air	WLD,bkg	1ng/m^3(av)	£NRCCR -,33(76)
air	USA	15ng/m^3(av)	DHEWC* -,75(69)
air	USA,cty	<120ng/m^3(av)(69)	EPAAC* -,5(73)
air	DEU,cty	4.6ng/m^3	IAEAF* -,75(74)
air	ATA	2.5-10pg/m^3	SCIEAS 183,198(74)
soil	WLD	<5-1000mg/kg	CABUK* -,29(55)
soil	USA	25-85mg/kg(64%)	USGSP* -,574-d(71)
soil	USA	1-1500mg/kg	£NRCCR(76)ADAGA7 24,267(72)
soil	CAN	20-125mg/kg	£NRCCR(76)#MORH* -,-(75)
sed,mar	USA,SEcst	19.88mg/kg wwt AA	BECTA6 21,53(79)
sed,mar	USA,NWcst	1.9-3.2mg/kg AAS(76)	NOAAR* 8,199(78)
sed,mar	ARCo	0.7-6.5mg/kg GC(76)	NOAAR* 8,372(78)
sed,mar	BERs	0.6-2.9mg/kg GC(75)	NOAAR* 8,372(78)
sed,est	GBR	64mg/kg dwt AAS(74)	JMBAAK 58,89(78)
sed	WLD	6-1240mg/kg(av)	EPACR* -,241(78)
sed,frs	USA,N,lak,bkg	20-40mg/kg	TMMOI* -,89(74)
sed,frs	USA,N,lak	52-70mg/kg(av)	TMMOI* -,89(74)
sed,mar	USA,W,cst,bkg	100mg/kg	ESTHAG 8,425(74)
sew	-	86-380mg/kg(av)	EPASS* -,96(74)
food	USA	0.175-0.472mg/kg(av)	ESTHAG 5,436(71)

food,plt	-	0.15-0.39mg/kg(av)	JFOAA2 25,771(74)
food,plt	-	0.02-0.04mg/kg(av)	JOCDAE 15,941(62)
food,plt		0.01-0.42mg/kg wwt	JAFCAU 21,69(73)
food,ani,fsh	USA	0.23mg/kg wwt(av)	£NRCCR(76)JAFCAU 21,69(73)
food,ani,fsh	-	0.11mg/kg(av)	£NRCCR(76)JOCDAE 15,941(62)
food,ani,fsh	CAN	60-180µg/kg wwt	£NRCCR -,44(76)
food,plt	CAN	40-260µg/kg wwt	£NRCCR -,44(76)
inv	-	10mg/kg	£NRCCR(76)JWPFA5 45,1573(73)
mol	-	5mg/kg	£NRCCR(76)JWPFA5 45,1573(73)
mam,mar	MEDs,W	0.04-3.65mg/kg wwt AA	AIOM** 54,5(78)
fsh,mar	MEDs,W	0.01-0.81mg/kg wwt AA	AIOM** 54,5(78)
mol,mar	USA,SEcst	0.99mg/kg wwt AA	BECTS6 21,53(79)
mol,mar	MEDs,W	0.09-1.15mg/kg wwt AA	AIOM** 54,5(78)
mol,mar	ITA,NWcst	19.5mg/kg dwt AAS(75)	24NPAY 6,179(78)
crs,mar	USA,SEcst	3.73mg/kg wwt AA	BECTA6 21,53(79)
crs,mar	MEDs,W	1.53-3.5mg/kg wwt AA	AIOM** 54,5(78)
crs	MEDs,NE	2.1-3.89mg/kg dwt AAS(75)	MBIOAJ 46,247(78)
inv,mar	USA,SEcst	2.02mg/kg wwt AA	BECTA6 21,53(79)
inv,mar	MEDs,E	0.83-13.0mg/kg dwt AA(74)	MPNBAZ 7(8),143(76)
fsh	-	1-1.2mg/kg	£NRCCR(76)JWPFA5 45,1573(73)
fsh,frs	CAN,lak	1mg/kg wwt	£NRCCR(76)JFRBAK 27,677(70)

MODEL ECOSYSTEM STUDIES

trr	JRMGAQ 23,367(70)
aq-trr	ESTHAG 13,546(79)

ENVIRONMENTAL FATE

air to aq	Ns	740t/Y(74-76)	MSCOM* 5,175(79)
aq,frs to aq,mar	USA,SEcst	70t/Y	GCACAK 40,573(76)
soil to aq,mar	USA,SEcst	23t/Y	GCACAK 40,573(76)
aq,mar to sed	USA,SEcst	67t/Y	GCACAK 40,573(76)
aq,rvr to aq,lak	USA,N,lak	30t/Y	WAPLAC 1,50(71)
air to aq,lak	USA,N,lak	90t/Y	WAPLAC 1,50(71)
soil to aq	USA,NE,cty	114t/Y	JWPFA5 46,2653(74)
air to aq,mar	WLD	1500tt/Y	£NRCCR -,47(76)
air to soil	WLD	600tt/Y	£NRCCR -,47(76)
soil to biota	WLD	91tt/Y	£NRCCR -,47(76)
aq,mar to biota	WLD	390tt/Y	£NRCCR -,47(76)
aq,mar to sed	WLD	200tt/Y	£NRCCR -,47(76)
biota to sed	WLD	390tt/Y	£NRCCR -,47(76)

MAMMALIAN TOXICITY ARRAY

-	-	- hmn	SKM:all		UGLAAD 141(21),1404(79)
-	OCC	- hmn	PUL:ifl,car	SNS:str-dth	IEAHDW 43(2),107(79)

CARCINOGENICITY

eval: "There is an excessive risk of lung cancer among workers in the chromate-producing industry. It is likely that exposure to one or more chromium compounds is responsible, but the identity of this or these is not known.

There is no evidence that non-occupational expsoure to chromium constitutes a cancer hazard."

£IARC2 2,120(73)

AQUATIC TOXICITY

wor,est	12.5µg/l	100D	rep	JWPFA5 48,1929(76)
wor,est	0.2mg/l	53D	bhv	JWPFA5 48,1929(76)
wor,juv,est	0.5mg/l	3D	ret	SCCWR* -,15(74)
mol	1.0mg/l	4Wk	PUL:oxy-fnc	PRMBP* -,225(77)
wor,est	3.23mg/l	96H	LC50	JWPFA5 48,1929(76)
fsh,mar	5.0mg/l	21D	LC50	JWPFA5 48,1929(76)
crs	10.0mg/l	96H	LC50	AECTCV 6(2/3),315(77)
mcr	15mg/l	10D	ret	RVOMAY 28,27(72)
fsh	15mg/l	5D	dth(100%)	GFCMR* -,-(78)
crs,est	21mg/l	48H	LC50	BECTA6 20,447(78)
fsh,mar	30mg/l	96H	LC50	JWPFA5 48,1929(76)
crs,juv,mar	34mg/l	96H	LC50	BECTA6 21,74(79)
fsh,juv,mar	31.2mg/l	96H	LC50	AJMFA4 27,137(76)

SAMPLING/PREPARATION/ANALYSIS

air-AAS	Det: 0.01mg/m^3(samp 100 l)	£NSHAM 1,152(77)
air-AAS	Det: 21µg/m^3	£NSHAM 1,173(77)
air-AAS	Det: 0.282mg/m^3(samp 90 l)	£NSHAM 3,S323(77)
air-AAS	Det: 0.493mg/m^3(samp 90 l)	£NSHAM 3,S352(77)

RECOMMENDATIONS/LEGAL MECHANISMS

JPN	REG	aq:emi - PL:2mg/l	EAJLR* -,-(76)	RED Nov(79)
USA	REC	aq(frs):imi - 100µg/l	£EPAQC -,37(76)	RED Nov(79)
USA	REG	aq:drk - MPC:0.05mg/l AAS Eff:24 Jun(77)	FEREAC 40,59570(75)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:0.5mg Cr/m^3	ACGIH* -,13(79)	RED Nov(79)

3.5.2 CHROMIUM (VI)(generic)

IRPTC NU: 000008
DEF: Hexavalent chromium compounds (specific compound not defined)

PATHWAYS INTO THE ENVIRONMENT

wst to aq	USA,SW,est	576t/Y	CCWAR* -,-(77)
wst to aq	WLD,rvr	236tt/Y	£GESAM -,-(76)

CONCENTRATIONS

aq,drk	-	>50µg/l(0.4%)	JAWWA5 62,670(70)
aq,mar	-	0.2-0.36µg/l	NATUAS 213,901(67)
aq	JPN	1.2µg/l AAS (74)	BNSKAK 25,122(76)

ADSORPTION

$MnO_2.nH_2O$,18-23°C,pH7.7-8.2	-,90%/4D	GCACAK 9,1(56)
$Fe_2O_3.nH_2O$,18-23°C,pH7.7-8.2	-,47%/2D	GCACAK 9,1(56)
Apatite,18-23°C,pH7.7-8.2	-,15%/2D	GCACAK 9,1(56)

MAMMALIAN TOXICITY ARRAY

68µg/m3	OCC	ihl-hmn	SNS:mlt	LVR:siz	URS:bcm	PUL:car	£NSHCR(75)XPHBAO -,-(53)
-	OCC	- -hmn	PUL:ifl,car	SNS:str-dth			IAEHDW 43(2),107(79)

AQUATIC TOXICITY

fsh	16µg/l	-	ret	£NRCCR(76)HBRAR* -,215(58)
mcr	22µg/l	48H	LC50	CECAR* -,4(73)
mcr	0.03mg/l	-	ret	£NRCCR(76)BOGAA5 111,1(49)
fsh	0.2mg/l	5Wk	ret,53%dth	£NRCCR(76)HBRAR* -,215(58)
plt	1mg/l	7D	bcm	£NRCCR(76)UCIMR* 1,-(59)
fsh	2mg/l	-	HEM:str	£NRCCR(76)SIWAAQ 31,205(59)
wor,mar	3.1mg/l	4D	LC50	JWPFA5 48,1929(76)
fsh	17.6mg/l	96H	LC50	£NRCCR(76)AWPOAZ 10,453(66)
crs	60mg/l	12D	50%dth	IAPWAR 7,435(63)
fsh	65mg/l	6D	GIT:str	£NRCCR(76)JWMAA9 22,40(58)
ins,egg	-	-	CHR:cng-rep	£NRCCR(76)WSWOAC 111,548(64)

TERRESTRIAL TOXICITY

plt	10µg/l	-	siz	BIRAR* -,32(55)
plt	0.5mg/kg	-	bcm	SSSAA8 35,755(71)
plt	5mg/kg	-	str	SSSAA8 35,755(71)
plt	5mg/kg	-	ret	£NRCCR(76)SOSCAK 88,322(59)
plt	5mg/kg	-	bcm	£NRCCR(76)AABIAV 40,761(53)
plt	10mg/l	-	dth	£NRCCR(76)JAPEAI 10,513(73)

SAMPLING/PREPARATION/ANALYSIS

air-kinetic analysis Det: 0.01mg/m^3(samp 100 l) £NSHAM 1,182(77)

REMOVAL

Reduction to chromium (III) with ferrous sulfate, sodium bisulfite or metabisulfite, or sulfur dioxide at low pH values. The pH is then raised to about 9.5, and chromic hydroxide precipitate. The precipitate is collected in settling ponds, dried, and then disposed of by landfill, ocean dumping or incineration.

Ion exchange

EPACR* -,248(78)

RECOMMENDATIONS/LEGAL MECHANISMS

JPN	REG	aq:imi - ML: 0.05ppm	EAJLR* -,-(76)	RED Nov(79)
SUN	-	air:imi - limits	EPAWA* -,28(74)	RED Nov(79)
USA	REG	aq:drk(bottled) - MPC:0.05mg/l	FEREAC 40,14325(77)	RED Nov(79)
USA	REG	air:occ - C:100µg/m^3	£NSHSS -,-(79)	RED Nov(79)
USA	REC	air:occ - TWA:1µg carcinogenic Cr(VI)/m^3; 25µg other Cr(VI)/m^3	£NSHSS -,-(79)	RED Nov(79)
USA	REC	air:occ - C:50µg/m^3	£NSHSS -,-(79)	RED Nov(79)

3.5.3 CHROMIC ACID,CALCIUM SALT (1:1)(generic)

IRPTC NU: 000009
DEF: Chromic acid, calcium salt anhydrous and hydrous (hydration state not defined)

SYN: CALCIUM CHROMATE * CALCIUM CHROMATE(VI) * CALCIUM CHROME YELLOW * CHROMIC ACID(H_2CrO_4),CALCIUM SALT(1:1) * C.I.77223 * C.I. PIGMENT YELLOW 33 * C.I. PIGMENT YELLOW ULTRAMARINE * GELBIN * GELBIN YELLOW ULTRAMARINE * PIGMENT YELLOW 33 * STEINBUHL YELLOW * YELLOW ULTRAMARINE

PRODUCTION PROCESS(ES)

Reaction of calcium chloride with sodium chromate £IARC2 2,104(73)

USES

corrosion inhibitor
depolarizer in batteries
£IARC2 2,104(73)

MAMMALIAN TOXICITY ARRAY

0.12mg/kg	15WkI	itr-ham	PUL:mlt	£NSHCR(75)JNCIAM 47,1129(71)
0.17mg/kg	10MoI	itr-rat	PUL:uns,car	£NSHCR(75)AEHLAU 5,445(62)
0.36mg/kg	20Wk	ims-rat	UNS:ifl,neo	£NSHCR(75)BJCAAI 23,172(69)
2.0mg/m^3	891DI	ihl-rat	UNS:car SKN:uns	£NSHCR(75)PHSPR* -,-(72)
36mg/m^3	6Mo	ihl-mus	PUL:str,neo IMM:str-siz	£NRCCR -,97(76)

CARCINOGENICITY

ham-itr	0.12mg/kg	15WkI	inc	£NSHCR(75)JNCIAM 47,1129(71)
rat-ims	0.36mg/kg	20Wk	inc	£NSHCR(75)BJCAAI 23,172(69)
rat-imp	10mg/kg	-	PUL:neo	£NSHCR -,88(75)
rat-imp	62.5mg/kg	-	UNS:car	£NSHCR(75)AEHLAU 5,445(62)
ham-ihl	2.0mg/m^3	891DI	inc	£NSHCR(76)PHSPR* -,-(72)
mus-ihl	13mg/m^3	LTI	PUL:neo	£NASCR(74)JNCIAM 47,1129(71)

eval: "In many experiments, various chromium compounds have been shown to induce tumours in mice and rats. Calcium chromate has been found to be carcinogenic by several routes of administration, producing epithelial tumours of the lung by intrabronchial implantation and sarcomas by intramuscular and intrapleural administration to rats."
£IARC2 2,119(73)

RECOMMENDATIONS/LEGAL MECHANISMS

DEU	REC	occ:carcinogenic substance found in the workplace	DFSK** -,41(79) RED Nov(79)

3.5.4 CHROMIC ACID, CALCIUM SALT (1:1)

IRPTC NU: 000010
CAS NU: 13765-19-0 MOLFM: O4CrCa MOLWT: 156.08
WLN: CA CR-O4

SYN: CALCIUM CHROMATE(VI) * CALCIUM CHROME YELLOW * C.I.77223 *
C.I. PIGMENT YELLOW 33 * GB2750000(RTECS) * GELBIN *
YELLOW ULTRAMARINE * 018974 0 (ECDIN)

MUTAGENICITY

mcr PHN:cng NATUAS 250,493(74)

RECOMMENDATIONS/LEGAL MECHANISMS

USA REG aq:emi - HQ:454kg/24H Eff:12 Jun(78) FEREAC 43,10489(78) RED Nov(79)
USA REG hazardous substance Eff: 12 Jun(78) FEREAC 43,10489(78) RED Nov(79)

3.5.5 CHROMIC ACID, CALCIUM SALT (1:1),DIHYDRATE

IRPTC NU: 000011
CAS NU: 10060-08-9 MOLFM: O4CrCa.2H2O MOLWT: 192.12

SYN: CALCIUM CHROMATE * CALCIUM CHROMATE(VI) * CALCIUM CHROME YELLOW *
CHROMIC ACID(H2CrO4),CALCIUM SALT(1:1) * C.I. NO.77223 * C.I. PIGMENT
YELLOW 33 * C.I. PIGMENT YELLOW ULTRAMARINE * GB2800000(RTECS) *
GELBIN YELLOW ULTRAMARINE * PIGMENT YELLOW 33 * STEINBUHL YELLOW

MP: 200°C
AQSOL: 163g/l,20°C

3.5.6 DICHROMATES (generic)

IRPTC NU: 000012
DEF: Dichromates (specific compound not defined)

SYN: 1264(UN)

HAZ: UN Class 5.1

PRODUCTION/CONSUMPTION

EEC	142tt-c(71)	140tt-c(70)	137.5tt-c(69)	CECME* -,30(77)

3.5.7 DICHROMIC ACID,DISODIUM SALT (generic)

IRPTC NU: 000013
DEF: Dichromic acid, disodium salt anhydrous and hydrous (hydration state not defined)

SYN: BICHROMATE DE SODIUM(FRA) * BICHROMATE OF SODIUM * CHROMIC ACID * CHROMIC ACID DISODIUM SALT * NATRIUMBIOCHROMAAT(NLD) * NATRIUMDICHROMAAT(NLD) * NATRIUMDICHROMAT(DEU) * SODIO(DICHROMATO DI)(ITA) * SODIUM ACID CHROMATE * SODIUM BICHROMATE * SODIUM DICHROMATE * SODIUM DICHROMATE(VI) * SODIUM(DICHROMATE DE)(FRA) *

PRODUCTION PROCESS(ES)

Roasting finely ground chromite ore with sodium carbonate and calcium carbonate, leaching with hot water, addition of dilute sulfuric acid
EPACR* -,204(78)

USES

chromic acid and potassium dicromate production
electroforming
lead chromate pigment production
oxidant in dye industry
photocopying
photography
wood preservatives
£NATOM -,M6-5(76)

MODEL ECOSYSTEM STUDIES

trr JEVQAA 4(2),170(75)

MAMMALIAN TOXICITY ARRAY

140mg/kg	69WkI	ims-rat	UNS:neo	ITIIT* -,476(75)
-	-	skn-hmn	SKN:str	£NASCR(74)SCHWL* -,-(57)

CARCINOGENICITY

rat-ipl	10mg/kg	16x	inc	£IARC2(73)AEHLAU 5,445(62)
rat-ims	10mg/kg	16x	nef	£IARC2(73)AEHLAU 5,445(62)
rat-imp	10mg/kg	-	inc	£NSHCR -,88(75)
rat-ipl	-	-	nef	£IARC2(73)CNREA8 21,842(61)
rat-imp	-	-	nef	£IARC2(73)CNREA8 21,842(61)

SENSITIZATION

hmn-skn	SKN:all	£NSHCR(75)DERAAC 100,100(50)
hmn-skn	SKN:all	£NSHCR(75)JAMAAP 147,1133(51)

AQUATIC TOXICITY

fsh,frs	13µg/l	-	ret,rep	EPACR* -,128(78)
fsh,frs	0.08mg/l	-	emr,rep	EPACR* -,128(78)
mcr	10mg/l	48H	LC50	EPACR* -,128(78)
fsh	410mg/l	48H	LC50	EPACR* -,128(78)

TERRESTRIAL TOXICITY

plt	400mg/kg	-	siz	JEVQAA 4(2),170(75)

3.5.8 DICHROMIC ACID, DISODIUM SALT

IRPTC NU: 000014
CAS NU: 10588-01-9 MOLFM: 07Cr2Na2 MOLWT: 261.98

SYN: BICHROMATE DE SODIUM(FRA) * CHROMIC ACID DISODIUM SALT(CAS) * HX7700000(RTECS) * NATRIUM BICHROMAAT(NLD) * NATRIUMDICHROMAAT(NLD) * NATRIUMDICHROMAT(DEU) * SODIO (DICHROMATO DI)(ITA) * SODIUM BICHROMATE * SODIUM DICHROMATE(VI) * SODIUM DICHROMATE * SODIUM(DICHROMATE DE)(FRA)

MP: 357°C DEN:1.35g/ml
BP: dec AQSOL: 1833g/l

MAMMALIAN TOXICITY ARRAY

50mg/kg	1x	orl-hmn	LDLo	27ZTAP 3,51(69)

RECOMMENDATIONS/LEGAL MECHANISMS

USA	REG	aq:emi - HQ:454kg/24H	Eff:12 Jun(78)	FEREAC 43,10489(78) RED Nov(79)
USA	REG	hazardous substance	Eff:12 Jun(78)	FEREAC 43,10489(78) RED Nov(79)

3.5.9 DICHROMIC ACID, DISODIUM SALT DIHYDRATE

IRPTC NU: 000015
MOLFM: 07Cr2Na2.2H2O MOLWT: 298.00

SYN: BICHROMATE OF SODA * SODIUM ACID CHROMATE * SODIUM BICHROMATE *
SODIUM BICHROMATE DIHYDRATE * SODIUM DICHROMATE * SODIUM DICHROMATE(VI) *
SODIUM DICHROMATE(VI) DIHYDRATE *

MP: 357°C DEN: 2.52g/ml
AQSOL: 1800g/l

PRODUCTION/CONSUMPTION

WLD	118.1tt-p(75)	248.1tt-p(70)	208.5tt-p(66)
ASIAexSUN	29.5tt-p(76)	67tt-p(70)	43.6tt-p(66)
EEC	16.9tt-p(76)	20.1tt-p(70)	21.7tt-p(66)
EUR-E	19.2tt-p(76)	17tt-p(70)	13.9tt-p(66)
EURexSUN	42.5tt-p(76)	41.8tt-p(70)	36.6tt-p(66)
EURother	6.4tt-p(76)	4tt-p(70)	5tt-p(66)
NAm	141.3tt-p(76)	139.3tt-p(70)	128.3tt-p(66)
ESP	7.3tt-p(74)	4tt-p(70)	5tt-p(66)
FRA	8.3tt-p(75)	10.2tt-p(70)	8.6tt-p(66)
ITA	12.5tt-p(72)	8.7tt-p(69)	9.1tt-p(66)
JPN	22.1tt-p(75)	67tt-p(70)	43.6tt-p(66)
POL	19.2tt-p(76)	17.7tt-p(70)	13.9tt-p(66)

UNYS1* -,321(77) UNYS2* -,327(78)

3.5.10 DICHROMIC ACID, DIPOTASSIUM SALT

IRPTC NU: 000016
CAS NU: 7778-50-9 MOLFM: 07Cr2K2 MOLWT: 294.20

SYN: BICHROMATE OF POTASH * DICHROMATE OF POTASSIUM * KALIUMDICHROMAT(DEU) *
POTASSIUM BICHROMATE * POTASSIUM DICHROMATE * POTASSIUM DICHROMATE(VI) *
POTASSIUM DICHROMATE(DOT) * RED POTASSIUM CHROMATE * HX7680000(RTECS)

MP: 398°C DEN: 2.68g/ml
BP: 500°C,dec
AQSOL: 49g/l,0°C

PRODUCTION PROCESS(ES)

Reaction of sodium dichromate with potassium chloride

Roasting chrome ore with potassium carbonate

£IARC2 2,106(73)

USES

electroforming
lead chromate pigment production
oxidant in dye industry
photocopying
photography
wood preservatives

£NATOM -,M6-5(76)

MAMMALIAN METABOLITES

hmn	reduced chromium	£NSHCR(75)JIDEAE 43,35(64)

MAMMALIAN TOXICITY ARRAY

0.35mg/kg	3Wk	orl-hmn	GIT:fnc	ITIIT* -,431(75)
1.6mg/kg	160D	scu-mky	URS:str	£NSHCR(75)AJPAA4 9,133(33)
16mg/kg	1x	scu-mky	URS:str-dth	£NSHCR(75)AJPAA4 9,133(33)
26mg/kg	1x	orl-chd	LDLo	ZEKIA5 81,417(58)
28mg/kg	1x	orl-man	HEM:mlt CNS:fnc-dth	£NRCCR(76)AJDCAI 119,374(70)
50mg/kg	1x	orl-hmn	LDLo	RTECS* -,-(77)
-	ACC	orl-wmn	GIT:fnc LVR:ifl SKN:str	£NSHCR(75)AJMSA9 189,400(35)
-	-	skn-hmn	SKN:str	£NASCR(74)SCHWL* -,-(57)
-	OCC	- -hmn	SKN,SNS:str PUL:car	DHEWC* -,75(69)

SENSITIZATION

hmn-skn	SKN:all	£NSHCR(75)ADVEA4 43,119(63)
hmn-skn	SKN:all	£NSHCR(75)DERAAC 100,100(50)

AQUATIC TOXICITY

mcr	0 18mg/l	15D	ret	BOGAA5 111,1(49)
mcr,pop	397µg/l	-	pop	EPANG* -,250(75)
mcr	1mg/l	-	bcm	TSTSAA 2,118(70)
fsh	10mg/l	15D	dth	SETCA* -,31(75)
mcr	23mg/l	100H	LC50	EPACR* -,126(78)
mol	39mg/l	96H	LC50	EPACR* -,126(78)
fsh	656mg/l	96H	LC50	JWPFA5 32,868(60)
ins,lar	1600mg/l	48H	LC50	EPACR* -,126(78)

TERRESTRIAL TOXICITY

plt	5.7mg/kg - ret		SOSCAK 88,322(59)

RECOMMENDATIONS/LEGAL MECHANISMS

USA	REG	aq:emi - HQ:454kg/24H	Eff:12 Jun(78)	FEREAC 43,10489(78) RED Nov(79
USA	REG	hazardous substance	Eff:12 Jun(78)	FEREAC 43,10489(78) RED Nov(79

3.6 CYANIDES

3.6.1 ACRYLONITRILE

IRPTC NU: 000017
CAS NU: 107-13-1 MOLFM: C3H3N MOLWT: 53.07
STRFM: NC-CH=CH2 WLN: NC1U1

SYN: ACN * ACRN * ACRYLNITRIL(DEU,NLD) * ACRYLON * ACRYLONITRILE(DOT) * ACRYLONITRILE MONOMER * AKRYLONITRYL(POL) * AN * CARBACRYL * CIANURO DI VINILE(ITA) * CYANOETHYLENE * CYANURE DE VINYLE(FRA) * ENT 54 * FUMIGRAIN * MILLER'S FUMIGRAIN * NC1-C50215 * NITRILE ACRILICO(ITA) * NITRILE ACRYLIQUE(FRA) * PROPENENITRIL * PROPENENITRILE * 2-PROPENENITRILE (CAS) * TL 314 * VCN * VENTOX * VINYL CYANIDE * AT 5250000(RTECS) * 003156 8 (ECDIN)

MP: -84°C FP: -4°C(c-cup),0°C(o-cup) DEN:0.81g/ml
BP: 78°C FL: 66-368g/m^3 RVDEN: 1.8
HAZ: UN CLASS 3, UN PACK I (inhibited)
VP: 11kPa,(83mmHg),20C
PC: 0.12 AQSOL: 73.5g/l,20°C

ADD: HYDROQUINONE MONOMETHYL ETHER £IAR19 19,74(79)
IMPUR: ACETALDEHYDE * ACETIC ACID * ACETONE * ACETONITRILE * ACROLEIN * DIVINYLACETYLENE * HYDROGEN CYANIDE * IRON * METHYL VINYL KETONE * HYDROGEN PEROXIDE
NTISA* -,5(78) £IAR19 19,74(79)

PRODUCTION/CONSUMPTION

WLD	2400tt-p(76)	1653.1tt-p(75)	1459tt-p(70)	988.3tt-p(66)
ASIA-exSUN	635.9tt-p(76)	423.8tt-p(70)	167.7tt-p(66)	
EEC	744tt-p(76)	540.8tt-p(70)	468.8tt-p(66)	
EFTA	.6tt-p(76)	6.8tt-p(70)	10.3tt-p(66)	
EUR-exSUN	760tt-p(76)	563.6tt-p(70)	495.1tt-p(66)	
EUR-other	16tt-p(76)	16tt-p(70)	16tt-p(66)	
NAm	669tt-p(76)	472.1tt-p(70)	325.5tt-p(66)	
CAN	.7tt-p(75)	1tt-p(74)		
DEU	442.4tt-p(76)	285tt-p(76)	297.1tt-p(75)	292.6tt-p(74)
ESP	89.7tt-p(77)	45tt-p(76)	27tt-p(74)	5tt-p(73)
FRA	149.7tt-p(77)	125tt-p(76)	111tt-p(72)	116tt-p(71)
GBR	180tt-p(76)			
ITA	231.7tt-p(77)	185.1tt-p(76)	90.5tt-p(70)	32tt-p(66)
JPN	609tt-p(78)	633tt-p(76	528tt-p(75)	
JPN	633.4tt-p(76)	423.8tt-p(70)	167.7tt-p(66)	
MEX	22tt-p(76)	18.9tt-p(73)	11tt-p(71)	
NLD	95tt-p(76)	42tt-p(70)	12tt-p(69)	
SWE	.6tt-p(74)	5.9tt-p(71)	6.1tt-p(68)	
USA	794.7tt-p(78)	746.6tt-p(77)	680.4tt-p(76)	550.8tt-p(75)
USA	614.1tt-p(73)	471.3tt-p(70)	324.7tt-p(66)	
EUR-W	900tt-c(76)			

CENEAR 57(24),68(79) NTISA* -,21,(78) £IAR19 19,75(79) UNYS1* 2,301(77) UNYS2* 2,308(78)

PRODUCTION PROCESS(ES)

Reaction of acetylene and hydrogen cyanide in presence of a cuprous chloride catalyst	NTISA* -,9(78)
Catalytic dehydration of ethylene cyanohydrin	NTISA* -,9(78)
Catalytic reaction of propylene with nitric acid	NTISA* -,10(78)
Catalytic vapour oxidation of propylene and ammonia (major WLD)	NTISA* -,10(78)

USES

elastomers production	EUR-W 5%(77)	USA 4%(76)	
fibres production	EUR-W 68%(77)	JPN 65%(76)	USA 48%(76)
fumigant			
nylon production	USA 12%(76)		
packaging material			
resins production	EUR-W 15%(77)	USA 21%(76)	
resins and elastomers production	JPN 17%(76)		

£IAR19 19,75(79) NTISA* -,-(78)

PATHWAYS INTO THE ENVIRONMENT

spill to aq	USA	41t(70)	NCNSA6 -,209(75)

BIODEGRADATION

aq,frs-acc	BOD	65%/5D	Ammonia -/-	PEXSAO 9,449(55)
aq,frs-acc,20°C	CO2	60%/10D	-,-/-	PEXSAO 14,547(58)
aq,frs-acc,5°C	CO2	60%/40D	-,-/-	PEXSAO 14,547(58)
sew	BOD	5%/15D	-,-/-	PEXSAO 14,547(58)

ENVIRONMENTAL FATE

soil to aq,grnd	spill(73)	-/-	IEPAA* -,-(74)

MAMMALIAN METABOLITES

mus,rat,ham,gpg,rbt,dog,mky	cyanide; thiocyanate	£IAR19 19,84(79)
rat	N-acetylated cystein conjugate	NTISA* -,100(78)
rat	D-glucuronic acid conjugate	ZHYGAM 22(5),310(76)
rat	carbon dioxide	DOWA5* -,-(77)
-	cyanide, cyanmethemoglobin	JHEMA2 3,106(59)
-	L-cysteine conjugate; L-glutathione conjugate	INHEAO 3(1-2),30(65)

MAMMALIAN TOXICITY ARRAY

1.5mg/kg	1x	ivn-rbt	HEM,LVR,CNS:bcm	BCPCA6 21(5)635(72)
2.1mg/kg	1YI	orl-rat	MLT:neo	IARCC* 3,127(76)
4mg/kg	1Y	orl-rat	siz	DOWA4* -,-(77)
10mg/kg	1Y	orl-rat	CVS:siz GIT:str MLT:neo PLT	DOWA4* -,-(77)
11mg/kg	90D	orl-rat	SON:bhv URS:siz	DOWA1* -,-(75)
16mg/kg	24Wk	orl-dog	URS:siz PLT	DOWA3* -,-(75)
27mg/kg	1X	orl-mus	LD50	JHEMA2 3,106(59)
50mg/kg	1X	orl-rat	END:crc	ENDKAC 57(3),405(71)
62mg/kg	1X	orl-rat	LD50	MEPAAX 22(3),257(71)
65mg/kg	6-15DP	orl-rat	REP:fnc FET:mlt PLT:mlt	DOWA2* -,-(76)
-	-	skn-chd	SON:mlt GIT:fcn - dth	DMWOAX 75,1087(50)
-	6Wk	skn-hmn	SKN:all	HAUTAW 26,599(75)
-	20Y	- -hmn	MLT:car	OBEMT* -,-(7)
-	occ	- -hmn	HEM:str,bcm	GTPZAB 8,8(75)
2.5mg/m^3	occ	ihl-hmn	HEM:mlt	GTPZAB 7,25(68)
10.8mg/m^3	52WkI	ihl-rat	MLT:neo	IARCC* 3,127(76)
35mg/m^3	20M	ihl-hmn	SKN:irr SON:bhv-sns	INMEAF 17(6),199(48)
43mg/m^3	0-10Y	ihl-hmn	LVR:fnc	RKDBA5 48(5),273(72)
50mg/m^3	6MoI	ihl-rat	HEM:bcm,str URS:fnc - siz	MEPAAX 22(3),257(72)
63mg/m^3	4H	ihl-dog	GIT:fnc	JIHTAB 24,27(42)
120mg/m^3	4WkI	ihl-dog	SON:bhv,msc - dth	JIHTAB 24,255(42)
140mg/m^3	4H	ihl-mky	PUL:act	JIHTAB 24,27(42)
198mg/m^3	4H	ihl-mky	SON:bhv SKN:irr	JIHTAB 24,27(42)
300mg/m^3	-	ihl-mus	LC50	MEPAAX 22(3),257(71)
330mg/m^3	8WkI	ihl-rat	SNS,:irr - siz,ret,dth	JIHTAB 24,255(42)
470mg/m^3	4H	ihl-rat	LC50	MEPAAX 22(3),257(71)
-	5-15M	ihl-hmn	SON:sns GIT:fnc	ZAARAM 19(8),225(69)

CARCINOGENICITY

eval: "Acrylonitrile was tested in two experiments in rats by oral administration and inhalation exposure. Although full results were not available, the data indicate that acrylonitrile is carcinogenic in rats, producing tumours of the forestomach, brain and Zymbal gland. Acrylonitrile is also embryotoxic, teratogenic and mutagenic."

"A preliminary epidemiological report on cancer incidence and mortality demonstrated that individuals who were exposed to acrylonitrile in certain areas of a textile fibres plant had an increased risk of cancer of the lung and of the large intestine. Exposure to acylonitrile in certain areas of a textile fibres plant had an increased risk of cancer of the lung and of the large intestine. Exposure to acrylonitrile is known to occur in various occupational settings, and members of the general population may be exposed as a result of fumigant applications on tobacco and contact with food and other consumer goods contaminated by this compound."

Evaluation

"Animal experiments involving oral administration and inhalation exposure have demonstrated that tumours are induced in the brain, forestomach and Zymbal gland in male and female rats.

In a preliminary report, humans exposed to acrylonitrile in a synthetic fibres plant were found to be at a statistically increased risk of cancer, particularly of the lung and of the large intestine. This combined evidence from human and experimental data, in addition to the finding that acrylonitrile is mutagenic, indicates that, while confirmatory evidence in experimental animals and humans is desirable, acrylonitrile should be regarded as if it were carcinogenic to humans"

£IAR19 19,101(79)

MUTAGENICTIY

mcr	PHN:cng	TXCYAC 13(1),7(79)
mcc	PHN,DNA:cng	JNCIAM 62(4),1025(79)
mcr	PHN:cng	£IAR19(79)AIPBAY 86,418(78)
mcr	PHN:cng	£IAR19(79)TXCYAC 11,19(78)
mcr	PHN:cng	£IAR19(79)MUREAV 57,110(78)
mcr	PHN:cng	£IAR19(79)MUREAV 48,271(77)
mcr	PHN:cng	£IAR19(79)MUREAV 45,283(77)
mcr	PHN:cng	£IAR19(79)MUREAV 57,107(78)
mcr	PHN:cng	CNREA8 39(3),682(79)

eval: see carcinogenicity — £IAR19 19,101(79)

NEUROTOXICITY/BEHAVIOUR

rat-ipr 20mg/kg 6Wk SON:bhv — MEPAAX 22-6,601(71)

PRIMARY IRRITATION

rbt-skn SKN:str — ZAARAM 19-8,225(69)

REPRODUCTION

rat-orl 62.5mg/kg REP:fnc — SVIJL* -,-(61)

TERATOGENICITY

rat-orl 65mg/kg 6-15tDP FET:str,dth — £IAR19(79)FEREAC 43,2586(78)

eval: see carcinogenicity — £IAR19 19,101(79)

AQUATIC TOXICITY

crs,mar	6.0mg/l	96H	LC50	CLTNO* -,-(76)
crs,mar	10mg/l	24H	LC50	MAFFF* 22,-(71)
fsh,frs	11.8mg/l	96H	LC50	PEXSAO 45(2),120(61)
fsh,mar	14.0mg/l	96H	LC50	CLTNO* -,-(76)
fsh,mar	24.5mg/l	24H	LC50	PEXSAO 45(2),120(61)
fsh,frs	50mg/l	10H	SKN:cng;dth	PEXSAO 45(2),120(61)
mcr	50mg/l	-	pop	SIWAAQ 28(9),1137(56)
mol,lar,mar	>100mg/l	72H	LC100	NELPH* -,-(60)

TERRESTRIAL TOXICITY

plt	9.0mg/l	-	cng	FZRSAV 42,144(67)
ins	700mg/m^3	8H	LD50	JEENAI 69,725(76)
mcr	1000µg/ml	-	ret	JOBAAY 68,637(54)

SAMPLING/PREPARATION/ANALYSIS

air-GC	Det: 17.5mg/m^3(samp - 20 1)	£NSHAM 3,S156(77)

RECOMMENDATIONS/LEGAL MECHANISMS

DEU	REC	air:occ - TRK:13.23mg/m^3(6ppm)	DFSK** -,41(79)	RED	Nov(79)
DEU	REC	occ:carcinogenic substance found in the workplace	DFSK** -,41(79)	RED	Nov(79)
JPN	REC	air:occ - PL-TWA:45mg/m^3	£ILOOE -,37(77)	RED	Nov(79)
SUN	REG	air:occ - MAC:0.5mg/m^3 Eff: 1 Jan(77)	£ILOOE -,37(77)	RED	Nov(79)
SWE	REC	poisonous substance	STNAF* 5,-(78)	RED	Nov(79)
USA	REG	aq:emi - HQ:45.4kg/24H Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED	Nov(79)
USA	REG	air:occ - TWA:10ppm	FEREAC 39,23540(74)	RED	Nov(79)
USA	REG	air:occ - TWA:2ppm	£NSHSS -,-(79)	RED	Nov(79)
USA	REG	air:occ - C:10ppm	£NSHSS -,-(79)	RED	Nov(79)
USA	REC	air:occ - TLV-TWA:45mg/m^3	ACGIH* -,9(79)	RED	Nov(79)
USA	REC	air:occ - TLV-STEL:65mg/m^3	ACGIH* -,9(79)	RED	Nov(79)
USA	REC	air:occ - ML:4ppm(8.7mg/m^3)GC	£NSHAN -,3(78)	RED	Nov(79)
USA	REG	use - RSTR	FEREAC 43,5770(78)	RED	Nov(79)
USA	REG	hazardous substance Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED	Nov(79)
USA	REC	human carcinogen	ACGIH* -,39(79)	RED	Nov(79)
USA	REC	occ:medical; labelling and posting:warnings; personal protective clothing and equipment; Informing employees of hazards from acrylonitrile; Work practices; monitoring and recordkeeping requirements	£NSHAN -,3(78)	RED	Nov(79)

3.7 DETERGENTS

3.7.1 ALKYL BENZENE SULFONATE, (generic)

IRPTC NU: 000018

SYN: ABS

PRODUCTION/CONSUMPTION

USA 230tt/Y		CMAJAX 90,1089(64)

USES

Surface active component in synthetic detergents	MBIOAJ 9,183(71)

PATHWAYS INTO THE ENVIRONMENT

dom,wst to aq	JPN,cty 10tt/Y	JOSJP* 29,1(73)

CONCENTRATIONS

aq,est	FRA,rvr	35.5µg/l AAS(72)	RIPMAG 37,429(73)
aq,mar	FRA,S,cst	21µg/l AAS(71-72)	RIPMAG 37,429(73)
aq,est	USA,sbd	60µg/l	JWPFA5 37,262(65)
sed,mar	JPN,cty,cst	11-80mg/kg dwt COLM(71)	JOSJP* 29,1(73)
fsh,mar	ITA,cst	2.1mg/kg COLM(71)	IGMPAX 66(4),-(73)
mol,mar	ITA,cst	1.2mg/kg COLM(71)	IGMPAX 66(4),-(73)

MAMMALIAN TOXICITY ARRAY

500mg/kg 1x	orl-hmn	LDLo	27ZTAP 3,141(69)
1000mg/kg 1x	orl-rat	LD50	TXAPA9 18,83(71)

AQUATIC TOXICITY

mol,lar	50µg/l	-	ret	AOLVAE 18,99(75)
ver,egg	0.1mg/l	-	rep	THJUAP 10,197(74)
inv,egg,mar	0.6mg/l	96H	ret	PSMBAG 24,9(77)
plt,mar	2.0mg/l	48H	res	UCIMR* -,-(60)
fsh	2.9mg/l	96H	LC50	RIPMAG 37,411(73)
mol	3.0mg/l	96H	LC50	RIPMAG 37,411(73)
mcr	3.4mg/l	10D	ret	RIPMAG 37,411(73)
fsh	5.0mg/l	-	bhv	MBIOAJ 9,183(71)
fsh	5mg/l	48H	LVR:crc PUL:cng	VTTNAO 5,430(68)
wor	10.11mg/l	96H	LC50	TETHBG 4(3),597(72)
crs,mar	18.5mg/l	96H	LC50	CLTNO* -,-(76)
crs	312mg/l	-	rep	CERBO* -,83(71)

3.7.2 LINEAR ALKYLBENZENE SULFONATES (generic)

IRPTC NU: 000019

SYN: LAS

DEF: Surfactants, which are a complete mixture of isomers and homologues whose proportion is dependent on starting materials and the conditions of reaction for preparing the linear alkybenzenes which are the precursors of LAS. The alkyl chains of commercially available LAS mixtures generally range from 10 to 14 carbons in length and the phenyl groups are placed at various internal carbon positions in the alkyl chains.

ADLI** -,1(77)

IMPUR: DIALKYLINDANE * DIALKYLNAPHTHALENE * DIALKYLTETRALIN * INORGANIC SULFATE

ADLI** -,1(77)

PRODUCTION/CONSUMPTION

USA 318tt-p(73) ADLI** -,1(77)

PRODUCTION PROCESS(ES)

Phenyl ring sulfonation of linear alkylbenzene (LAB) ADLI** -,1(77)

USES

detergent ADLI** -,1(77)

BIODEGRADATION

aq,rvr	DIS	100%/15D	YKGKAM 21(7),451(75)
sew,acc	DIS	91.1%/21D	JAOCA7 41,738(64)
sew,acc-a	DIS	36%/28D	JAOCA7 16,517(67)
soil,20% 02	DIS	51%/15D	SSSAA8 34(6)883(70)
sew,acc	DIS	90%/ 5D	JWPFA5 42(8)2263(70)
aq,mar	DIS	97%/14D	AVFSAO 22,287(71)

ADSORPTION

soil -,-/- SSSAA8 30,685(66)

CLEARANCE TIME

fsh	-	100%/3D		PSBWQ* -,-(75)

MAMMALIAN TOXICITY ARRAY

0.7mg/kg	1x	ivn-rbt	ANS:fnc HEM:cel	RPCMB2 10(2),47(73)
100mg/kg	6Mo	orl-rat	URS:str	TREWAF 24,409(73)
250mg/kg	3Mo	orl-rat	LVR:siz HEM:bcm	ZERNAL 10,35(70)
404mg/kg	1x	orl-rat	LD50	TREWAF 24,397(73)
900mg/kg	6Mo	orl-rat	LVR,URS,GIT:str-siz	TREWAF 24,409(73)
1575mg/kg	1x	orl-mus	LD50	TREWAF 24,397(73)

POTENTIATION

fsh parathion	WATRAG 3,767(69)
fsh methyl parathion	BECTA6 5,408(70)
fsh ronnel	BECTA6 5,408(70)
fsh trithion	BECTA6 5,408(70)
fsh trichloronat	BECTA6 5,408(70)
ins diazinon	JEENAI 59,985(66)
fsh No.4 grade fuel oil	TAFSAI 100,1(71)

PRIMARY IRRITATION

gpg-skn	SKN:irr	YKGKAM 20,584(71)
rbt-eye	EYE:irr	YKGKAM 21,46(72)
hmn-skn	SKN:irr	AKEDAX 235,180(69)

REPRODUCTION

rat-orl	250mg/kg	84D	REP,FET:nef	TXAPA9 18,83(71)
rat-orl	125mg/kg	26Wk	REP:nef	FSASAX 63,938(61)

SENSITIZATION

hmn-skn	SKN:nef	PRGAC* -,-(-)

TERATOGENICITY

rat-orl	780mg/kg	0-20tDP	FET:nef	ADLI** -,145(77)
mus-skn	500mg/kg	DP	FET:dth	TXCYAC 4,171(75)

AQUATIC TOXICITY

mol,egg	50µg/l	-	rep,ret	MBIOAJ 15,356(72)
fsh,mar	0.1mg/l	-	emr	MBIOAJ 9,183(71)
fsh	0.18mg/l	-	PUL:str	WATRAG 2,255(68)
fsh	0.5mg/l	24D	SNS:cng	SCIEAS 140,1605(65)
mol,lar	0.5mg/l	-	ret	PNSFAN 57,11(67)
fsh,mar	0.5mg/l	24H	bhv,msc,res	MBIOAJ 9,183(71)
fsh	0.5mg/l	72H	LC50	WATRAG 2,255(68)
crs,lar	3mg/l	96H	LC50	MBIOAJ 9,183(71)
mcr	3.46mg/l	24H	LC50	SHCC** -,-(-)
mol	5mg/l	96H	LC50	MBIOAJ 9,183(71)
mol	5mg/l	-	msc	MBIOAJ 9,183(71)
ins,lar	5.33mg/l	96H	LC50	AHYBA4 74,123(74)
crs,lar	10mg/l	-	bhv	MBIOAJ 9,183(71)
crs	50mg/l	96H	LC50	MBIOAJ 9,183(71)

TERRESTRIAL TOXICITY

plt	10mg/l	-	- ret	NEPHAV 70,457(71)
plt	50mg/l	-	- ret	JAFCAU 15,864(67)
plt	1000mg/l	48H	- str	NEPHAV 70,477(71)

3.8 FLUORIDES

3.8.1 FLUORIDE (generic)

IRPTC NU: 000020
DEF: Fluorine and fluorine compounds (specific compound not defined)

SYN: FLUORIDES * FLUORINES

PRODUCTION/CONSUMPTION

USA 39000tt-p(71)
ITA 185.5tt-p(77) 210.8tt-p(76) 223.1tt-p(75)

USA 28000tt-c(71)

£NSHIF -,19(75) MYEAAG 1,971(73)

PATHWAYS INTO THE ENVIRONMENT

ind,wst to air	USA	118700t(68)	£NASRF -,9(71)
natur to air	USA	6tt/Y	£NASRF -,30(71)
ind,wst to air	CAN	15644t(72)	£NRCCF -,11(77)

CONCENTRATIONS

aq,mar	USA,NE,cst	0.02-0.1mg/l(av)	£NASRF -,6(71)
aq,frs	WLD,rvr	0.01-0.02mg/l(av)	£NRCCF(77)GCACAK 33,1153(69)
aq,mar	WLD	1.35-1.4mg/l	£NRCCF(77)DESRAY 18,237(71)
aq,frs	DEU,rvr	0.20-0.35mg/l	£NRCCF(77)INWWAH -,235(72)
aq,mar	MEDs	3.36mg/l	AIMEAS 55,193(70)
aq,mar	ARBsNW	8.72mg/l	AIMEAS 55,193(70)
aq,mar	MEDs,NE	0.8-3.6mg/l(74)	MBIOAJ 46,247(78)
air	WLD,cty	<0.05µg/m^3(88%)	£NRCCF(77)JPCAAC 21,484(71)
air	WLD,cty	0.05-1.0µg/m^3(12%)	£NRCCF(77)JPCAAC 21,484(71)
air	WLD,cty	>1.0µg/m^3(0.2%)	£NRCCF(77)JPCAAC 21,484(71)
air	ITA,pol	≤15.14µg/m^3	WALDB* -,30(78)
soil	USA	292mg/kg(av)	£NASRF -,6(71)
food,ani	WLD	≤7.7mg/kg(av)	£NASRF -,8(71)
food,plt	WLD	≤20mg/kg(av)	£NASRF -,8(71)
plt	AUT,cty	≤47mg/kg(av)	£NRCCF(77)AHBAAM B-155,425(72)
plt	USA	3.6mg/kg(av)	£NASRF(71)JAFCAU 17,1350(69)
ani,tiss	NZL,bkg	148mg/kg dwt(av)	£NRCCF(77)NZJSAB 17,105(74)
brd,tiss	WLD,bkg	97-535mg/kg dwt(av)	£NRCCF(77)FLUOA4 8(3),125(75)
fsh	WLD	<24mg/kg(av)	£NASRF -,8(71)
crs	MEDs,NE	138-212mg/kg dwt(75)	MBIOAJ 46,247(78)

MODEL ECOSYSTEM STUDIES

trr	QPMVAW 14,223(67)

ENVIRONMENTAL FATE

food to hmn - 0.8-3.5mg/D	MURJJ* -,148(76)

MAMMALIAN TOXICITY ARRAY

- OCC -hmn SKL:bcm	FLUOA4 12(1),18(79)

MUTAGENICITY

ins CHR:cng	£NRCCF(77)PCAC** 2,158(71)

AQUATIC TOXICITY

mol	1.0mg/l	15D	dth(30%)	WATRAG 6,1301(72)
fsh,juv,mar	5.88mg/l	68D	ret	PGWTA2 7(3/4),579(75)
crs	20mg/l	5D	ret	CPSCAL 12,1(71)
crs	52mg/l	72D	rep,dth(70%)	WATRAG 6,1301(72)
crs	300mg/l	48H	LC50	SHFIL* 19,10(70)

TERRESTRIAL TOXICITY

plt	0.1µg/m^3	28Mo	siz	£NRCCF(77)PFSHAZ 83,34(70)
plt	0.3µg/m^3	3Wk	siz	£NASRF(71)CJBOAW 46,1207(68)
plt	1.5µg/m^3	3Mo	str	£NASRF(71)APIM** -,-(69)
plt	42µg/m^3	pol	dth	£NASRF(71)HMSOF* -,-(49)
plt	$\leq$0.612mg/m^3	pol	siz	£NASRF(71)OPUUAD 5,45(66)

SAMPLING/PREPARATION/ANALYSIS

urn-pX	Det: 0.19mg/l	£NSHAM 1,114(77)
air-pX	Det: 0.05mg/m^3(samp-40 l)	£NSHAM 1,117(77)
air-pX	Det: 5ug/m^3	£NSHAM 1,212(77)

RECOMMENDATIONS/LEGAL MECHANISMS

DEU	REG	aq:emi - ML: 4kg F^-/H	IPAI** -,-(76)	RED Nov(79)
DEU	REG	aq(rvr):emi ML: 20mg F^-/l	IPAI** -,-(76)	RED Nov(79)
DEU	REC	air:occ - MAK:0.2mg/m^3(0.1ppm)	DFSK** -,25(79)	RED Nov(79)
DEU	-	plt:tiss - AL: 40ppm dwt	IPAI** -,-(76)	RED Nov(79)
GBR	REC	air:occ - TLV:2.5mg/m^3	IPAI** -,-(76)	RED Nov(79)
JPN	REG	aq:emi - ML: 15mg F^-/l Eff: 24 Jun(76)	IPAI** -,-(76)	RED Nov(79)
JPN	REG	air:emi(sel ind) - limits	EAJLR* -,-(76)	RED Nov(79)
SUN	REG	air:occ - MAC: 1mg HF/m^3 Eff: 1 Jan(77)	£ILOOE -,119(77)	RED Nov(79)
SWE	REG	air:occ - TLV:2.5mgF/m^3	£ILOOE -,119(77)	RED Nov(79)
USA	REC	aq:emi(sel ind) - limits	IPAI** -,-(76)	RED Nov(79)
USA	REG	aq:drk - MPC:1.4-2.4mg/l pX Eff: 24 Jun(77)	FEREAC 40,59570(75)	RED Nov(79)
USA	REG	aq:drk(bottled) - MPC:0.8-2.4mg/l	FEREAC 42,14325(77)	RED Nov(79)
USA	REG	air:emi(sel ind) - limits	IPAI** -,-(76)	RED Nov(79)
USA	REG	air:occ - TWA:2.5mgF/m^3	FEREAC 39,23540(74)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:2.5mg F/m^3	ACGIH* -,19(79)	RED Nov(79)

3.8.2 SODIUM FLUORIDE

IRPTC NU: 000021
CAS NU: 7681-49-4 MOLFM: NaF MOLWT: 41.99
WLN: Na F

SYN: ALCOA SODIUM FLUORIDE * ANTIBULIT * FDA 0101 * FLORIDINE * FLOROCID * FLUORIDE OF SODIUM * FLUORIDE,SODIUM * FLUORID SODNY(CSK) * FLUOROL(VILLIAUMITE) * FLUORURE DE SODIUM(FRA) * FLURA DROPS * FLURSOL * FUNGOL B * KARIDIUM * LURIDE * NCI C55221 * PERGANTENE * ROACH SALT * SODIUM FLUORIDE,SOLID(DOT) * SODIUM FLORURE(FRA) * SODIUM MONOFLUORIDE * T-FLUORIDE * VILLIAUMITE * WB0350000(RTECS) * ZYMAFLUOR * 003432 8 (ECDIN) * 1960(UN)

MP: 993°C DEN: 2.8g/ml
BP: 1695°C
HAZ: UN CLASS 6.1
AQSOL: 40g/l,20°C

IMPUR: SODIUM and ALUMINIUM FLUOSILICATES 12VXA5 8,959(68)

PRODUCTION PROCESS(ES)

Fusing cryolite with NaOH 12VXA5 8,959(68)
Adding equivalent amounts of NaOH or Na_2CO_3 to 40% HF 12VXA5 8,959(68)

USES

chemical cleaning
coated paper
dental laboratories
disinfecting fermentation apparatus
electroplating
fluoridation of drinking water
fluxes
fungicide
glass manufacture
heat treated salt compositions
insecticide
pastes and musilage
prophylaxis of dental caries
rodenticide
steel degassing agent
veterinary uses
wood preservative

ITIIT* -,477(75) 12VXA5 -,959(68)

PATHWAYS INTO THE ENVIRONMENT

appli	USA	185t(64)	2.7t(66)	NASRF(71)USDOA* -,-(70)

MAMMALIAN TOXICITY ARRAY

70µg/kg	10Y	orl-hmn	SKL:bcm			£NASRF(71)AOBIAR 2,190(60)
100µg/kg	-	orl-hmn	SKL:str	URS:bcm		£WHOFH(70)BJRAAP 36,497(63)
210µg/kg	1x	- hmn	MLT:all			£WHOFH(70)AMSVAZ 174(400),1(63)
300µg/kg	10D	- gpg	SNS:bcm			AONKAP 200,292(71)
800µg/kg	10Y	orl-cow	SKL:str			£NASRF(71)TUAUA3 -,283(62)
860µg/kg	6Wk	- hmn	EYE:ifl			£NASRF(71)BMJOAE 2,355(64)
1.4mg/kg	10D	ivn-hmn	SNS:bhv	URS:fnc		£WHOFH(70)11FYAN -,-(65)
2.2mg/kg	7½Y	orl-ctl	REP:exo	SKL:str	SON:msc	£NASRF(71)JANSAG 23,537(64)
3.1mg/kg	23D	orl-rat	SKL:str			£WHOFH(70)XPHBAO 49,1075(34)
4mg/kg	3Mo	ims-gpg	CNS:bcm			FHCYAI 12,37(74)
6mg/kg	18Wk	orl-swn	ret			£NRCCF(77)NURIBL 5,313(72)
8.29mg/kg	60D	orl-rat	HEM:uns			PRLFAG 17(4),139(65)
10mg/kg	3Mo	orl-rbt	HRT,LVR:bcm			£WHOFH(70)SKIZAB 12,616(58)
25mg/kg	21D	orl-rat	URS:fnc			APTOA6 13,36(57)
28mg/kg	11-21tDP	orl-mus	FET:ter			JDREAF 33,780(54)
44mg/kg	1x	ivn-dog	LD50,GIT:fnc	CNS:uns		£WHOFH(70)XPHBAO 71,459(56)
75mg/kg	1x	orl-hmn	LDLo			PCOC** -,1033(66)
180mg/kg	1x	orl-rat	LD50			AIHAAP 30,470(69)
250mg/kg	1x	scu-rbt	SON,LVR:bcm			£WHOFH(70)SKIZAB 12,616(58)
-	ACC	orl-hmn	GIT:fnc,crc -sns,dth			£NSHIF(75)JAMAAP 121,826(43)
-	-	skn-hmn	SKN:cor			JAMAAP 64,1985(15)
-	-	- hmn	END:fnc			£WHOFH -,257(70)
-	-	orl-chd	SON:bhv-sns			WALDB* -,122(78)
-	-	orl-hmn	bcm,dth			£WHOFH(70)CMAJAX 52,345(45)
2.2mg/m3	-	ihl-hmn	PUL:irr			£NSHIF(75)XPHBAO 229,-(48)
-	-	ihl-hmn	dth			£WHOFH(70)PIHFA* -,-(43)

MUTAGENICITY

mus-orl	1mg/kg	6Wk	CHR:inc	£NASDW(77)MOHAH* -,-(76)
mcc	CHR:cng			£NASDW(77)AEHLAU 29,230(74)
hcc	CHR,DNA:cng			£NASDW(77)MUREAV -,-(76)

NEUROTOXICITY/BEHAVIOUR

gpg-ims	4mg/kg	3Mo	CNS:bcm	FHCYAI 12,37(74)
rbt- -	50mg/kg	45D	SON:msc	FLUOA4 7,177(74)

TERRESTRIAL TOXICITY

plt	42µg/l	12H	gen	£NRCCF(77)CNJGA8 15,703(73)

RECOMMENDATIONS/LEGAL MECHANISMS

SWE	REC	poisonous substance	Eff: 22 Dec(78)	STNAF* 5,-(78)	RED Nov(79)
USA	REG	aq:emi - HQ:2270kg/24H	Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)
USA	REG	hazardous substance	Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)

3.9 LEAD

3.9.1 LEAD (generic)

IRPTC NU: 000022
DEF: Lead and its compounds (specific compound not defined)

PRODUCTION/CONSUMPTION

WLD	3750tt-p(77)	3838tt-p(73)	2911tt-p(65)
WLD	4280tt-p(76)	4080tt-p(71)	3436tt-p(66)
AFRI	80tt-p(76)	137tt-p(71)	131tt-p(66)
ASIAexSUN	417tt-p(76)	402tt-p(71)	289tt-p(66)
EEC	972tt-p(76)	923tt-p(71)	741tt-p(66)
EFTA	71tt-p(76)	60tt-p(71)	58tt-p(66)
EUR-E	296tt-p(76)	253tt-p(71)	198tt-p(66)
EURexSUN	1544tt-p(76)	1435tt-p(71)	1176tt-p(66)
EURother	206tt-p(76)	200tt-p(71)	179tt-p(66)
NAm	1384tt-p(76)	1332tt-p(71)	1119tt-p(66)
OCEA	200tt-p(76)	186tt-p(71)	221tt-p(66)
SAm	155tt-p(76)	138tt-p(71	126tt-p(66)
SUN	500tt-p(76)	450tt-p(71)	375tt-p(66)
SUN	600tt-p(75)	640tt-p(73)	
AUS	187tt-p(75)	206tt-p(70)	221tt-p(66)
AUS	191tt-p(75)	221tt-p(73)	
BEL	122tt-p(76)	94tt-p(71)	93tt-p(66)
BEL	103tt-p(75)	98tt-p(73)	
CAN	176tt-p(76)	168tt-p(71)	168tt-p(66)
CAN	172tt-p(75)	187tt-p(73)	
DEU	278tt-p(75)	305tt-p(70)	248tt-p(66)
DEU	260tt-p(75)	300tt-p(73)	
FRA	172tt-p(76)	161tt-p(71)	142tt-p(66)
FRA	150tt-p(75)	185tt-p(73)	
GBR	251tt-p(75)	287tt-p(70)	175tt-p(66)
ITA	118tt-p(76)	76tt-p(71)	65tt-p(66)
ITA	70tt-p(75)	100tt-p(73)	
JPN	219tt-p(74)	209tt-p(70)	119tt-p(66)
JPN	195tt-p(75)		
MEX	163tt-p(76)	136tt-p(71)	164tt-p(66)
MEX	179tt-p(75)	177tt-p(73)	
USA	1045tt-p(75)	1057tt-p(70)	787tt-p(66)
USA	1008tt-p(75)	1100tt-p(73)	

AUS	68tt-c(75)	74tt-c(73)	CAN	55tt-c(75)	69tt-c(73)
DEU	210tt-c(75)	290tt-c(73)	FRA	188tt-c(75)	214tt-c(73)
GBR	238tt-c(75)	282tt-c(73)	ITA	200tt-c(75)	234tt-c(73)
JPN	186tt-c(75)	267tt-c(73)	MEX	74tt-c(75)	88tt-c(73)
SUN	544tt-c(75)	600tt-c(73)	USA	1027tt-c(75)	1423tt-c(73)

UNYS2* -,-(78) £WHOPB -,36(77)

USES

alloys
batteries
cable sheathing
chemical pigment
gasoline additive
insecticide
semi-manufacturers

£WHOPB -,36(77) £WHOPB -,38(77)

PATHWAYS INTO THE ENVIRONMENT

wst,erg to air	WLD	404tt/Y	£NRPBB(78)GARRM* -,206(75)
geoph	WLD	3100tt/Y	£NRPBB(78)GARRM* -,206(75)
natur	WLD	400tt/Y	£NRPBB(78)GARRM* -,206(75)
natur	WLD	210tt/Y	£NRPBB(78)HMSOL* 2,47(74)
appli	CAN	6t(70)	£NRPBB(78)ECAPD* -,17(74)
load	CAN	21416t(70)	£NRPBB(78)ECAPD* -,17(74)
wst to air	CAN	18700t(72)	£NRPBB(78)ECIWD* 41,94(76)

CONCENTRATIONS

aq,drk	CAN	<1.0µg/l(7.8%)	£NRPBB(78)UOECM* -,223(77)
aq,drk	CAN	1.0-29.9µg/l(89%)	£NRPBB(78)UOECM* -,223(77)
aq,drk	CAN	>30µg/l(3.3%)	£NRPBB(78)UOECM* -,223(77)
aq,mar	WLD,bkg	0.03µg/l	£NRPBB(78)HMSOL* 2,47(74)
aq,frs	WLD,bkg	0.5µg/l	£NRPBB(78)HMSOL* 2,47(74)
aq,grnd	WLD	1-60µg/l	£WHOPB -,31(77)
aq,frs	WLD	1-10µg/l	£WHOPB(77)XIPPAN 440,-(63)
aq,mar	MEDs,W	4.5mg/l POLG(76)	RVOMAY 48,73(77)
aq,mar	BERs	0.03-0.68mg/l ASV(77)	NOAAR* 8,199(78)
aq,mar	HKG,cst	0.16mg/l AAS	MPNBAZ 10,56(79)
aq,mar	LBN,cst	0.3-0.5mg/l AAS(77)	HYDRB8 63,105(79)
aq,mar	NOR,Wcst	0.2-1.7µg/l AAS(76)	JEMBAM 37,271(79)
aq,est	GBR,NEcst	0-2.0mg/l AAS(77)	MPNBAZ 10,170(79)
aq,part,frs	USA,NWcst	66mg/kg XF(77)	NOAQR* 3,32(78)
aq,part,mar	USA,NWcst	56mg/kg XF(77)	NOAQR* 3,32(78)
aq,frs	CAN,lak	39-103µg/l	£NRPBB(78)WPRC** 8,178(73)
aq,frs	USA,lak	6-34µg/l	£NRPBB(78)USDI2* -,-(68)
air,mar	BEL,cst	39-614ng/m^3 XE(72-77)	ATENBP 13,267(79)
air	CAN,cty	0.97µg/m^3(av)	£NRPBB(78)ESTHAG 10,1124(76)
air	WLD,rur	0.1µg/m^3(av)	£NRPBB(78)HMSOL* 2,47(74)
air	WLD,cty	1-10µg/m^3(av)	£NRPBB(78)HMSOL* 2,47(74)
air	WLD,rur	<0.5µg/m^3	£WHOPB(77)WHOTAC 410,19(69)
air	WLD,cty	1-10µg/m^3	£WHOPB(77)WHOTAC 410,19(69)
soil	WLD,bkg	16µg/kg	£NRPBB(78)HMSOL* 2,47(74)
soil	WLD	5-25mg/kg(av)	£WHOPB(77)CBSST* 48,-(55)
soil	WLD,bkg	10mg/kg(av)	£NRPBB -,7(78)
soil	- ,pol	<7.6g/kg	£NRPBB(78)STEAE* -,499(74)
sed,frs	CAN,lak,rvr	11.1-415mg/kg dwt(av)	£NRPBB(78)PTPCE* -,I-83(74)

sed,mar	HKG,cst	4mg/kg AAS	MPNBAZ 10,56(79)
sed,mar	ITA,Wcst	200mg/kg dwt AAS	MPNBAZ 9,208(78)
sed,mar	ISR,cst	27.0mg/kg(73-74)	MPNBAZ 9(1),10(78)
sed,mar	MEXg	739mg/kg XE	WAPLAC 9,363(78)
food,plt	WLD	0.1-1mg/kg dwt(av)	£WHOPB(77)JFOAA2 13,96(62)
food	WLD	<2.5mg/kg(av)	£WHOPB(77)JOCDAE 14,408(61)
food,plt	- ,pol	0.2-10.7mg/kg(71)	£NRPBB(78)STRHAV 34(1),26(74)
food,plt	USA,C,sbd,bkg	<20.6mg/kg dwt(av)	£NRPBB(78)JANCA2 56(4),994(73)
hmn,tiss	DEU,NW,ind,cty	4.53mg/kg(av)	IAEHDW 44(2),65(79)
hmn,tiss	DEU,NW,rur	2.74mg/kg(av)	IAEHDW 44(2),65(79)
plt	WLD	2.5mg/kg dwt(av)	£WHOPB(77)JFOAA2 13,96(62)
plt	WLD	1.0mg/kg dwt(av)	£WHOPB(77)JRAGAY 124,75(63)
biota	- ,cty	11-367mg/kg	£NRPBB(78)TMMOI* -,111(74)
biota	- ,rur	4.7-16mg/kg	£NRPBB(78)TMMOI* -,111(74)
plt	USA,C,sbd,pol	<49mg/kg	£NRPBB(78)JANCA2 56(4),994(73)
plt	- ,pol	<142g/kg	£NRPBB(78)STEAE* -,499(74)
mam,mar	MEDs,W	0.02-10.15mg/kg wwt	AIOM** 54,5(78)
crs,mar	USA,NWcst	0.62-1.71mg/kg dwt(77)	NOAAR* 8,199(78)
crs,mar	MEDs,W	1.67-2.89mg/kg wwt	AIOM** 54,5(78)
mol,mar	USA,NWcst	2-16mg/kg dwt(77)	NOAAR* 8,199(78)
mol	YUG	0.08mg/kg dwt(77)	GFCMR* 3,-(78)
fsh,mar	USA,NWcst	0.95-1.04mg/kg dwt(77)	NOAAR* 8,199(78)
fsh,mar	MEDs,W	0.04-3.4mg/kg wwt	AIOM** 54,5(78)
plt,mar	LBN,cst	6.8-96.6mg/kg dwt AAS(77)	HYDRB8 63,105(79)
plt,mar	ISR,cst	22.2mg/kg dwt AAS(74)	ESTHAG 11,265(77)
mol,aq	-	0.6-34830mg/kg dwt	£NRPBB -,230(78)
fsh	- ,bkg	0.2-0.6mg/kg(av)	£NRPBB(78)ENCON* 2,39(75)
mcr,mar	HKG,cst	24mg/kg dwt AAS	MPNBAZ 10,56(79)
mcr,mar	MEDs,N	1.6-90mg/kg ASV(75)	ZANCA8 282,357(76)

BIODEGRADATION

- -a,20°C	-,-/-	tetramethyl lead -/-	£NRPBB(78)NATUAS 253,263(75)

ADSORPTION

montmorillonite,pH8	-, 24mg/g	£NRPBB -,84(78)
montmorillonite,pH7	-, 35mg/g	£NRPBB -,84(78)
montmorillonite,pH4	-, 3mg/g	£NRPBB -,84(78)
kaolinite,pH8	-, 8mg/g	£NRPBB -,84(78)
kaolinite,pH4	-, 2mg/g	£NRPBB -,84(78)
humus,pH8	-,116mg/g	£NRPBB -,84(78)
humus,pH2	-, 12mg/g	£NRPBB -,84(78)
Fe2O3.nH2O,18-23°C,pH7.7-8.2	-, 86%/3D	GCACAK 9,1(56)
clay ,18-23°C,pH7.7-8.2	-, 96%/3D	GCACAK 9,1(56)

MODEL ECOSYSTEM STUDIES

aq	£NRPBB(78)ENCON* 2,39(75)
aq	£NRPBB(78)JEVQAA 4,505(75)
trr	£NRPBB(78)JEVQAA 4,123(75)
aq-trr	ESTHAG 13,546(79)

ENVIRONMENTAL FATE

air to soil	WLD	150tt/Y	£NRPBB(78)GARRM* -,206(75)
air to aq,mar	WLD	250tt/Y	£NRPBB(78)GARRM* -,206(75)
soil to aq,mar	WLD	416tt/Y	£NRPBB(78)GARRM* -,206(75)
aq,mar to sed	WLD	400-600tt/Y	£NRPBB(78)GARRM* -,206(75)
air to aq,mar	USA,SEcst	200t/Y	GCACAK 40,573(76)
soil to aq,mar	USA,SEcst	10t/Y	GCACAK 40,573(76)
aq,frs to aq,mar	USA,SEcst	100t/Y	GCACAK 40,573(76)
aq,mar to sed	USA,SEcst	424t/Y	GCACAK 40,573(76)
air to aq,mar	Ns	5.8tt/Y(74-76)	MSCOM* 5,175(79)
aq,frs to aq,mar	BALs	19.68t/Y	AMBOS* 5,-(77)
aq,mar to sed	BALs	1-10tt/Y	ICESR* E:9,-(77)

BIOCONCENTRATION FACTOR

fsh	flow,0.15mg/l	24/14D wwt	NOARV* -,41(78)

MAMMALIAN METABOLITES

-	tertiary lead phosphates	MEWEAC 30(18),683(79)

MAMMALIAN TOXICITY ARRAY

2.2µg/m^3	-	ihl-man	HRT:cng			£NRPBB(78)PEHPB* -,441(73)
0.01mg/m^3	OCC	ihl-hmn	URS:bcm,fnc	HEM:bcm		GTPZAB 12,24(78)
-	-	chd	CNS:ret			£NRPBB(78)CPEDAM 5,292(66)
-	OCC	- hmn	SNS:fnc	SON:msc,bhv		£NRPBB(78)£NSHPB -,59(76)
-	OCC	- hmn	HRT:cng			£NRPBB(78)TTMKBR 14,56(65)
-	-	- hmn	URS:ifl	HEM:prs-dth		£NRPBB(78)KDYIA5 4(1),1(73)
-	-	- hmn	SKL:ifl			£NRPBB(78)NEJMAG 280,1199(69)
-	OCC	- wmn	FET:dth			£NRPBB(78)£NSHPB -,39(76)
-	-	- wmn	REP:cng			£NRPBB(78)RCOCB8 13(2),309(76)
-	OCC	- man	REP:fnc,str			£NRPBB(78)AEHLAU 30(8),396(75)
-	OCC	- hmn	EYE:fnc			£NRPBB(78)VEOFA6 25(4),74(74)
-	-	- man	END:bcm			£NRPBB(78)AEHLAU 20(3),356(70)
-	-	- hmn	URS:fnc	HEM:bcm		SMJOAV 72(4),433(79)
-	20Y,OCC	- hmn	PNS:fnc			AOHVS* 1,-(79)
-	-	- hmn	HEM:bcm	ANS:msc	PNS:str,fnc	MEWEAC 30(18),683(79)
-	-	- man	SKL,HEM:str	SKN:str,crc-sns		OSMOAE 47(6),500(79)
-	OCC	- hmn	SON:bhv	CNS:fnc	HEM:bcm	IAEHDW 41(4),217(78)

CARCINOGENICITY

eval: "There is no evidence to suggest that exposure to lead salts causes cancer of any site in man. However, only one epidemiological study of the relationships between exposure to lead and the occurrence of cancer has been reported. It must be noted that the level of human exposure equivalent to the levels of lead acetate producing renal tumours in rats is 810mg per day (550mgPb). This level appears to exceed by far the maximum tolerated dose for man."

£IARC1 1,48(72)

NEUROTOXICITY/BEHAVIOUR

eval: "Toxic effects of lead on man and animals are numerous, are of variable severity and have been studied extensively. The entity of severe clinical lead poisoning is manifested as a constellation of effects on the central nervous system, the gastrointestinal system, the hematopoietic system, and the kidneys. Other organs (such as the thyroid gland and the heart) may be involved to varying degrees. In the most severe form of poisoning, profound disturbances of the central nervous system are prominent, and permanent damage to the brain may occur. Damage to the kidneys also is prominent and may be permanent. The life-span of erythrocytes is shortened, with or without coexistent anemia. This form of lead poisoning is encountered today mainly among infants and heavy drinkers of illicitly distilled whiskey."

£NASPB -,207(72)

POTENTIATION

rat	Vitamin D	£NRPBB(78)THACD* -,-(75)
ham	Cadmium	£NRPBB(78)EXPEAM 25(1),56(69)

AQUATIC TOXICITY

fsh	13µg/l	16Wk	HEM:bcm	£NRPBB(78)JFRBAK 33,268(76)
mcr	0.05mg/l	9D	str	£NRPBB(78)PYCOAD 14,265(75)
fsh	64µg/l	6Mo	neu	£NRPBB(78)WATRAG 10,199(76)
fsh	70µg/l	24H	bhv	£NRPBB(78)AEHLAU 20,45(70)
mcr	0.1mg/l	14D	bcm	£NRPBB(78)AHBPAX 14,115(72)
fsh	0.1mg/l	-	SKN:str	£NRPBB(78)NATUAS 258,431(75)
mcr,pop	0.1mg/l	-	bcm	OKNOAR 15,589(76)
mol	0.1mg/l	12Wk	str	ICESC* 75,-(78)
wor	0.2mg/l	8D	bcm	RVOMAY 45-46,71(77)
mcr	0.25mg/l	17D	ret	£NRPBB(78)COREAF 282,633(76)
crs	0.3mg/l	30D	bcm	RVOMAY 33,111(74)
mol,emb	0.5mg/l	2D	ret	MBIOAJ 44,109(77)
plt	0.5mg/l	8D	ret	£NRPBB(78)PRLBA4 177,389(71)
fsh	0.53mg/l	21D	bcm	£NRPBB(78)TXAPA9 32(1),191(75)
mol,emb	0.78mg/l	42H	LC50	BECTA6 11,92(74)
fsh,emb	1.0mg/l	-	FET:str	JFIBA9 11,49(77)

plt	1mg/l	4Wk	str		£NRPBB(78)ZSPPAD 73,377(74)
wor	1mg/l	28D	LC50		£NRPBB(78)WATRAG 10,299(76)
crs	1mg/l	30D	LC50		£NRPBB(78)MPNBAZ 2,182(71)
fsh	1.17mg/l	96H	LC50		£NRPBB(78)EPACV* -,81(73)
fsh	1.25mg/l	>30D	ret		£NRPBB(78)TAMSAJ 82,59(63)
fsh	1.25mg/l	60D	HRT,URS:str		£NRPBB(78)TAMSAJ 82,59(63)
mcr	2.0mg/l	17D	dth		COREAF 282,633(76)
crs,emb	2.45mg/l	48H	LC50		MBIOAJ 18,162(73)
mcr	2.5mg/l	9D	fnc,str		£NRPBB(78)WAPLAC 3(3),371(74)
fsh,est	2.65mg/l	60D	oxy,bhv		AECTCV 6(2/3),349(77)
crs,egg	5.0mg/l	3D	rep		MPNBAZ 7,181(76)
mcr	5mg/l	1D	res		£NRPBB(78)WAPLAC 2(2),181(73)
fsh	10.0mg/l	7D	LVR:bcm		JFRBAK 30,560(73)
fsh	10.7mg/l	-	SNS:str		£NRPBB(78)HYDRB8 47,291(75)
mol,mar	20mg/l	40D	LC50		AECTCV 7,73(78)
amp	25mg/l	20D	SKN,HEM,GIT:str	LVR:str,fnc	£NRPBB(78)LAACAR 17(2),240(67)
mol	27mg/l	96H	LC50		BECTA6 17,137(77)
fsh	27mg/l	16D	HEM,HRT:str		£NRPBB(78)BIBUBX 68(3),335(35)
crs	30mg/l	3Wk	rep		£NRPBB(78)JFRBAK 29,1691(72)
mcr	100mg/l	-	rep		£NRPBB(78)VIMBAC 15,237(75)

TERRESTRIAL TOXICITY

plt	5µg/l	-	ret	£NRPBB(78)CJBOAW 50,973(72)
plt	1mg/kg	-	res	£NRPBB(78)BPBFA4 164(2),126(73)
plt	2mg/l	-	fnc	£NRPBB(78)ENVPAF 7,241(74)
plt	4.1mg/l	-	bcm	£NRPBB(78)NATWAY 62,184(75)
plt	10mg/l	-	rep	£NRPBB(78)AABIAV 13,160(26)
plt	20.7mg/l	-	dth	£NRPBB(78)BIJOAK 17,439(23)
plt	21mg/l	-	bcm	£NRPBB(78)ALLIAM 19,89(74)
plt	30mg/l	-	str	£NRPBB(78)AABIAV 24,690(37)
plt	80mg/kg	-	fnc	£NRPBB(78)FNSCA6 21(1),33(75)
mcr	250mg/l	-	bcm	£NRPBB(78)FZRSAV 54,122(74)
mcr	600mg/kg	-	osm	£NRPBB(78)APMBAY 29(5),669(75)
plt	1000mg/kg	-	ret,bcm,str,fnc	£NRPBB(78)ENVPAF 5(1),35(73)

SAMPLING/PREPARATION/ANALYSIS

bld-COLM (Dithizone)	Det:3µg/100ml(samp 10ml)	£NSHAM 1,102(77)
urn-COLM (Dithizone)	Det:12µg/100ml(samp 25ml)	£NSHAM 1,102(77)
air-AAS	Det:42µg/m^3	£NSHAM 1,173(77)
air-ASV	Det:0.16µg/m^3(samp 100 l)	£NSHAM 1,191(77)
bld-ASV	Det:0.04µg/ml(samp 100µl)	£NSHAM 1,195(77)
urn-ASV	Det:4µg/l(samp 1ml)	£NSHAM 1,200(77)
bld-AAS	Det:0.05µg/g	£NSHAM 1,208(77)
urn-AAS	Det:0.05µg/ml	£NSHAM 1,208(77)
air-AAS	Det:0.02mg/m^3(samp 5 l)	£NSHAM 1,214(77)
bld-AAS	Det:0.1µg/ml(samp 1ml)	£NSHAM 1,214(77)
bld-AAS	Det:5µg/100g(samp 10ml)	£NSHAM 1,262(77)
urn-AAS	Det:10µg/l(samp 50ml)	£NSHAM 1,262(77)
air-AAS	Det:0.128mg/m^3(samp 180 l)	£NSHAM 3,S341(77)

RECOMMENDATIONS/LEGAL MECHANISMS

WHO/FAO	REC	hmn: - AWI:3mg/person	£WHOF1 -,46(72)	RED Nov(79)
EEC	REG	fuel: - MPC:0.4g/l Eff:1 Jan(81)	£CECPB -,-(78)	RED Nov(79)
DEU	REG	fuel: - MPC:0.15g/l Eff:1 Jan(76)	BGBL** 1(77,7),1234-6(71)	RED Nov(79)
GBR	-	air:emi(ind) - limits	EPAWA* -,124(74)	RED Nov(79)
GBR	REG	hmn:food - MPC:limits Eff:12 Apr(80)	UKDHS* -,-(79)	RED Nov(79)
GBR	REG	fuel: - MPC:0.45g/l Eff:1 Jan(78)	UKDOT* -,-(79)	RED Nov(79)
GBR	REG	fuel: - MPC:0.40g/l Eff:1 Jan(81)	UKDOT* -,-(79)	RED Nov(79)
JPN	REG	aq:imi - ML:0.1ppm	EAJLR* -,-(76)	RED Nov(79)
JPN	REG	aq:emi - PL:1mgPb/l Eff:(71)	EAJLR* -,-(76)	RED Nov(79)
JPN	-	air:emi(ind) - limits	EAJLR* -,-(76)	RED Nov(79)
SUN	-	air:imi - 0.7µgPb/m^3(24H)	EPAWA* -,47(74)	RED Nov(79)
SWE	REG	hmn:food(sel)-MAC:limits Eff:1 Mar(79)	STLIF* 34,-(78)	RED Nov(79)
SWE	REG	hmn:food(from sel water areas) marketing-PRO Eff:1 Apr(79)	STLIF* -,-(79)	RED Nov(79)
SWE	REG	fuel: - MPC:0.15mg/l Eff:1 Jan(80)	SVENF* 614,-(78)	RED Nov(79)
USA	REG	aq:drk-MPC:0.05mg/l AAS Eff:24 Jun(77)	FEREAC 40,59570(75)	RED Nov(79)
USA	REG	aq:drk(bottled)-MPC:0.05mg/l	FEREAC 42,14325(77)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:0.15mgPb/m^3	ACGIH* -,21(79)	RED Nov(79)
USA	REC	air:occ - TLV-STEL:0.45mg/Pbm^3	ACGIH* -,21(79)	RED Nov(79)
USA	REG	fuel:- MPC:0.5mgPb/gallon Eff:1 Oct(79)	FEREAC 40,29292(75)	RED Nov(79)

4.9.2 ACETIC ACID,LEAD(2+) SALT (generic)

IRPTC NU: 000023
DEF: Acetic acid, lead(2+) salt (hydration state not defined)

SYN: ACETATE DE PLOMB(FRA) * ACETATE OF LEAD * BLEIAZETAT(DEU) * LEAD ACETATE * LEAD DIACETATE * NCI-C01489 * NEUTRAL LEAD ACETATE * NORMAL LEAD ACETATE * PLUMBOUS ACETATE * SALT OF SATURN * SUGAR OF LEAD * 1616(UN)

HAZ: UN Class 6.1

PRODUCTION PROCESS(ES)

Reaction of lead oxide with acetic acid	£NATOM -,M2-7(76)

USES

analytical reagent
antifouling paints
drying agent in paint
gold cyanidation process
insecticide
lead salts, lead chromate and lead carbonate production
medicine
metal coating
textile-dyeing
varnishes
water proofing

£NATOM -,M2-7(76) £EPAPB -,-(77)

MODEL ECOSYSTEM STUDIES

trr £NRPBB(78)JEVQAA 1(1),92(72)

MAMMALIAN TOXICITY ARRAY

20µg/kg	21D	orl-hmn	HEM:bcm	PCECS* -,537(74)
20µg/kg	30D	orl-rat	REP:mlt	£NRPBB(78)AJOGAH 115(8),1058(73)
0.16mg/kg	1x	ipr-rat	SKL:bcm	£NRPBB(78)ESKGA2 20(5),287(74)
0.6mg/kg	15D	orl-dog	CNS:cng SON:bhv	£NASPB(72)JPETAB 64,364(38)
3.75mg/kg	30D	ipr-mus	IMM:fnc	£NRPBB(78)EXPEAM 33(5),667(77)
10mg/kg	1Mo	orl-dog	GIT:bcm	£NRPBB -,401(78)
12mg/kg	160D	orl-dog	URS:bcm-dth	£NASPB(72)14CYAT 30,114(48)
17mg/kg	16D	orl-rbt	HEM:str	£NASPB -,257(72)
2.5-50mg/kg	6Mo	orl-dog	IMM:fnc HEM:str	BLOOAW 53(4)588(79)
120mg/kg	1x	ipr-mus	LD50	ITIIT* -,299(75)
120mg/kg	1x	ivn-rat	LD50	ITIIT* -,299(75)
125mg/kg	2Y	orl-ham	URS:uns	£IARC1(72)BJCAAI 23,765(69)
170mg/kg	2Y	orl-rbt	EYE:str	£NRPBB(78)TAOSAT 72,404(74)
350mg/kg	40D	orl-rat	HEM:prs-dth	£WHOPB(77)AHJOA2 28,295(44)
400mg/kg	LT	orl-mus	SON:bhv	£NSHPB(76)LIFSAK 13,1275(73)
500mg/kg	-	orl-rat	END:str,bcm	£NRPBB(78)OJSCA9 75(3),155(75)
1250mg/kg	18Mo	orl-rat	PNS:str	£NRPBB(78)JNENAD 27,111(68)
1250mg/kg	1Y	orl-rat	HRT:fnc,siz	£NRPBB(78)CISUAQ 50,III-232(74)

CARCINOGENICITY

rat-orl	15mg/kg	18Mo	MLT:neo	£IARC1(72)ZAPPAN 3,1(68)
mus-orl	200mg/kg	-	URS:neo	£IARC1(72)BJCAAI 23,765(69)
rat-orl	200mg/kg	29Mo	URS:neo	£IARC1(72)BJCAAI 16,289(62)
rat-orl	500mg/kg	-	URS:neo	£IARC1(72)BJCAAI 16,283(62)
rat-orl	1250mg/kg	10Mo	URS:car	£NRPBB(78)EXPTAX 8,137(73)
ham- -	-	-	nef	£NRPBB(78)BJCAAI 23,765(69)

eval: "Lead acetate is carcinogenic in rats and mice ---. Given orally, they produce benign and malignant tumours of the kidney." £IARC1 1,47(72)

MUTAGENICITY

hcc	CHR:cng	£NRPBB(78)EXPEAM 30(9),1006(74)
mcc	CHR:cng	£NRPBB(78)MUREAV 14,95(72)

NEUROTOXICITY/BEHAVIOUR

mky-orl	785µg/kg	2Y	SON:bhv	HEM:bcm	JENPT* 2(4),1195(79)
rat-orl	25mg/kg	8Wk	SON:bhv	CNS:bcm	JENPT* 2(2),473(78)
rat-orl	27.5mg/kg	3D	SON:bhv		£NRPBB(78)AJMDAW 79,5(74)
rat-ipr	100mg/kg	3D	SON:bhv		AEHLAU 22,370(71)
rat-orl	310mg/kg	5Wk	SON:bhv	CNS:bcm	TXCYAC 12(3),343(79)
mus-orl	400mg/kg	LT	SON:bhv		£NSHPB(76)LIFSAK 13,1275(73)
rat-orl	1250mg/kg	18Mo	PNS:str		£NRPBB(78)JNENAD 27,111(68)
mus-orl	2000mg/kg	40D	SON:bhv-ret		£NSHPB(76)EVHPAZ 9,227(74)
rat-orl	-	-	CNS:str	SON:msc	FEPRA7 31,665(72)

REPRODUCTION

rat- -	2µg/kg	6x	REP:fnc		£NRPBB(78)PEHPB* -,441(73)
rat-orl	20µg/kg	30D	REP:mlt		£NRPBB(78)AJOGAH 115(8),1058(73)
shp- -	5mg/kg	45DP	nef		£NRPBC(73)AJVRAH 27,132(66)
shp- -	9mg/kg	45DP	REP:fnc		£NRPBC(73)AJVRAH 27,132(66)
rat-orl	500mg/kg	-	REP:fnc	FET:siz-dth	£NRPBB(78)FESTAS 22(11),755(71)
mus-orl	3.7g/kg	28D	REP:fnc	FET:dth	£NRPBB(78)EXPEAM 30(5),486(74)

TERATOGENICITY

ham-ivn	50mg/kg	7-9tDP	FET:str	£NRPBB(78)EXMPA6 7,208(67)

AQUATIC TOXICITY

mol,aq	2.5mg/l	7D	ret	£NRPBB -,231(78)

TERRESTRIAL TOXICITY

brd,egg	5µg	1x	str	£NRPBB(78)PAMIAD 39,85(73)
plt	8µg/l	-	ret	£NRPBB(78)CJBOAW 50,973(72)
plt	3200kg/ha	-	nef	£NRPBB(78)JEVQAA 1(1),92(72)

RECOMMENDATIONS/LEGAL MECHANISMS

SWE	REC	dangerous substance	Eff: 22 Dec(78)	STNAF* 5,-(78) RED Nov(79)

3.9.3 ACETIC ACID,LEAD(2+)SALT

IRPTC NU: 000024
CAS NU: 301-04-2 MOLFM: C4H604Pb MOLWT: 325.29
STRFM: $Pb(C_2H_3O_2)_2$

SYN: ACETATE DE PLOMB(FRA) * ACETATE OF LEAD * AI5250000(RTECS) * LEAD ACETATE * LEAD DIACETATE * NCI-C01489 * NORMAL LEAD ACETATE * SALT OF SATURN * SUGAR OF LEAD * 1616(UN)

MP: 280°C DEN: 3.25g/ml,20°C
AQSOL: 443g/l,20°C

MAMMALIAN TOXICITY ARRAY

120mg/kg	1x	ipr-mus	LD50	COREAF 256,1043(63)

3.9.4 LEAD ACETATE (II), TRIHYDRATE

IRPTC NU: 000025
CAS NU: 6080-56-4 MOLFM: C4H604Pb.3H2-O MOLWT: 379.35
STRFM:.$Pb(CH_3COO)_2.3H_2O$

SYN: ACETIC ACID,LEAD(+2) SALT TRIHYDRATE * BIS(ACETATO)TRIHYDROXY TRILEAD * BLEIAZETAT(DEU) * NEUTRAL LEAD ACETATE * NORMAL LEAD ACETATE * PLUMBOUS ACETATE * OF8050000(RTECS)

MP: 75°C DEN: 2.55g/ml
AQSOL: 625g/l

3.10 MERCURY

3.10.1 MERCURY (generic)

IRPTC NU: 000026
DEF: Mercury and its compounds (specific compound not defined)

SYN: 2024(UN)(non-explosive liquid) * 2025(UN)(non-explosive solid)

HAZ: UN Class 6.1 (non-explosive solid and liquid)

PRODUCTION/CONSUMPTION

WLD	9141t-p(75)	9747t-p(70)	9091t-p(66)
WLD	9784t-p(73)	10236t-p(69)	
AFRI	1069t-p(76)	4t-p(70)	6t-p(66)
ASIA-exSUN	1056t-p(76)	1376t-p(70)	1415t-p(66)
EEC	987t-p(76)	1648t-p(70)	1942t-p(66)
EFTA	13t-p(76)	3t-p(70)	1t-p(66)
EUR-E	191t-p(76)	166t-p(70)	37t-p(66)
EUR-exSUN	3006t-p(76)	3765t-p(70)	4224t-p(66)
EUR-other	1815t-p(76)	1948t-p(70)	2245t-p(66)
NAm	1326t-p(76)	2811t-p(70)	1914t-p(66)
OCEA	1t-p(73)	1t-p(70)	2t-p(67)
OECD	6673t-p(73)	4854t-p(69)	
SAm	127t-p(75)	130t-p(70)	149t-p(66)
SUN	1930t-p(76)	1660t-p(70)	1380t-p(66)
CAN	456t-p(75)	827t-p(70)	172t-p(67)
CHN	900t-p(76)	690t-p(70)	900t-p(66)
CSK	191t-p(76)	166t-p(70)	30t-p(66)
DEU	219t-p(76)	68t-p(70)	70t-p(66)
DZA	977t-p(75)	456t-p(70)	246t-p(71)
ESP	1384t-p(76)	1415t-p(70)	1697t-p(66)
ESP	2194t-p(73)	2225t-p(69)	
ITA	768t-p(76)	1535t-p(70)	1846t-p(66)
ITA	1127t-p(73)	1681t-p(69)	
MEX	518t-p(76)	1043t-p(70)	759t-p(66)
USA	808t-p(75)	941t-p(70)	759t-p(66)
USA	77t-p(73)	1023t-p(69)	
YUG	431t-p(75)	533t-p(70)	548t-p(66)
YUG	538t-p(73)	494t-p(69)	

CECDS* -,9-18(76) UNYS1* -,28(77)

USES

agricultural	WLD 1.5% (69)	
catalysis	WLD 2% (69)	
chlor-alkali	WLD 15% (69)	
control instruments		
dental applications		
electrical apparatus	WLD 18.5% (69)	
laboratory use		
paints	WLD 7.5% (69)	
pharmaceuticals	WLD 4% (69)	
pulp and paper		
		CECDS* -,9-19(76)

PATHWAYS INTO THE ENVIRONMENT

geoph to air	USA	59t(73)	£NASHG(78)EPAPD* -,-(75)
geoph to aq	USA	3t(73)	£NASHG(78)EPAPD* -,-(75)
geoph to soil	USA	5t(73)	£NASHG(78)EPAPD* -,-(75)
wst to air	USA	413t(73)	£NASHG(78)EPAPD* -,-(75)
wst to aq	USA	85t(73)	£NASHG(78)EPAPD* -,-(75)
wst to soil	USA	959t(73)	£NASHG(78)EPAPD* -,-(75)
natur to air	USA	1019t(73)	£NASHG(78)EPAPD* -,-(75)
load	USA	2590t(73)	£NASHG(78)EPAPD* -,-(75)
geoph	WLD	4-5tt/Y	£WHOF1 -,11(72)
wst, ind to aq	WLD	10tt/Y	£WHOF1(72)ACLRBL 3,118(71)
natur to aq,mar	WLD	5tt/Y	£WHOF1 -,11(72)
natur to air	WLD	25-150tt/Y	£WHOHG(76)SCIEAS 174,692(71)
wst to soil	WLD	5.5tt/Y	£NASHG -,19(78)
wst to aq,frs	WLD	730tt/Y	£NASHG -,19(78)
wst to air	WLD	10tt/Y	£NASHG -,19(78)
appli to soil	SWE	80t/(40-66)	PRSCS* -,22(71)

CONCENTRATIONS

aq,drk	WLD	<1µg/l	£NASHG -,69(78)
aq,frs	WLD	20-60ng/l	£NASHG -,39(78)
aq,mar	WLD	10-30ng/l	£NASHG -,39(78)
air	WLD,rur	4ng/m^3(av)	£NASHG -,31(78)
air	WLD,cty	10ng/m^3(av)	£NASHG -,31(78)
air,mar	WLD	0.7ng/m^3(av)	£NASHG -,31(78)
soil	FIN	60µg/kg(av)	£NASHG(78)UKDOE* -,-(76)
soil	JPN	280µg/kg(av)	£NASHG(78)UKDOE* -,-(76)
soil	SWE	70µg/kg(av)	£NASHG(78)UKDOE* -,-(76)
soil	GBR	60-80µg/kg(av)	£NASHG(78)UKDOE* -,-(76)
soil	USA	71µg/kg(av)	£NASHG(78)UKDOE* -,-(76)
sed,frs	GBR	0.01-1.026mg/kg	£NASHG(78)UKDOE* -,-(76)
sed,frs	FIN	0.05-170mg/kg	£NASHG(78)UKDOE* -,-(76)
sed,frs	SWE	0.3mg/kg(av)	£NASHG(78)UKDOE* -,-(76)
sed,frs	USA	0.3mg/kg(av)	£NASHG(78)UKDOE* -,-(76)
sed,est	CAN	0.02-26.0mg/kg	£NASHG(78)UKDOE* -,-(76)

sed,est	GBR	400µg/kg(av)	£NASHG(78)UKDOE* -,-(76)
sed,est	USA	330µg/kg(av)	£NASHG(78)UKDOE* -,-(76)
sed,mar	ATLoN	410µg/kg(av)	£NASHG(78)UKDOE* -,-(76)
sed,mar	MEX,Wcst	12-173µg/kg	£NASHG(78)UKDOE* -,-(76)
wst,aq	USA,sbd	0.3-18mg/l	£EPHG1 -,14(77)
sew	USA,sbd	150-1500mg/l	£EPHG1 -,14(77)
sew,wst	USA,sbd	10-125mg/l	£EPHG1 -,14(77)
food,plt	WLD	1-300µg/kg wwt	£NASHG -,49(78)
food,ani	WLD	2-200µg/kg(av)	£NASHG -,70(78)
food,plt	WLD	2-50µg/kg(av)	£NASHG -,70(78)
food	SCND	<0.03mg/kg(av)(65-71)	£NASHG(78)NHTIA7 S4,-(71)
food,ani	USA	4-41µg/kg(70-72)	£NASHG(78)PEMJAA 7,127(74)
food,plt	USA	<2µg/kg(av)(70-72)	£NASHG(78)PEMJAA 7,127(74)
hmn,bld	WLD	<5ng/ml(77%)	£WHOTS -,6(66)
hmn,urn	WLD	<5ng/l(79%)	£WHOTS -,6(66)
brd	- ,bkg	0.01-0.1mg/kg	£NASHG -,64(78)
plt	WLD	0.1-0.7mg/kg wwt	£NASHG -,49(78)
plt	WLD	0.2-10mg/kg dwt	£NASHG -,49(78)
plt,aq	WLD	30-80µg/kg wwt	£NASHG -,48(78)
plt,aq	WLD,pol	<37mg/kg wwt	£NASHG -,48(78)
inv,aq	SWE	25-72µg/kg wwt	£NASHG -,49(78)
crs,mar	CAN,JPN,pol	0.87-35.7mg/kg wwt	£NASHG -,50(78)
crs,mar	WLD	90-270µg/kg wwt	£NASHG -,50(78)
mol	AUS	3-17µg/kg wwt	£NASHG(78)MPNBAZ 4,44(73)
fsh,frs	WLD	20-200µg/kg wwt	£NASHG -,52(78)
fsh	WLD	0.4-1.0mg/kg wwt	£NASHG -,52(78)
fsh,frs	WLD,pol	<10mg/kg wwt	£NASHG -,57(78)
fsh,frs	CAN,pol	0.04-6.90mg/kg(75)	£NASHG(78)MELSB* -,-(76)
fsh,mar	WLD	<0.10mg/kg wwt	£NASHG -,60(78)
fsh,mar	GBR	0.08mg/kg wwt(av)	£NASHG(78)UKDOE* -,-(76)
fsh,mol,crs	-	0.13mg/kg wwt(av)	£NASHG(78)JAFCAU 24,47(76)
fsh,mar	PACo,NE	0.15-0.45mg/kg wwt	£NASHG(78)FSYBAY 74(4),783(76)
fsh	-	<1.0mg/kg wwt	£NASHG(78)HMAE** -,-(75)
fsh,mar	MEDs	0.50-2.5mg/kg wwt	£NASHG(78)UKDOE* -,-(76)

BIODEGRADATION

sed	-,-/-	methylmercury -/-	£NASHG(78)JWPFA5 47,135(75)

PHOTODEGRADATION

-,sun	-/-	elemental mercury-/-	£EPHG2(71)GSCME* -,-(71)

MODEL ECOSYSTEM STUDIES

aq	£NASHG(78)TERZAP 61,72(68)
aq	£NASHG(78)IFRDR* 48,120(68)

ENVIRONMENTAL FATE

biota to soil	WLD	120tt/Y	£NASHG -,19(78)
biota to air	WLD	40t/Y	£NASHG -,19(78)
soil to air	WLD	17.8tt/Y	£NASHG -,19(78)
aq,mar to air	WLD	9.02tt/Y	£NASHG -,19(78)
air to aq,mar	WLD	11.2tt/Y	£NASHG -,19(78)
air to grnd	WLD	25.6tt/Y	£NASHG -,19(78)
grnd to aq,mar	WLD	5.3tt/Y	£NASHG -,19(78)
aq,mar to sed	WLD	6tt/Y	£NASHG -,19(78)
aq,mar to biota	WLD	100tt/Y	£NASHG -,19(78)
aq,frs to biota	WLD	12tt/Y	£NASHG -,19(78)

CLEARANCE TIME

fsh,-	50%/>2Y	£NASHG -,57(78)

SAMPLING/PREPARATION/ANALYSIS

urn-COLM	Det:0.04mg/l(samp 100ml)	£NSHAM 1,145(77)
urn-AAS	Det:3µg/l(samp 1.0ml)	£NSHAM 1,165(77)
bld-AAS	Det:5ng/ml	£NSHAM 1,167(77)
air-AAS	Det:1ng	£NSHAM 1,175(77)

REMOVAL

mist eliminators
wet scrubbers
chemical scrubbing and adsorption
direct and indirect condensation
sulfide precipitation
high temperature roasting
slag disposal in land fills

£EPHG1 -,14(77)

Cooling hydrogen gas to less than 0°C at 2 atmospheres of pressure, and returning the condensate to the decomposer.
Returning the condensate, obtained by cooling the chlorine gas, to the brine solution.
Separating the waste streams and using epoxy on concrete floors to prevent entrapment of mercury.
Enlarging and improving sedimentation basins.
Filtering wastewater through activated charcoal.
Treating wastewater by means of ion-exchange, probably after pretreatment by another method.
Improving procedures for reactivating cell anodes.
Recirculating all water used in production.

NDCHG* -,-(71)

RECOMMENDATIONS/LEGAL MECHANISMS

WHO/FAO	REC	hmn-AWI:0.3mg	£WHOF1 -,28(72)	RED Nov(79)
DEU	-	hmn:food(sel) - AL:0.5µg/g	£NASHG -,82(78)	RED Nov(79)
DEU	-	hmn:food - AL:0ppm(derived from pesticide treatment)	£FAOP7 -,208(68)	RED Nov(79)
JPN	REG	aq:imi - ML:0.0005ppm	EAJLR* -,-(76)	RED Nov(79)
JPN	REG	aq:emi - PL:0.005mg Hg/l Eff:(71)	EAJLR* -,-(76)	RED Nov(79)
JPN	REC	hmn:food(sel) - AL:0.4µg/g	£NASHG(78)JPNEA* -,-(75)	RED Nov(79)
SUN	-	air:imi - 3µg/m^3(24H)	EPAWA* -,49(74)	RED Nov(79)
SWE	REC	hmn:food - MTC:0.05ppm	£FAOP7 -,208(68)	RED Nov(79)
SWE	-	hmn:food(sel) - AL:1.0µg/g	£NASHG(78)NHTIA7 S4,-(71)	RED Nov(79)
SWE	REG	hmn:food(from sel water areas) marketing - PRO Eff: 30 Jul(79)	STLIF* -,-(79)	RED Nov(79)
USA	REC	aq(frs):imi - 0.05µg/l	£EPAQC -,98(76)	RED Nov(79)
USA	REC	aq(mar):imi - 0.1µg/l	£EPAQC -,98(76)	RED Nov(79)
USA	REG	aq:drk - MPC:0.002mg/l AAS Eff:24 Jun(77)	FEREAC 40,59570(75)	RED Nov(79)
USA	REG	air:emi(sel ind) - ML 2300g Hg/24H	FEREAC 40,48302(75)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:0.05mg Hg/m^3	ACGIH* -,21(75)	RED Nov(79)
USA	REC	air:occ - TLV-STEL:0.15mg Hg/m^3	ACGIH* -,21(75)	RED Nov(79)
USA	-	hmn:food(sel) - AL:0ppm	£FAOP7 -,208(68)	RED Nov(79)
USA	REC	hmn:food(sel) - AL:0.5ppm	£NASHG(78)CCEHG* -,-(70)	RED Nov(79)

3.10.2 METHYLMERCURY (generic)

IRPTC NU: 000027
DEF: Methylmercury compounds (specific compound not defined)

PRODUCTION PROCESS(ES)

reaction of mercury or sodium amalgam with alkyl halides	£NATOM -,M-7(76)

USES

fungicide	£NASHG -,91(78)

CONCENTRATIONS

aq	CAN,lak	<0.24ng/l	£NASHG(78)IJEAA3 3,133(73)
aq	CAN,lak,pol	0.5-0.7ng/l	£NASHG(78)IJEAA3 3,133(73)
aq	MEXg,E	ND	£NASHG(78)GCACAK 39,1253(75)
aq	WLD	<0.2-1.0ng/l	£NASHG -,39(78)
fsh,mar	JPN,pol	<40mg/kg wwt	£NASHG(78)TSUBT* -,-(71)
sed,mar	USA,SE	1µg/kg dwt EC-GC(74-76)	ENVPAF 15,243(78)
sed,mar	GBR	16µg/kg dwt EC-GC(75-76)	NATUAS 267,606(77)
sed,mar	USA,W	1.9mg/kg wwt GC	WATRAG 10(2),113(76)
sed,mar	GBR,Wcst	0-2.7µg/kg GC(77)	STEVA8 10,245(78)

sed,est	GBR,Wcst	5.1-22.1µg/kg GC(77)	STEVA8 10,245(78)
sed,est	GBR,NWcst	0.3-5.4µg/kg GC(77)	STEVA8 10,245(78)
mam,mar	CAN,Ncst	0.12mg/kg wwt(74)	ATICAB 31,75(78)
mam,mar	CAN,Ncst	0.89mg/kg wwt(75)	ATICAB 31,75(78)
mam,mar	CAN,Ncst	0.5mg/kg wwt(76)	ATICAB 31,75(78)
fsh,mar	INDo,E	0.02-0.46mg/kg	SDKHAK 26,251(78)
fsh,mar	ATLo	0.02-0.77mg/kg GLC(73-75)	ZLUFAR 164,71(77)
fsh,frs	DEU,N	0.48-1.18mg/kg GLC(73-75)	ZLUFAR 164,71(77)
fsh,mar	BALs	1.1-2.7mg/kg wwt GC(73-75)	ENVPAF 14,227(77)
fsh,mar	USA,SE	3.8mg/kg dwt EC-GC(74-76)	ENVPAF 15,243(78)
fsh,mar	PACoW,INDoE	250-300µg/kg GC (73)	SDKHAK 25,213(77)
mol,mar	MEDsNE	24-230µg/kg dwt GC (74)	CIEMM* -,89(77)
mol,mar	USA,SE	0.61mg/kg dwt EC-GC(74-76)	ENVPAF 15,243(78)
crs,mar	ATLo	0.11mg/kg wwt GC	JTEHD6 2,13(76)
crs,mar	USA,SEcst	0.36mg/kg dwt GC	ECMSC6 4,579(76)

BIODEGRADATION

sed	-,-/-	mercury metal; methane -/-	£NASHG -,41(78)

ADSORPTION

sodic montmorillonite, 20%sal	-,2.41µg/g	RVOMAY 48,67(77)
calcic montmorillonite, 20%sal	-,2.86µg/g	RVOMAY 48,67(77)
calcic montmorillonite, 10%sal	-,3.04µg/g	RVOMAY 48,67(77)
kaolinite, 20%sal	-,0.71µg/g	RVOMAY 48,67(77)

ENVIRONMENTAL FATE

aq,mar to biota	WLD	48t/Y	£NASHG(78)SCIEAS 166,72(69)
aq,frs to biota	WLD	10t/Y	£NASHG -,23(78)

BIOCONCENTRATION FACTOR

fsh	-,-	1000-2500/-,-	£NASHG(78)IFRDR* 48,120(68)

CLEARANCE TIME

fsh,-	50%/400->1000D	£WHOHG -,82(76)
fsh,-	50%/275D	JEMBAM 24,121(76)
fsh,-	50%/640-1030D	SUKBAJ 43,439(70)

MAMMALIAN METABOLITES

rat,mus	inorganic mercury	APTOA6 29,375(71)

MAMMALIAN TOXICITY ARRAY

5µg/kg	-	orl-hmn	nef	£WHOHG(76)TYCYAC 2,3(74)
80µg/kg	32D	orl-hmn	CNS:mlt-sns,dth	£WHOHG(76)WHOAC* -,23(74)
-	>4Y	orl-hmn	CNS,SNS,SON,FET:mlt	£OECHG(74)NHTIA7 S4,-(71)
-	-	tpl-chd	SON:msc,bhv-ret	£NASDW(77)REVHA3 2,39(75)

AQUATIC TOXICITY

crs	5µg/l	4D	rep	AOLVAE 18(3),189(76)
crs,juv	22µg/l	24H	LC50	GFCMR* -,-(78)
fsh,emb,mar	0.03mg/l	-	EYE:ter	TJADAB 16(3),317(77)
mol	0.4mg/l	24H	bhv	BECTA6 15,714(76)
fsh	5.0mg/l	2H	GIT:bcm	AIMPCT 9,11(77)
crs	25mg/l	3H	osm,str	ENVRAL 11,367(76)
mol	87mg/l	15M	neu	SCIEAS 18,1077(76)
fsh	100mg/l	5H	PUL:osm	RENJL* -,102(74)

SAMPLING/PREPARATION/ANALYSIS

aq-AAS	-	-	£NASDW(77)ESTHAG 8,850(74)

RECOMMENDATIONS/LEGAL MECHANISMS

WHO/FAO	REC	hmn: - AWI:0.2mg	£WHOF1 -,28(72)	RED Nov(79)
JPN	REC	hmn:food(sel) - AL:0.3µg/g	£NASHG(78)JPNEA* -,-(75)	RED Nov(79)
SWE	REC	hmn: - ADI:30µgHg	£NASHG(78)NHTIA7 S4,-(71)	RED Nov(79)

3.10.3 MERCURY, CHLOROMETHYL-

IRPTC NU: 000028
CAS NU: 115-09-3 MOLFM: CH3ClHg MOLWT: 251.08

SYN: METHYLMERCURIC CHLORIDE * METHYLMERCURY CHLORIDE * OW1225000(RTECS)

MP: 170°C DEN: 4.06g/ml

BIOCONCENTRATION FACTOR

fsh	stat,1µg/l	2500-27000/30D	BECTA6 22(6),813(79)

CLEARANCE TIME

fsh,-	-/-	£NASHG(78)TSKHAY 21,197(71)

MAMMALIAN METABOLITES

rat methylmercury cystein; inorganic mercury; protein-bound mercury
£WHOF1(72)AEHLAU 22,568(71)

MAMMALIAN TOXICITY ARRAY

0.1mg/kg	30D	orl-rat	URS:cng	£IAEHG -,75(72)
0.1mg/kg	140D	orl-mky	siz	£WHOF1 -,24(72)
0.4mg/kg	140D	orl-mky	CNS:uns	£WHOF1 -,24(72)
1.0mg/kg	7D	orl-rat	REP:fnc	£NASHG(78)TXAPA9 24,167(73)
1mg/kg	20D	- -cat	SON:msc	£IAEHG -,75(72)
2mg/kg	20DP	- -rat	FET:str	£IAEHG(72)KUMJAX 22,27(69)
2.5mg/kg	6-17tDP	orl-mus	FET:ret,dth	£WHOF1(72)PSMME* -,-(71)
4.2mg/kg	3WkI	orl-rat	URS:str GIT:fnc-siz	ATXKA8 35(1),25(76)
5mg/kg	1x	orl-hmn	LDLo	27ZTAP 3,11(69)
21mg/kg	1x	orl-gpg	LD50	TXAPA9 24,545(73)
58mg/kg	1x	orl-rat	LD50	£IAEHG -,74(72)

MUTAGENICITY

hcc	CHR:cng	HEREAY 64,142(70)

REPRODUCTION

rat-orl	1.0mg/kg	7D	REP:fnc	£NASHG(78)TXAPA9 24,167(73)
mus-orl	5mg/kg	7D	inc	£NASHG(78)TXAPA9 24,167(73)
rat -	0.1mg/kg	6-15tDP	FET:cng	PHMCAA 13,469(71)
mus-orl	5mg/kg	6-17tDP	REP:fnc	£WHOF1(72)PSMME* -,-(71)
mus-orl	2.5mg/kg	6-17tDP	FET:ret,dth	£WHOF1(72)PSMME* -,-(71)
rat -	2mg/kg	20DP	FET:str	£IAEHG(72)KUMJAX 22,27(69)
rat -	2mg/kg	1x,9-11tDP	FET:str	£IAEHG(72)LIFSAK 6,2321(67)

AQUATIC TOXICITY

mcr,frs	-	-	bcm	£NASHG(78)ESTHAG 6,158(72)
fsh,frs	0.5mg/l	7H	LC50	BECTA6 22(6),813(79)

3.11 ORGANOPHOSPHORUS COMPOUNDS

3.11.1 SUCCINIC ACID, MERCAPTO-, DIETHYL ESTER, S-ester with 0,0- DIMETHYL PHOSPHORODITHIOATE (generic)

IRPTC NU: 000029
CAS NU: 121-75-5 MOLFM: C10H1906PS2 MOLWT: 330.38
STRFM:

£CECOP -,7,(77)

SYN: AMERICAN CYANAMID 4,049 * S-(1,2-BIS(AETHOXYCARBONYL)-AETHYL)-0,0-DIMETHYL-DITHIOPHOSPHAT (DEU) * S-(1,2-BIS(ETHOXYCARBONYL)ETHYL)-0,0-DIMETHYL-DITHIOFOSFAAT (NLD) * S-(1,2-BIS(ETHOXYCARBONYL)ETHYL) 0,0-DIMETHYL PHOSPHORODITHIOATE * S-1,2-BIS(ETHOXYCARBONYL)ETHYL-0,0-DIMETHYL THIOPHOSPHATE * S-(1,2-BIS(ETOSSI-CARBONIL)-ETIL)-0,0-DIMETILDITIOFOSFATO (ITA) * BT MALATHION 50(SWE) * CARBETOX * CARBETHOXY MALATHION * CARBOFOS * CARBOPHOS * CELA * CHEMATHION * COMPOUND 4049 * CYTHION * DARBOPHOS * DICARBOETHOXYETHYL 0,0-DIMETHYL PHOSPHORODITHIOATE * S-(1,2-DIAETHOXYCARBONYLAETHYL)-0,0-DIMETHYLDITHIOPHOSPHORSAEUREESTER * 1,2-DI(ETHOXYCARBONYL)ETHYL 0,0-DIMETHYL PHOSPHORODITHIOATE * S-(1,2-DI(ETHOXY-CARBONYL)ETHYL DIMETHYL PHOSPHOROTHIOLOTHIONATE * DIETHYL ESTER MERCAPTO-SUCCINIC ACID S-ESTER with 0,0-DIMETHYL PHOSPHORODITHIOATE * DIETHYL MERCAPTO-SUCCINATE,0,0-DIMETHYL DITHIOPHOSPHATE,S-ESTER * DIETHYL MERCAPTO-SUCCINATE, 0,0-DIMETHYL PHOSPHORODITHIOATE * DIETHYL MERCAPTOSUCCINATE,0,0-DIMETHYL THIOPHOSPHATE * 0,0-DIMETHYL S-(1,2-BIS(ETHOXYCARBONYL)ETHYL)DITHIOPHOSPHATE * 0,0-DIMETHYL-S-(1,2-DICARBETHOXYETHYL)DITHIOPHOSPHATE * 0,0-DIMETHYL S-(1,2-DICARBETHOXY ETHYL)PHOSPHORODITHIOATE * 0,0-DIMETHYL S-(1,2-DICARBETHOXYETHYL) THIOTHIONOPHOSPHATE * 0,0-DIMETHYL S-1,2-DI(ETHOXYCARBAMYL)ETHYL PHOSPHORODITHIOATE * 0,0-DIMETHYLDITHIOPHOSPHATE DIETHYLMERCAPTO-SUCCINATE * 0,0-DIMETHYL-S-1,2-DIKARBETOXYLETHYLDITIOFOSFAT(CSK) * DIM-MALATHION(SWE) * DITHIOPHOSPHATE DE 0,0-DIMETHYLE ET DE S-(1,2-DICARBOETHOXYETHYLE)(FRA) * EMMATOS * EMMATOS EXTRA * ENT 17,034 * ETATOL-PUDER(SWE) * ETHIOLACAR * EXPERIMENTAL INSECTICIDE 4049 * FORMAL * FOSFOTHION * FOSFOTION * FOUR THOUSAND FORTY-NINE * FYFANON * GULLVIKS MALATHON 500(SWE) * INSECTICIDE NO.4049 * INSEKTS-TOXIDOL(SWE) * KARBOFOS * KOP-THION * KYPFOS * LANTMANNENS MALATION 500(SWE) * MALACIDE * MALAKILL * MALAGRAN * MALAMAR * MALAMAR 50 * MALAPHOS * MALASPRAY * MALATEX(SWE) * MALATHION * MALATHION(DOT) * MALATHION LV CONCENTRATE * MALATHON * MALTHON NA50(SWE) * MALATHON NA25 SPRUTPULVER(SWE) * MALATION(POL) * MALATION NA PUDER(SWE) * MALATOL * MALATOX * MALPHOS * MERCAPTOTHION * MLT * NCI-C00215 * OLEOPHOSPHOTHION * PHOSPHORODITHIOATE * PHOSPHORODITHIOIC ACID,0,0-DIMETHYL ESTER,S-ESTER with DIETHYL MERCAPTO-SUCCINATE * PHOSPHOTHION * PLANTEX MALATHION(SWE) * PLANTEX MYR-PUDER(SWE) * SADOFOS * SADOPHOS * SF 60 * SIPTOX I * WM8400000(RTECS) * ZITHIOL

MP: 3°C FP: 163°C DEN: 1.23g/ml
BP: 156-157 0.7mmHg
VP: 0.00004mmHg,20°C
AQSOL: 145mg/l,25°C

IMPUR: DIETHYLMALEATE * TOLUENE * TRIMETHYLDITHIOPHOSPHATE *
CECDS* -,6-25(76)
ISOMALATHION * MALAOXON * MIXED ESTER OF MALATHION *
O,O,S-TRIMETHYLPHOSPHORODITHIOATE * TETRAMETHYL THIODIPHOSPHATE
ARTODN 42(2),95(79)

PRODUCTION/CONSUMPTION

USA	15900t-p(71)	14000t-p(72)	
ARG	300t-c(76)	300t-c(75)	300t-c(74)
CAN	276t-c(76)	304t-c(75)	138t-c(74)
COK	57t-c(76)	57t-c(75)	75t-c(74)
GRC	454t-c(76)	151t-c(75)	246t-c(74)
HUN	257t-c(76)	284t-c(75)	271t-c(74)
IND	1750t-c(76)	1492t-c(75)	1450t-c(74)
ITA	1118t-c(75)	847t-c(74)	485t-c(72)
KOR	285t-c(76)	307t-c(75)	278t-c(74)
POL	60t-c(76)	49t-c(75)	50t-c(74)
URY	20t-c(76)	20t-c(75)	20t-c(74)
USA	1600t-c(71)	2300t-c(66)	

FAOPY* -,256(78) NCNSA6 -,620(77) £NSHMA(76)CHWKA9 110,33(72)

PRODUCTION PROCESS(ES)

Reaction of dimethyldithiophosphoric acid with diethylmaleate CECDS* -,6-23(76)

USES
insecticide NCNSA6 -,620(77)

CONCENTRATIONS

aq,frs	GBR,rvr	- 0.3µg/l(69/70)	£CECOP(76) -,6-21(76)
food	AUS,GBR,USA	8mg/kg(av)	£FAOP2(67) -,181(67)

BIODEGRADATION

aq,est-acc,25°C	DIS	54%/20D	-,-/-	EPERS* -,25(78)
aq,est-acc,28°C	DIS	87%/5D	MCA;DCA;desmethylmalathion; phosphothionates -/-	EPROB* -,42(75)
aq,est,pH7.4,25°C	DIS	60%/3D	-,-/-	JMSSAN 21,148(77)
sed,est,pH7.4,25°C	DIS	85%/1D	-,-/-	JMSSAN 21,148(77)

PHOTODEGRADATION

aq,pH6,sun	50%/990H	-,-/-	BECTA6 13,707(75)

HYDROLYSIS

aq,pH9	50%/12H	-,-/-	GBERL* -,-(76)
aq,pH5-7	0%/12D	-,-/-	£NASDW(77)CCECAU 33,259(69)
aq,pH2-6	0%/7D	-,-/-	£NASDW(77)CCECAU 33,259(69)
aq,pH8	50%/36H	-,-/-	BECTA6 13,707(75)
aq,30°C	78%/3D	-,-/-	EPERS* -,25(78)
aq,10°C	20%/4D	-,-/-	EPERS* -,25(78)
aq,25°C	62%/3D	-,-/-	JMSSAN 21,148(77)
aq,pH6	50%/55D	-,-/-	CFWSW* 260,9(67)
aq,pH8	50%/4,5D	-,-/-	CFWSW* 260,9(67)
aq,27°C	50%/3D	MCA;DCA;maloxon;desmethyl malathion	EPRDB* -,42(75)
sed,25°C	53%/6D	-,-/-	JMSSAN 21,148(77)

LOSS

aq,frsh	50%/16H	-,-/-	£CECOP(76)BECTA6 13,707(75)
aq,est	97-99%18D	-,-/-	£CECOP(76)JEVQAA 5,210(75)
aq,rvr	90%/2Wk	-,-/-	£CECOP(76)ESTHAG 5,541(71)
aq,rvr	100%/4Wk	-,-/-	£CECOP(76)ESTHAG 5,541(71)

MODEL ECOSYSTEM STUDIES

aq-trr	JEVQAA 6(4),373(77)

CLEARANCE TIME

fsh,flow	100%/<24H	BECTA6 16,282(76)

MAMMALIAN METABOLITES

mus,rat,ctl,hmn	malaoxon;hydrolyse products;malathion mono- and diacids	£FAOP1(64)HEADF* -,-(61)
hmn	desmethyl malthion; diethyl mercaptosuccinate; diethyl malate; carboxyesterase products	£NSHMA(76)AEHLAU 13,257(66)
ctl	dimethyl phosphate	£NSHMA(76)AJOPAA 59,586(65)
mus	phosphate products	£NSHMA(76)JPETAB 156,352(67)
hmn	dimethyl phosphorthioate;dimethyl phosphordithioate; dimethyl thiophosphate	£NSHMA(76)PTSEL* -,-(74)
hmn	dimethyl dithiophosphate	£NSHMA(76)JAFCAU 17,1186(69)
ctl,rat,dog,mus	desmethyl malathion	£NSHMA(76)OBRRD* -,307(67)

MAMMALIAN TOXICITY ARRAY

0.2mg/kg	-	orl-hmn	NEL	£FAOP2 -,178(67)
0.34mg/kg	47D	orl-hmn	ANS:bcm	£FAOP2(67)TXAPA9 4,123(62)
5mg/kg	-	orl-rat	NEL	£FAOP2 -,178(67)
5mg/kg	6Wk	orl-rat	END:siz	£CECOP -,59(76)
6mg/kg	2Y	orl-rat	ANS:bcm	£NSHMA(76)ACCOP* -,1,(-)
50mg/kg	1x	orl-hmn	LDLo	27ZTAP 3,89(69)
125mg/kg	3GN	orl-rat	REP:fnc FET:siz,dth	£NSHMA(76)ACCM3* 68-64,346(68)
200mg/kg	1x	orl-rat	LD50	£NSHMA(76)BLLIAX 38,518(58)
250mg/kg	2Y	orl-rat	SON:bhv ANS:bcm-siz	£FAOP2(67) -,176(67)
235mg/kg	80Wk	orl-rat	SKN:mlt URS:cnc REP:cnc-siz	NCITR* 24,19(78)
500mg/kg	1x	orl-hmn	EYE,PUL:fnc SKN:cng SON:msc-trt	£NSHMA(76)ANASAB 25,265(70)
570mg/kg	1x	orl-gpg	LD50	£NASDW(77)FEPRA7 12,327(53)
700mg/kg	1x	orl-hmn	GIT:fnc PLT:trt	£NSHMA(76)ANASAB 25,265(70)
857mg/kg	1x	orl-man	LDLo	AEHLAU 21,533(70)
1600mg/kg	80Wk	orl-mus	SKN:cng,str SON:bhv,msc PUL:irr-siz	NCITR* 24,29(78)
-	16WkI	skn-hmn	SKN:ifl	£NSHMA(76)BWHOA6 22,503(60)
-	2DI	skn-hmn	SKN:all	£NSHMA(76)AEHLAU 9,434(64)
-	occ	skn-hmn	SKN:all	£NSHMA(76)AEHLAU 9,434(64)
-	1x	orl-hmn	CNS:fnc CVS:cng PLT	£NSHMA(76)NEJMAG 271,1289(64)
68mg/m^3	4WkI	ihl-dog	EYE:irr PUL:str,imm	£NSHMA(76)AIHOAX 8,399(53)
68mg/m^3	6WkI	ihl-rat	ANS:bcm	£NSHMA(76)AIHOAX 8,399(53)
810mg/m^3	2DI	ihl-gpg	SNS:irr,cnc	£NSHMA(76)AIHOAX 8,399(53)

CARCINOGENICITY

rat-orl	408mg/kg	80Wk	inc	NCITR* 24,viii(78)
mus-orl	3200mg/kg	80Wk	inc	NCITR* 24,viii(78)

MUTAGENICITY

hmn- -	- -		CHR:cng	£NSHMA(76)HUMAA7 24,33(74)
mcr	PHN:nef			£NSHMA(76)MUREAV 20,7(73)
hcc	CHR:nef			£NSHMA(76)PSEBAA 142,36(73)

NEUROTOXICITY/BEHAVIOUR

chk-scu	100mg/kg	1x	SON:msc	£NSHMA(76)AMIHAB 13,326(56)
chk-orl	2000mg/kg	15Wk	CNS:nef	£NSHMA(76)FEPRA7 15,424(56)

POTENTIATION

mus,rat,dog	ethyl-p-nitrophenyl thionobenzene-phosphate(EPN)	£FAOP2(67)JPETAB 121,96(66)
rat	fenitrothion	£FAOP2(67)PICN** 7,-(66)
rat	EPN;Dipterex;Co-Ral	£NSHMA(76)APCRAW 4,117(61)
-	Ronnel;Delnav	£NSHMA(76)RREVAH 25,201(69)
-	Baytex	£NSHMA(76)PSEBAA 100,483(59)
-	chlorphenvinfos	£CECOP -,85(77)
-	phosalone	£CECOP -,86(77)
-	dichlorvos	£CECOP -,86(77)
rat	tri-o-totyl phosphate	£NSHMA(76)BIJOAK 84,255(62)

REPRODUCTION

rat- -	20mg/kg	20D	REP:siz,str	£NSHMA(76)ANDRO* 7,109(75)
rat-orl	125mg/kg	3GN	REP:fnc FET:siz,dth	£NSHMA(76)ACCM3* 68-64,746(68)
rat-orl	240mg/kg	10Wk	FET:siz,dth	£NSHMA(76)NATUAS 192,464(61)

SENSITIZATION

hmn-skn	SKN:all	£NSHMA(76)AEHLAU 16,805(68)

TERATOGENICITY

rat-ipr	900mg/kg	1x(11DP)	FET:nef	£NASDW(77)AEHLAU 16,805(68)
rat-orl	-	8-15DP	FET:nef	£NSHMA(76)JFMAAQ 54,452(67)

AQUATIC TOXICITY

crs,lar,mar	0.001mg/l	96H	LC50	EPRDC* -,143(77)
fsh,mar	0.01mg/l	96H	LC50	CAFGAX 60,128(74)
fsh	0.01mg/l	14D	ret	TJADAB 16(3),317(77)
fsh,egg	0.01mg/l	10D	bcm	BMDBL* 15,24(75)
crs,egg	0.011mg/l	-	ret	PRMBP* -,3(77)
fsh,mar	0.03mg/l	72H	LC60	BECTA6 16,282(76)
crs,mar	0.05mg/l	72H	LC100	CRAFG* -,19(70)
crs,mar	0.08mg/l	96H	LC50	USDI3* -,-(71)
fsh,emb	0.1mg/l	48H	FET:str	TJADAB 10,263(74)
fsh,est	0.2mg/l	24H	ANS:bcm	BECTA6 11,483(74)
fsh,mar	0.25mg/l	72H	CNS:bcm	PMSWM* 2,24(71)
mcr,est	1.0mg/l	4H	bcm	PMSWM* 1,83(64)
crs,mar	1.0mg/l	48H	CNS:bcm	BECTA6 11(5),483(74)
mol,mar	3.3mg/l	48H	LC50	EPRDC* -,143(77)
mol,lar,mar	6.0mg/l	30D	ret	EPASP* -,102(75)
fsh,emb,mar	10.0mg/l	-	ret	BMDBL* 15,24(75)
mol,emb	13.4mg/l	48H	LC50	EPASP* -,102(75)
mcr	100mg/l	24H	oxy	ARCLAS 25,513(73)
mcr	1000mg/l	24H	res	ARCLAS 25,513(73)
mcr	10000mg/l	24H	oxy,dth	ARCLAS 25,513(73)

TERRESTRIAL TOXICITY

brd	2.5g/kg diet	2Y	ANS:bcm REP:fnc	£FAOP1 -,92(64)

SAMPLING/PREPARATION/ANALYSIS

air-GC	Det: 8.0mg/m^3(samp 106 l)	£NSHAM 3,S370(77)

RECOMMENDATIONS/LEGAL MECHANISMS

FAO/WHO	REC	hmn:food(sel) - MRL:limits	£FAOP5 -,-(71)	RED Nov(79)
FAO/WHO	REC	hmn:food(sel) - MRL:limits	£FAOP6 -,351(78)	RED Nov(79)
DEU	REC	air:occ - MAK:15mg/m^3	DFSK** -,28(79)	RED Nov(79)
SUN	-	air:imi - 15µg/m^3(30M)	EPAWA* -,48(74)	RED Nov(79)
SUN	REG	air:occ - MAC:0.5mg/m^3 Eff: 1 Jan(77)	£ILOOE -,139(77)	RED Nov(79)
SWE	REG	hmn:food(sel) - MAC:limits Eff: 1 Mar(79)	STLIF* 34,-(78)	RED Nov(79)
SWE	REC	dangerous substance Eff: 22 Dec(78)	STNAF* 5,-(78)	RED Nov(79)
USA	REC	aq:imi 0.1µg/l	£EPAQC -,160(76)	RED Nov(79)
USA	REG	aq:emi - HQ:4.54kg/24H Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)
USA	REG	air:occ - TWA:15mg/m^3	FEREAC 39,23540(74)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:10mg/m^3	ACGIH* -,21(79)	RED Nov(79)
USA	REC	occ:skin contact to be prevented; blood monitoring required	£NSHSS -,-(79)	RED Nov(79)
USA	REG	hmn:food(sel) - AL:limits	FEREAC 41,26568(76)	RED Nov(79)
USA	REG	hmn:food(agr) - AL:limits	FEREAC 43,22974(78)	RED Nov(79)
USA	REG	hazardous substance Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)

3.11.2 SUCCINIC ACID, MERCAPTO-, DIETHYL ESTER, S-ester with 0,0- DIMETHYL PHOSPHORODITHIOATE (95% purity grade)

IRPTC NU: 000030
MOLFM: C10H19O6PS2 MOLWT: 330.38
DEF: A product of 95% pure succinic acid, mercapto-, diethyl, S-ester with 0,0-dimethyl phosphorodithioate

SYN: MALATHION 95% pure

MAMMALIAN TOXICITY ARRAY

1.0mg/kg	1Y	orl-ctl	HEM:bcm,str	BECTA6 20(6),819(79)
80mg/kg	1x	orl-ctl	LD50	£FAOP2(67)ACCM1* -,-(55)
120mg/kg	1x	orl-rbt	ANS:bcm	£NSHMA(76)AEHA** -,1(75)
125mg/kg	3GN	orl-rat	REP:fnc FET:siz,dth	£NSHMA(76)ACCM3* 68-64,346(68)
560mg/kg	1x	orl-ctl	LD50	£FAOP2(67)ACCM1* -,-(55)
123mg/m^3	6H	ihl-rbt	ANS:bcm	£NSHMA(76)AEHA** -,1(75)
128mg/m^3	6H	ihl-rbt	PUL:fnc-dth	£NSHMA(76)AEHA** -,1(75)

CARCINOGENICITY

rat-orl	408mg/kg 80Wk	inc		NCITR* 24,viii(78)
mus-orl	3200mg/kg 80Wk	inc		NCITR* 24,viii(78)

REPRODUCTION

rat-orl	125mg/kg 3GN	REP:fnc	FET:siz,dth	£NSHMA(76)ACCM3* 68-64,346(68)
rat-orl	240mg/kg 10Wk		FET:siz,dth	£NSHMA(76)NATUAS 192,464(61)

TERRESTRIAL TOXICITY

brd	5g/kg diet	10Wk	ANS:bcm-ret,dth	£FAOP1(64)ACCM1* -,-(55)

4.12 ORGANOSILICON COMPOUNDS

4.12.1 SILICONES (generic)

IRPTC NU: 000031
DEF: Organosilicon oxide polymers including silicon fluids, elastomers and resins

SYN: SILOXANES

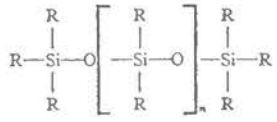
PRODUCTION/CONSUMPTION

WLD 100tt-p(70) EUR 27tt-p(70) JPN 11tt-p(70)
SUN 12tt-p(70) USA 50tt-p(70)

SACSA* 5,-(77)

4.12.2 SILICONE FLUIDS (generic)

IRPTC NU: 000032
DEF:



R = hydrocarbon group

JIHTAB 30(6),333(48)

SYN: LIQUID SILOXANES * SILICONES * SILOXANE FLUIDS * SILOXANES

PRODUCTION/CONSUMPTION

WLD 17tt-p(70)
USA 66tt-p(78)

USA 14tt-c(73)

CENEAR -,9(78) FISUM* 3,19(77) £EPALS -,16(75)

PRODUCTION PROCESS(ES)

The silicone fluids are synthesized from the hydrolysis products of organochlorosilanes £EPALS -,18(75)

USES

Antifoams
Cosmetics
Damping devices
dielectric fluids
foaming of polyurethane
food additives
heat transfer media
Hydraulic fluids
Lubricants
Polishes
Protective coatings
Release agents
Textile finishings
Waxes

JIHTAB 30(6),342(48) £EPALS -,23(75)

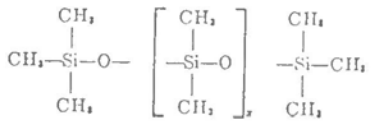
AQUATIC TOXICITY

fsh 250g/kg diet 42DI nef FISUM* 3,19(77)

3.12.3 POLYDIMETHYL SILOXANES (generic)

IRPTC NU: 000033

DEF:



JIHTAB 30(6),344(48)

SYN: DIMETHYL POLYSILOXANE * GUM * LATEX * POLYMETHYLSILOXANE * DC200 FLUID * TQ2690000(RTECS)

USES

Release material
Foam preventive
Mechanical fluid
Surface-active material
Lubricant
Cosmetics and skin preparations
Polishes and chemical specialities
Electrical/electronic equipment
Food processing

DOWSF* -,-(74)

BIODEGRADATION

sew	-,0%/70D	-,-/-	£EPALS -,-(75)

HYDROLYSIS

soil	-/-	volatile oligomers; water-soluble silanols and siloxanols	-/-	FRYEC* -,-(78)

MAMMALIAN METABOLITES

hmm	octomethyl cyclotetrasiloxane; decamethylcyclopentasiloxane	£WHOF2 -,173(75)

MAMMALIAN TOXICITY ARRAY

150mg/kg	-	orl-rat	NEL	£WHOF2 -,173(75)
1.5g/kg	1x	scu-rat	UNS:neo	ARPAAQ 67,589(59)

AQUATIC TOXICITY

mcr,sew	500mg/l	-	nef	BUEL** -,-(-)

SAMPLING/PREPARATION/ANALYSIS

air-AAS	Det:10µg/m^3(samp 400 l)	£NSHAM 1,227(77)

RECOMMENDATIONS/LEGAL MECHANISMS

WHO/FAO	REC	hmn: - ADI:≤1.5mg/kg bw	£WHOF2 -,174(75)	RED Nov(79)
DEU	-	hmn:food(sel) - PRO	FOADT* -,-(75)	RED Nov(79)
JPN	-	hmn:food(sel) - MPC:50ppm	FOADT* -,-(75)	RED Nov(79)
JPN	-	hmn:food(sel) - PRO	FOADT* -,-(75)	RED Nov(79)
SWE	REG	hmn:food(sel) - limits Eff:1 Jan(79)	STLIF* 33,-(78)	RED Nov(79)
USA	REG	hmn:food(sel) - limits	FEREAC 43,2872(78)	RED Nov(79)

3.12.4 POLYDIMETHYLSILOXANE, 1000 cSt

IRPTC NU: 000034
DEF: A polydimethylsiloxane with a viscosity of 1000 cSt.

SYN: DC200 FLUID, 1000 cSt

FP: 315°C(o-cup) DEN: 0.97g/ml

CARCINOGENICITY

mus-orl 5g/kg 80Wk UNS:nef FRAZA* -,-(70)

3.12.5 POLYDIMETHYLSILOXANE, 350 cSt

IRPTC NU: 000035
DEF: A polydimethylsiloxane with a viscosity of 350 cSt.

SYN: DC200 FLUID, 350 cSt

MP: -53°C FP: 315°C(o-cup) DEN: 0.972g/ml
BP: not distillable

BIODEGRADATION

sew-o,23°C CO2 0%/70D -,-/- ENVRAL 10(3),397(75)

MAMMALIAN TOXICITY ARRAY

4.85g/kg 1x orl-gpg GIT:fnc JIHTAB 30(6),344(48)
48.6g/kg 1x orl-gpg UNS:neo ARSUAX 96,237(68)

PRIMARY IRRITATION

rbt-ocu EYE:irr JIHTAB 30(6),346(48)
rbt-skn SKN:nef JIHTAB 30(6),346(48)

3.12.6 POLYDIMETHYLSILOXANE, 350 cSt, medical grade

IRPTC NU: 000036
DEF: A polydimethylsiloxane with a viscosity of 350 centistokes, medical grade.

SYN: DC360 MEDICAL, 350 cSt

CARCINOGENICITY

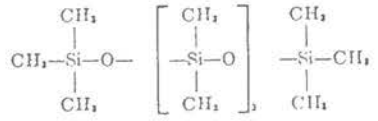
rat-ipr 4.9g/kg 17Mo inc ALPDAR 7,224(69)
mus-ipr 16g/kg 18Mo inc ALPDAR 7,224(69)

TERATOGENICITY

rat-scu	20mg/kg 6-16tDP	inc	FDRL** -,-(67)
rbt-scu	20mg/kg 6-18tDP	inc	FDRL** -,-(67)

3.12.7 DODECAMETHYLPENTASILOXANE, 2.0 cSt

IRPTC NU: 000037
MOLFM: C12H3604Si5 MOLWT: 384.85
STRFM:



JIHTAB 30(6),343(48)

MP: -84°C FP: 91°C DEN: 0.8710g/ml
BP: 230°C

MAMMALIAN TOXICITY ARRAY

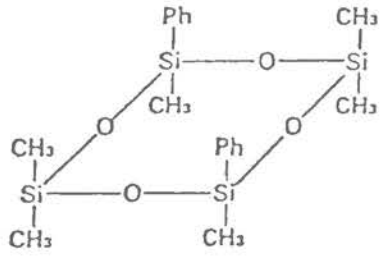
8.7g/kg 1x	orl-gpg	GIT:fnc	JIHTAB 30(6),344(48)
43.5g/kg 1x	orl-gpg	dth	JIHTAB 30(6),344(48)

PRIMARY IRRITATION

rbt-ocu	EYE:irr	JIHTAB 30(6),346(48)
rbt-skn	SKN:nef	JIHTAB 30(6),346(48)

3.12.8 2,6-cis-DIPHENYLHEXAMETHYLCYCLOTETRASILOXANE

IRPTC NU: 000038
MOLFM: C18H2804Si4 MOLWT: 410.68
STRFM:



KABI** -,33(-)

SYN: 2,6-cis * CISOBITAN * 2,6-cis $(PhMeSiO)_2(Me_2SiO)_2$ * CYCLIC 2,6-cis $(PhMeSiO)_2(Me_2SiO)_2$ * DCQ98-300 * DCAF40 * KABI1774 * X9-8300

MP: 44°C
AQSOL: 0,003mg/ml

ADD: Fractionated soya bean oil KABI** -,34(-)

USES

treatment of prostatic cancer KABI** -,3(-)

MAMMALIAN TOXICITY ARRAY

0.33mg/kg 1-11tDP	orl-rat	REP:fnc		APTSAI 36,85(75)
100mg/kg 7D	orl-rat	HEM:bcm	LVR:bcm	TXAPA9 21,83(72)
300mg/kg -	orl-hmn	REP:fnc		KABI** -,21(-)

REPRODUCTION

rat-orl 0.33mg/kg 1-11tDP REP:fnc APTSAI 36,81(75)

TERATOGENICITY

rat- 10mg/kg 13-21tDP FET:nef APTSAI 36,81(75)

3.13 ORGANOTINS

3.13.1 ORGANOTIN COMPOUNDS (generic)

IRPTC NU: 000039
DEF: Organotin compounds (specific compound not defined)

PRODUCTION/CONSUMPTION

WLD 25tt-p(75) 10tt-p(67) 8.5tt-p(67) 5.5tt-p(65) 3tt-p(62)
CECDS* -,7(76)

PRODUCTION PROCESS(ES)

The Grignard process: $4RMgCl + SnCl_4 = R_4Sn + 4MgCl_2$

The Wurtz method: $SnCl_4 + 4RCl + 8Na = R_4Sn + 8NaCl$

The Aluminium-alkyl technique: $3SnCl_4 + 4R_3Al = 3R_4Sn + 4AlCl_3$
CECDS* -,7-10(76)

USES

biocidal components
catalytic agents
heat stabilizers
EVHPAZ 61(4),61(73)

MAMMALIAN TOXICITY ARRAY

- - -hmn CNS:cng EYE:fnc-sns ECNEAZ 29,215(70)

SAMPLING/PREPARATION/ANALYSIS

air,part-COLM	Det: 0.1mg/m^3(samp 5 l)	£NSHAM 1,176(77)
biota-COLM	Det: 0.5µg	£NSHAM 1,176(77)

RECOMMENDATIONS/LEGAL MECHANISMS

DEU	REC	air:occ - MAK:0.1mgSn/m^3	DFSK** -,38(79)	RED Nov(79)
USA	REG	air:occ - TWA:0.1mg/m^3	FEREAC 39,23540(74)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:0.1mgSn/m^3	ACGIH* -,29(79)	RED Nov(79)
USA	REC	air:occ - TLV-STEL:0.2mgSn/m^3	ACGIH* -,29(79)	RED Nov(79)
USA	REC	occ:medical examination (chest X-ray; blood; urine; eye; heart; nervous system)	£NSHSS -,-(79)	RED Nov(79)

3.13.2 STANNANE,ACETOXYTRIPHENYL-

IRPTC NU: 000040
CAS NU: 900-95-8 MOLFM: C20H18O2Sn MOLWT: 409.07
WLN: 1VO-SN-R&R&R

SYN: ACETATE DE TRIPHENYL-ETAIN(FRA) * ACETATO DI STAGNO TRIFENILE(ITA) * ACETOXYTRIPHENYLTIN * BATASAN * BRESTAN * BRESTAN 60 * ENT 25208 * FENOLOVO ACETATE * FENTIN ACETAAT(NLD) * FENTIN ACETAT(DEU) * FENTIN ACETATE * FENTINE ACETATE(FRA) * FERTIN ACETATE * FINTIN ACETATO(ITA) * GC6936 * HOE-2824 * LINOSTANOL * LIROSTANOL * PHENTINOACETATE * SUZU * TIN,ACETOXYTRIPHENYL- * TIN TRIPHENYL ACETATE * TPTA * TRIFENYL-TINACETAAT(NLD) * TRIPHENYLTIN ACETATE * TRIPHENYL-ZINNACETAT(DEU) * TUBOTIN * VP 1940 * VP 19-40 * WH6650000(RTECS) * 004167 0 (ECDIN)

MP: 122-124°C

USES

biocide
wood preservative

£NSHOT -,171(76)

MODEL ECOSYSTEM STUDIES

trr	PSBEA4 37,57(68)

MAMMALIAN TOXICITY ARRAY

0.25mg/kg	90D	orl-gpg	HEM:str CNS:siz-dth	£NSHOT(76)FCTXAV 4,35(66)
0.25mg/kg	90D	orl-rat	END:siz	£NSHOT(76)FCTXAV 4,35(66)
1mg/kg	90D	orl-gpg	LVR,URS,REP:siz CNS:str	£NSHOT(76)FCTXAV 4,35(66)
2.5mg/kg	105D	orl-rat	PUL:ifl SON:bhv PLT:siz,dth	£NSHOT(76)ZEVMA4 11,29(64)
21mg/kg	1x	orl-gpg	LD50	£NSHOT(76)ZEVMA4 11,29(64)
80mg/kg	1x	orl-rat	ANS:fnc PLT-dth	£NSHOT(76)ZEVMA4 11,29(64)
125mg/kg	1x	orl-rat	LD50	TIUSAD 43,9(58)
-	2D	- -ham	SKN:irr	£NSHOT(76)AHRTAN 18,355(67)
-	-	- -hmn	GIT:fnc EYE:fnc LVR:str-sns	£NSHOT(76)PRLFAG 22,61(70)
-	-	skn-hmn	SKN:irr LVR:ifl-sns	£NSHOT -,32(76)
-	2H	ihl-hmn	CNS:fnc-sns	£NSHOT(76)LAUMAL 19,307(67)
-	M	ihl-hmn	GIT:fnc PUL:fnc URS:bcm	£NSHOT(76)LAUMAL 19,307(67)

CARCINOGENICITY

mus-orl	464µg/kg	18Mo	nef	£NSHOT(76)JNCIAM 42,1101(69)

MUTAGENICITY

mus-ipr	12mg/kg	1x	PHN:nef	£NSHOT(76)TXAPA9 23,288(72)
mus-orl	6mg/kg	5D	PHN:nef	£NSHOT(76)TXAPA9 23,288(72)

REPRODUCTION

rat-orl	20mg/kg	19D	REP:str,fnc	£NSHOT(76)JEENAI 61,32(68)
rat-orl	20mg/kg	4D	REP:siz	£NSHOT(76)JEENAI 61,1668(68)

AQUATIC TOXICITY

mol	3µg/l	-	dth	ERNFA7 16(4),527(72)

TERRESTRIAL TOXICITY

ins	0.25mg/kg	-	dth	JEENAI 61(5),1154(68)
ins	10g/kg	-	siz,dth	CHREAY 60,459(60)

3.13.3 STANNANE, DIETHYLDIIODO-

IRPTC NU: 000041
CAS NU: 2767-55-7 MOLFM: C4H10I2Sn MOLWT: 430.63

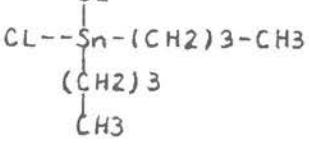
SYN: DEDI * DIETHYLTIN DIIODIDE * TIN,DIETHYL-,DIIODIDE * WH7270000(RTECS)

MP: 45°C
BP: 240-245°C dec

MAMMALIAN TOXICITY ARRAY

100 mg/kg	1x	orl-rat	LDLo	BJPCAL 10,16(55)
-	-	orl-hmn	GIT,EYE,URS,HRT,SON,CNS-sns,dth	£NSHOT(76)RENEAM 98,85(58)

3.13.4 STANNANE,DIBUTYLDICHLORO-

IRPTC NU: 000042
CAS NU: 683-18-1 MOLFM: C8H18Cl2Sn MOLWT: 303.85
STRFM:  WLN: G-SN-G4&4

SYN: CHLORID DI-n-BUTYLCINICITY(CSK) * D.B.D.C. * D.B.T.C. * DIBUTYLTIN DICHLORIDE * DI-n-BUTYL-ZINN-DICHLORID(DEU) * TIN,DIBUTYL-,DICHLORIDE * WH7100000(RTECS) * 013731 5 (ECDIN)

MP: 114°C FP: 168°C
BP: 142°C
HAZ: fire SAX*** -558(57)

USES

biocide
catalyst
curing agent
stabilizer

£NSHOT -,167(76)

MAMMALIAN TOXICITY ARRAY

1mg/kg	9WkI	orl-rat	IMM:fnc	TXAPA9 42,213(77)
1mg/kg	1x	ipr-mus	LVR,HEM,URS:siz	£NSHOT(76)BIIHAS 5,25(61)
5mg/kg	1x	ipr-rat	CNS,GIT:str PUL:crc PLT	£NSHOT(76)TIDZAH 33,573(75)
16mg/kg	90D	orl-rat	HEM:bcm-ret	£NSHOT(76)FCTXAV 6,599(68)
50mg/kg	1x	orl-rat	LVR,PNC:ifl,str	£NSHOT(76)JPTLAS 75,267(58)
35mg/kg	1x	orl-mus	LD50	FCTXAV 6,599(68)
100mg/kg	1x	orl-rat	LD50	ARZFAN 19,934(69)
-	1x	skn-hmn	SKN:ifl	£NSHOT(76)BJIMAG 15,193(58)
1470mg/m3	1H	ihl-rat	SKN:cng SON:bhv GIT:fnc	£NSHOT -,49(76)

3.14 PETROLEUM HYDROCARBONS - OILS

3.14.1 MINERAL OIL (generic)

IRPTC NU: 000043
DEF: Petroleum derived oils including crude oils and refined products but not petrochemicals

SYN: OIL * PETROLEUM * PETROLEUM HYDROCARBONS * PETROLEUM OIL * PETROLEUM DISTILLATE * SE7449000(RTECS) * 1267(UN) * 1268(UN) * 1270(UN)

HAZ: UN CLASS 3

PRODUCTION/CONSUMPTION

WLD	2700000tt-p(75)	WLD	2478400tt-p(71)		
CAN	77100tt-p(71)	FRA	132900tt-p(71)	IRN	226200tt-p(71)
IRQ	83400tt-p(71)	KWT	147100tt-p(71)	LBY	132900tt-p(71)
SAU	223400tt-p(71)	SUN	372000tt-p(71)	USA	533300tt-p(71)
VEN	187300tt-p(71)				

WLD	2396000tt-c(71)			
CAN	77000tt-c(71)	DEU	136600tt-c(73)	133000tt-c(71)
ESP	27000tt-c(71)	FRA	116400tt-c(73)	103000tt-c(71)
GBR	99300tt-c(73)		103000tt-c(71)	
ITA	92200tt-c(73)		92200tt-c(71)	
JPN	220000tt-c(71)	MEX	26000tt-c(71)	
NTZ	28300tt-c(71)	USA	715000tt-c(71)	

£NASPM -,2(75)

PATHWAYS INTO THE ENVIRONMENT

spill to aq,mar	WLD	300tt/Y	£NASPM -,6(75)
natur to aq,mar	WLD	600tt/Y	£NASPM(75)PWPME* -,-(73)
geoph to aq,mar	WLD	80tt/Y	£NASPM(75)PWPME* -,-(73)
wst to aq,mar	WLD	2633tt/Y	£NASPM -,6(75)
tot to aq,mar	WLD	6113tt/Y	£NASPM -,6(75)
wst	WLD	4000tt(75)	AMBOCX 6(6),317(77)
wst	EEC	1800tt(76)	AMBOCX 6(6),317(77)

CONCENTRATIONS

plt,mar	-	1-5mg/kg wwt	£NASPM(75)DESRAY 20.207(73)
mol,mar	-,pol	9-160mg/kg dwt	£NASPM -,62(75)
crs,mar	-,pol	4mg/kg wwt	£NASPM(75)NSFPR* -,-(71)
crs,mar	-	3-34mg/kg wwt	£NASPM -,62(75)
fsh,mar	-	0.3-8.8mg/kg wwt	£NASPM -,62(75)
fsh,mar	-,pol	4mg/kg wwt	£NASPM(75)NSFPR* -,-(71)

BIODEGRADATION

aq ,mar	DIS	70%/-	-,-/-	£GESAM(77)ENVPAF 4,291(73)
- ,24-30°C	DIS	0.02-2g/m^2/D	-,-/-	£GESAM(77)PCPOS* -,317(69)
mar,5°C	DIS	36.5g/m^3/Y	-,-/-	£GESAM(77)AWPOAZ 7,173(60)
- ,25°C	DIS	45%/30D	-,-/-	£GESAM(77)ZAPOAK 6,143(66)
- ,20-30°C	DIS	50%/-	-,-/-	£GESAM(77)APIC** -,-(71)
sed, -	DIS	1.42mg/D	-,-/-	£GESAM(77)CJMIAZ 22,1209(76)

PHOTODEGRADATION

aq,sun	2.5µm slick/100H	-,-/-	£NASPM(75)AMLIR* -,-(70)

ENVIRONMENTAL FATE

air to aq,mar	WLD	600tt/Y	£NASPM(75)PWPME* -,31(73)
soil to aq,mar	WLD	300tt/Y	£NASPM(75)SERLP* 67-2,140(66)
aq,frs to aq,mar	WLD	1600tt/Y	£NASPM -,6(75)

MAMMALIAN TOXICITY ARRAY

-	OCC	- hmn	PUL,GIT:car	JOCMA7 21(3),167(79)
-	OCC	- hmn	CNS,GIT:car	JOCMA7 21(5),367(79)

AQUATIC TOXICITY

mcr	0.01µl/l	-	ret	£GESAM -,70(77)
fsh,egg	0.1µl/l	-	rep,dth	£GESAM(77)MIRBR* -,105(72)
mcr	0.1µl/l	-	dth	£GESAM -,71(77)
mcr	10µl/l	3D	dth	£GESAM(77)MIROP* -,222(72)
fsh	50µl/l	120H	LC50	£GESAM(77)JMMRAO 31(3),135(73)
crs	0.01ml/l	-	bhv	£GESAM(77)MIRBR* -,105(72)
wor	0.1ml/l	96H	LC50	£GESAM(77)JWPFA5 42,198(73)
fsh	250µl/l	96H	LC50	£GESAM(77)JMMRAO 31(3),135(73)
crs	0.9ml/l	-	bhv,bcm	£GESAM(77)WOITR* -,-(72)
mol	20ml/l	-	bhv	£GESAM(77)RYBKH* 42,16(66)
mcr	10µg/l	-	res	£NASPM -,78(75)
mol	1mg/l	-	res	£GESAM(77)PCPOS* -,691(73)
crs,juv	2mg/l	96H	LC50	£GESAM(77)MPNBAZ 3(7),105(72)
mol	3.7mg/l	-	LVR:bcm	£GESAM(77)MAZNP* -,-(73)
mol	6.6mg/l	-	LC50	£GESAM(77)NONAA2 353,1(62)
mol	30mg/l	-	ret	£NASPM(75)CHINAG 1,14(70)
fsh,juv	110mg/l	96H	LC50	£GESAM(77)PCPOS* -,667(73)
fsh	600mg/l	-	str	£NASPM(75)JFRBAK 35,3185(73)
mol	1000mg/l	-	str	£NASPM(75)PCPOS* -,-(71)
brd	-	ACC	dth	£GESAM(77)PWPME* -,619(73)
brd	-	-	GIT:fnc	£GESAM(77)ENVPAF 7,165(74)
mam	-	ACC	uns	£GESAM(77)MPNBAZ 1,71(70)
fsh	-	ACC	dth	£GESAM(77)WOITR* -,-(72)
fsh,egg	-	-	dth	£GESAM(77)MPSL** -,315(72)
fsh,lar	-	-	bhv	£GESAM(77)MPSL** -,315(72)
plt	-	1H	rep	£NASPM(75)PEEOP* -,-(71)

SAMPLING/PREPARATION/ANALYSIS

air-GC Det: 937mg/m^3(samp 4 l) £NSHAM 3,S380(77)

REMOVAL

stripping	CECDS* -,12-24(76)
gravimetric separation	CECDS* -,12-24(76)
chemical precipitation	CECDS* -,12-24(76)
flotation	CECDS* -,12-24(76)
filtration	CECDS* -,12-24(76)
adsorption	CECDS* -,12-24(76)
biological treatment	CECDS* -,12-24(76)
sludge treatment	CECDS* -,12-24(76)

RECOMMENDATIONS/LEGAL MECHANISMS

JPN	REG	aq:emi - PRO	EAJLR* -,-(76)	RED Nov(79)
SUN	REG	air:occ - MAC:5mg/m^3 Eff: 1 Jan(77)	£ILOOE -,153(77)	RED Nov(79)
USA	REG	aq:emi - PRO	FEREAC 41,49810(76)	RED Nov(79)
USA	REG	trnsp:combustible liquid	FEREAC 41,57018(76)	RED Nov(79)

3.14.2 LUBRICATING OILS (generic)

IRPTC NU: 000044
DEF: Mixture of straight and branched chain paraffinics (64-78%), naphtenics (13-31%) and aromatic and polycyclic aromatic hydrocarbons (0-11%),>17C
FIRL** -,52(76)
SYN: AUTOMOTIVE LUBRICANTS * BEARING AND CHASSIS LUBRICANTS * BRICK OILS * CABLE OILS * COAL SPRAY OILS * CRANKASE OILS * CUTTING OILS * FLOTATION OILS * FORM OILS AND COMPOUNDS * GEAR OILS * HEAT-TRANSFER OILS * INK OILS * MACHINE AND ENGINE OILS * MOTOR OILS * PAINT AND PUTTY OILS * PAPER PROCESSING OILS * PETROLEUM SULFONATES * POLISHING OILS * QUENCHING OILS * REFRIGERATING MACHINE OILS * RUB-ROLL OILS * RUST PREVENTIVE OILS AND COMPOUNDS * SPRAY OILS * STEAM ENGINE(CYLINDER) OILS * STEAM TURBINE OILS * TEMPERING OILS * TEXTILE MACHINERY OILS * TEXTILE PROCESSING OILS * TRANSFORMER OILS * TRANSMISSION AND AXLE LUBRICANTS

FP: 149-232°C(o-cup)
BP: 302-815°C

ADD:
butene polymers
calcium stearate
silicone compounds
chlorinated hydrocarbons
FIRL** -,57(76)

PRODUCTION/CONSUMPTION

WLD	22265tt-p(75)	23026tt-p(70)	19046tt-p(66)
AFRI	493tt-p(76)	234tt-p(70)	46tt-p(66)
ASIAexSUN	3274tt-p(76)	2797tt-p(70)	1453tt-p(66)
EEC	5203tt-p(76)	4645tt-p(70)	3572tt-p(66)
EFTA	380tt-p(76)	448tt-p(70)	331tt-p(66)
EUR-E	2047tt-p(76)	1794tt-p(70)	1479tt-p(66)
EURexSUN	8080tt-p(76)	7213tt-p(70)	5674tt-p(66)
EURother	450tt-p(76)	326tt-p(70)	292tt-p(66)
NAm	10945tt-p(76)	11523tt-p(70)	10786tt-p(66)
OCEA	555tt-p(76)	433tt-p(70)	311tt-p(66)
SAm	876tt-p(75)	826tt-p(70)	776tt-p(66)
SUN	9000tt-p(76)		
ANT	730tt-p(76)	925tt-p(71)	1003tt-p(67)
CAN	596tt-p(76)	390tt-p(71)	235tt-p(66)
DEU	1282tt-p(76)	1188tt-p(71)	792tt-p(66)
FRA	1280tt-p(76)	1134tt-p(71)	866tt-p(66)
GBR	1310tt-p(76)	1429tt-p(71)	1090tt-p(66)
ITA	685tt-p(76)	545tt-p(71)	443tt-p(66)
JPN	1889tt-p(76)	2184tt-p(71)	1178tt-p(66)
NLD	543tt-p(76)	558tt-p(71)	338tt-p(66)
ROM	668tt-p(76)	600tt-p(71)	502tt-p(66)
USA	8843tt-p(76)	9369tt-p(71)	9119tt-p(66)

EEC	7143tt-c(75)	DEU	1527tt-c(75)	FRA	1268tt-c(75)
GBR	2015tt-c(75)	ITA	815tt-c(75)	NLD	831tt-c(75)

UNYS2* -,-(78)

PRODUCTION PROCESS(ES)

Atmospheric distillation of crude oil followed by vacuum distillation

CECDS* -,12-18(76)

USES

apron dressings
bearing and chassis lubricants
belt dressings
brick oils
cable oils
coal spray oils
crankase oils
cutting oils
defoaments
flotation oils
form oils and compounds
fruit and vegetable preservatives
gear oils

heat transfer oils
industrial greases
ink oils
machine and engine oils
paint and putty oils
paper processing oils
petroleum sulfonates
polishing oils
quenching oils
refrigerating machine oils
rub-roll oils
rust preventive oils and compounds
spray oils
steam engine oils
steam turbine oil
tanners products
tempering oils
textile-processing oils
textile-machinery oils
transformer oils
transmission and axle lubricants

FIRL** -,74(76)

PATHWAYS INTO THE ENVIRONMENT

wst	USA	4230tt/Y	EPAWO* -,-(74)

BIODEGRADATION

-	,24-30°C	DIS	0.02-2g/m^2/D	-,-/- £GESAM(77)PCPOS* -,317(-)
soil	,23°C	DIS	0.4g/m^2/D	-,-/- £GESAM(77)MIKBA5 3,79(34)

MAMMALIAN TOXICITY ARRAY

640mg/kg	1x	ihl-rat	dth		AEHLAU 6,329(63)
-	21Y,OCC	- -hmn	SKN,REP:car		BJIMAG 12,240(65)
-	OCC	- -hmn	REP:car	SKN,PUL:neo	ANCHAM 46(1),183(74)
-	-	- -hmn	SKN:ifl		BJDEAZ 46,344(54)
-	30Y,OCC	- -hmn	SKN,REP:car		AMPMAR 36,37(75)
-	OCC	- -hmn	SKN:str		DBEUM* 26(1),25(78)

CARCINOGENICITY

mus-skn	-	-	UNS:car	BJIMAG 12,244(55)
mus-skn	-	-	SKN:neo	RLYMAE 16,409(67)
mus-skn	-	-	SKN:neo	AMPMAR 34,669(73)
rat-skn	-	-	nef	AMPMAR 34,669(73)
mus-skn	-	-	SKN:car	BJCAAI 21,694(67)
rat-orl	100mg/kg	14Mo	UNS:neo	JNCIAM 9,159(48/49)

POTENTIATION

hmn	UV radiation	JOCMA7 17,44(75)

PRIMARY IRRITATION

mus-skn	SKN:str	RLYMAE 16,409(67)

SENSITIZATION

hmn-skn	SKN:all	CONDE* 4(6),359(78)

RECOMMENDATIONS/LEGAL MECHANISMS

SWE	REG	occ:work practices, equipment, medical supervision Eff:1 Jan(79)	ARBME* 38,-(78)	RED Nov(79)

3.14.3 OIL MIST (MINERAL)

IRPTC NU: 000045
DEF: Mist of petroleum-base lubricating or cutting oils or white petroleum oil

SYN: RI7400000(RTECS)

MAMMALIAN TOXICITY ARRAY

63mg/m^3	100D	ihl-mky	PUL,GIT:ifl-dth	AIHOAX 1,237(50)
-	-	ihl-hmn	PUL:car	AMPMAR 11,48(50)
-	2Y	- -man	PUL:car-dth	JFMCAW 19,561(65)
-	OCC	ihl-hmn	PUL:mlt SKN:cng	MUFVH* 22,37(78)

CARCINOGENICITY

mus-ihl	63mg/m^3	100D	nef	AIHOAX 1,237(50)
rat-ihl	-	2YI	PUL:neo	ARPAAQ 70,375(60)

SAMPLING/PREPARATION/ANALYSIS

air-FL	Det: 0.05mg/m^3(samp 100 l)	£NSHAM 1,159(77)
air-FL	Det: 2.5mg/m^3(samp 100 l)	£NSHAM 3,S272(77)

RECOMMENDATIONS/LEGAL MECHANISMS

SWE	REC	air:occ - ML-TWA:5mg/m^3	£ILOOE ~,165(77)	RED	Nov(79)
USA	REG	air:occ - TWA:5mg/m^3	FEREAC 39,23540(74)	RED	Nov(79)
USA	REC	air:occ - TLV-TWA:5mg/m^3	ACGIH* ~,24(79)	RED	Nov(79)
USA	REC	air:occ - TLV-STEL:10mg/m^3	ACGIH* ~,24(79)	RED	Nov(79)

3.15 PHOSPHORUS AND ITS INORGANIC COMPOUNDS

3.15.1 PHOSPHORUS (generic)

IRPTC NU: 000046
DEF: Phosphorus and phosphorus compounds (specific compound not defined)

PATHWAYS INTO THE ENVIRONMENT

wst,erg to air	WLD	80tt/Y	ECOLB* 22,78(75)

ENVIRONMENTAL FATE

soil to aq frs	WLD	2500-12300tt/Y	
sed frs to aq	WLD	1000tt/Y	
biota to aq frs	WLD	10000tt/Y	
aq frs to biota	WLD	10000tt/Y	
aq frs to sed	WLD	1000tt/Y	
aq frs to aq mar	WLD	17400tt/Y	
air to aq mar	WLD	2600-12300tt/Y	
biota to aq mar	WLD	1000000tt/Y	
aq mar to biota	WLD	990000-1300000tt/Y	
aq mar to sed	WLD	2600-12300tt/Y	
air to soil	WLD	3600-9300tt/Y	
biota to soil	WLD	136000tt/Y	
soil to biota	WLD	190600-249400tt/Y	

ECOLB* 22,86(75)

3.15.2 PHOSPHORUS(white)

IRPTC NU: 000047
CAS NU: 7723-14-0 MOLFM: P4 MOLWT: 123.88

SYN: BONIDE BLUE DEATH RAT KILLER * COMMON SENSE COCKROACH and RAT PREPARATIONS * FOSFORO BIANCO(ITA) * GELBER PHOSPHOR(DEU) * ORDINARY PHOSPHORUS * PHOSPHORE * PHOSPHORE BLANC(FRA) * PHOSPHORE JAUNE(FRA) * PHOSPHORE ORDINAIRE(FRA) * PHOSPHOROUS(WHITE) * PHOSPHOROUS YELLOW * PHOSPHOROUS (YELLOW) * PHOSPHORUS YELLOW * PHOSPHORUS WHITE DRY(DOT) * PHOSPHORUS YELLOW DRY(DOT) * RAT-NIP * STICK PHOSPHORUS * TETRAFOSFOR(NLD) * TETRAPHOSPHOR (DEU) * TH3500000(RTECS) * WEISS PHOSPHOR(DEU) * WEISSER PHOSPHOR(DEU) * WHITE PHOSPHORUS * YELLOW PHOSPHORUS * 1381(UN) * 2447(UN-MOLTEN) * 003406 6 (ECDIN)

MP: 44°C FP: 30°C DEN: 1.82g/ml
BP: 280°C
HAZ: UN CLASS 4.2
VP: 0.13kPa(1.0mmHg)20°C
AQSOL: 3mg/l,15°C

PRODUCTION/CONSUMPTION

USA	441tt-p(78)	526tt-p(73)	613tt-p(68)	
USA	437tt-p(76)	524tt-p(74)	597tt-p(70)	CENEAR 57(27),40(79)

PRODUCTION PROCESS(ES)

Phosphate rock, sand and coke heated in a furnace	14CYAT -,2257(67)

USES

fertiliser manufacture
phosphor-bronze manufacture
tracer bullets manufacture
smokes manufacture
incendiaries manufacture
fireworks
insect and rodent poisons
smoke screens
gas analysis

12VXA5 -,824(68) 14CYAT 2,88(63) AREJM* -,133(74)

PATHWAYS INTO THE ENVIRONMENT

wst,ind to aq,mar	CAN,E,cst	25-41t(69-70)	FBCCAC 2,71(72)

CONCENTRATIONS

aq,mar	CAN,Ecst	3µg/l GLC(69)	FBCCAC 2,260(72)
fsh,mar	CAN,Ecst	3.8µg/kg GLC(69)	FBCCAC 2,217(72)
crs,mar	CAN,Ecst	8.69mg/kg GLC(70)	FBCCAC 2,217(72)

CLEARANCE TIME

fsh,-	50%/0.9-5.27H	ENPBBC 4,121(74)
fsh,-	50%/1H	WATRAG 10(4),289(76)

MAMMALIAN METABOLITES

rat	organic and inorganic phosphates	FBCCAC 2,7(72)

MAMMALIAN TOXICITY ARRAY

0.1mg/kg	1x	scu-dog	LVR,URS:cng		AIHOAX 9(1),1(54)
0.3mg/kg	117D	orl-rbt	SKL:ret,siz		AIHOAX 9(1),1(54)
0.4mg/kg	1x	scu-dog	MLT:crc GIT:str PLT		ARPAAQ 30,1192(40)
1mg/kg	6x	scu-gpg	HEM:str		AIHOAX 4,567(51)
1mg/kg	1x	orl-hmn	CVS,CNS PLT:dth		MEDIAV 29,269(50)
1.4mg/kg	1x	orl-hmn	LDLo		PCOC** -,901(66)
3.03mg/kg	1x	orl-rat	LD50 SON:bhv LVR:cng		MRIMC* -,-(75)
4.82mg/kg	1x	orl-mus	LD50 SON:bhv LVR:cng		MRIMC* -,-(75)
-	-	skn-man	SKN:cor HEM:bcm		JOTRA5 7(3),476(67)
-	-	skn-wmn	SKN:cor SKL:str		ARZWA6 8,362(53)
-	-	skn-man	SKN:cor URS:bcm		JOTRA5 7(3),476(67)
35mg/m^3	-	ihl-hmn	LVR,PUL:ifl HEM:str	ANS:bcm,crc	GTPZAB 15(10),48(71)
150mg/m^3	60DI	ihl-rat	SKL:ret		IGKEAO 26(11),28(56)
150mg/m^3	60DI	ihl-rbt	HEM:str,bcm		FKIZA4 46,604(55)
500mg/m^3	10M	ihl-mus	LCLo		ITIIT* -,420(75)

CARCINOGENICITY

dog-scu	1mg/kg	55D	nef	AIHOAX 9(1),1(54)
rat-orl	1.6mg/kg	512D	nef	JIHTAB 24,154(42)
rat-scu	3.2mg/kg	610DI	nef	JIHTAB 24,154(42)

MUTAGENICITY

mcc	PHN:cng	CJZOAG 48,133(69)

NEUROTOXICITY/BEHAVIOUR

rbt-ivn	-	0.24mg/kg	15WkI	CNS:str	PSQUAP 12,294(38)

PRIMARY IRRITATION

rbt-skn	SKN:cor	HEM:bcm-dth	ANSUA5 174,779(71)
rat-skn	SKN:cor	LVR,URS:cng-dth	IJMDAI 9(1),40(73)
rbt-skn	SKN:nef		MRIMC* -,-(75)

AQUATIC TOXICITY

fsh,mar	0.5µg/l	50H	bcm		JFRBAK 27,1379(70)
fsh,mar	1.89µg/l	125H	LC50		JFRBAK 29,1295(72)
fsh,mar	2.5µg/l	130H	HEM:str		JFRBAK 27,21(70)
fsh,mar	6µg/l	96H	LC50		WATRAG 10(4),289(76)
crs,mar	0.12mg/l	96H	LC50,bhv		JFRBAK 27,21(70)
crs,juv,mar	-	-	str		SCIEAS 176,1434(72)
fsh,mar	-	-	MLT:str		SCIEAS 176,1434(72)

SAMPLING/PREPARATION/ANALYSIS

air-GC	Det: 5µg/m^3(samp 50 l)	£NSHAM 1,242(77)
air-GC	Det: 10µg/m^3(samp 20 l)	£NSHAM 1,257(77)

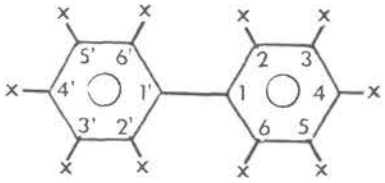
RECOMMENDATIONS/LEGAL MECHANISMS

DEU	REC	air:occ - MAK 0.1mg/m^3	DFSK** -,32(79)	RED Nov(79)
JPN	REC	air:occ - PL-TWA:0.1mg/m^3	£ILOOE -,175(77)	RED Nov(79)
SUN	REG	air:occ - MAC:0.03mg/m^3 Eff: 1 Jan(77)	£ILOOE -,175(77)	RED NOV(79)
SWE	REC	poisonous substance Eff: 22 Dec(78)	STNAF* 5,-(78)	RED Nov(79)
USA	REC	aq(mar):imi - 0.1ug/l	£EPAQC -,186(76)	RED Nov(79)
USA	REG	aq:emi - HQ:0.454kg/24H Eff:12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:0.1mg/m^3	ACGIH* -,26(79)	RED Nov(79)
USA	REC	air:occ - TLV-STEL:0.3mg/m^3	ACGIH* -,26(79)	RED Nov(79)
USA	REG	trnsp:flammable solid label:flammable solid and poison	FEREAC 41,57018(76)	RED Nov(79)
USA	REG	hazardous substance Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)

3.16 POLYCHLORINATED BIPHENYLS

3.16.1 POLYCHLORINATED BIPHENYLS (generic)

IRPTC NU: 000048
CAS NU: 1336-36-3
DEF:



x represents either a chlorine or a hydrogen atom

£IARC7 7,261(74)

SYN: AROCLOR (USA) * CHLOREXTOL (USA) * CHLORINATED BIPHENYL * CHLORINATED DIPHENYL * CHLOROBIPHENYL * CLOPHEN(DEU) * DYKANOL (USA) * FENCLOR(ITA) * INERTEEN(USA) * KANECHLOR(JPN) * NOFLAMOL(USA) * PCB * PCBs * PHENOCLOR(FRA) * POLYCHLORINATED BIPHENYL * POLYCHLOROBIPHENYL * PYRALENE(FRA) * PYRANOL(USA) * SANTOTHERM(JPN) * SOVAL(SUN) * THERMINOL(USA) * TQ1350000(RTECS)

PRODUCTION/CONSUMPTION

OECD	48.4tt-p(71)		
ESP	1.5tt-p(71)		
FRA	9.7tt-p(73)	7.6tt-p(71)	
GBR	4.1tt-p(73)		
ITA	2.5tt-p(73)	1.5tt-p(71)	
JPN	6.8tt-p(71)	11.1tt-p(70)	3tt-p(65)
USA	18.4tt-p(74)	38.5tt-p(70)	17.2tt-p(60)

CCECAU -,471(75) £EPPBB -,208(76) £IAR18(78)CCPCB* -,1(74) £OECDB -,20(73)

PRODUCTION PROCESS(ES)

Catalytic chlorination of biphenyl with anhydrous chlorine £NSHPC -,22(77)

USES

Adhesives	
Capacitors	USA 70%(74);GBR 830t(73)
Capacitors(large)	BEL 180t(73);CAN 200t(73);FIN 200t(73); FRA 1.3tt(73);ITA 1.43tt(73);NOR 20t(73); SWE 330t(73);
Capacitors(small)	CAN 190t(73);NOR 2t(73);

Catalyst carrier in polymerization of olefins

Conversion of water-permeable solids to non-permeable
Dedusting agents

Heat transfer	FRA 70t(73)
Hydraulics	FRA 80t(73);USA 20t(73)
Inks	
In immersion oil for microscopes	
Insecticide and bactericide formulations	
Insulate electric wires	
Lubricants/cutting oils	FRA 220t(73)
Microencapsulation of dyes for carbonless duplicating paper	
Pesticide extenders	
Plastizers	FRA 220t(73);ITA 290t(73);NZL 9t(73);USA 20t(73)
Sealants and caulking compounds	
Surface coatings	
Transformers	BEL 530t(73);CAN 900t(73);FIN 40t(73); FRA 2.94tt(73); ITA 1.23tt(73); NZL 30t(73);GBR 320t(73);USA 30%(74)
Transformers and capacitors	USA 17.19tt(73)
Vacuum pumps	FRA 5t(73);NLZ 2t(73)
Wax extenders	

£IAR18(78)£EPPBB -,4(76)

PATHWAYS INTO THE ENVIRONMENT

load	ATLo,N	5tt/Y	EVHPAZ 1,21(72)
load	USA	7tt(70);0.8tt(74)	£EPPBB 2,288(76)
wst to soil	USA	7tt/Y	£EPPBB 2,293(76)
wst,ind to aq	USA	1.5t/Y	£EPPBB 2,294(76)
spill	USA	4.6t(74)	£EPPBB 2,255(76)
wst to aq,mar	USA,SWcst	19t(71) 5400kg(74)	PCPCB* -,-(75)

CONCENTRATIONS

aq,frs	EUR,C,lak	75ng/l(75)	£IAR18(78)ZLUFAR 161,327(76)
aq,frs	DEU,rvr	75ng/l(75)	£IAR18(78)ZLUFAR 161,327(76)
aq,mar	MEDsNW	13ng/l(75)	£IAR18(78)MPNBAZ 7,63(76)
aq,mar	MEDs	2.0ng/l EC-GC(av)(75)	MPNBAZ 8(1),19(77)
aq,mar	ATLo,N	1.3ng/l(av)(73-74)	NATUAS 252,387(74)
aq,mar	USA,SWcst	9.2ng/l(av)(74)	24NPAY 3,337(75)
air	USA,sbd,cty	0.1µg/m^3(75)	£IAR18(78)PCPCB* -,182(76)
air,mar	MEDs	0.03-0.9ng/m^3 EC-GC(75-76)	IAEAR* -,-(76)
sed,mar	MEDs,NW	0.11mg/kg dwt	MBIOAJ 48,303(78)
mol,mar	USA,SWcst	0.01-0.37mg/kg wwt EC-GC(74)	PCPCB* -,-(75)
fsh,mar	MEDs	0.127mg/kg GC(75)	SCPEAT 258,-(76)
fsh,mar	CAN	0.07-2.65µg/g(75)	£IAR18(78)PCPCB* -,155(76)
fsh,frs	CAN	0.10-17.14µg/g(75)	£IAR18(78)PCPCB* -,155(76)
fsh	AUT,rvr,lak	0.1-0.3µg/g(75)	£IAR18 18,63(78)

PHOTODEGRADATION

ads,sun	-/-	reductive dechlorinated products-/-	£DHEPC(76)NATUAS 252,698(74)

ENVIRONMENTAL FATE

air to grnd	lak,USA,N	5.35t(74)	£EPPBB 2,D-25(76)
aq recv	lak,USA,N	6.09t(74)	£EPPBB 2,D-25(76)
air to grnd	USA	1tt/Y	£IAR18(78)PCPCB* -,254(76b)
air to grnd	SWE,S	2t/Y	£WHOPC 2,29(76)
air recv	WLD	15.2tt(70)	EVHPAZ 1,21(72)

MAMMALIAN TOXICITY ARRAY

500mg/kg	-	orl-hmn	LDLo	27ZTAP 3,34(69)
-	OCC	- -hmn	SKN:ifl	£IAR18(78)JAMAAP 154,1417(54)
-	ACC	orl-hmn	SKN:str,ifl-sns	IAEHDW 44(1),25(79)

CARCINOGENICITY

eval: "There is experimental evidence of a carcinogenic effect of some polychlorinated biphenyls in rodents. The epidemiological data provide suggestive evidence of a relationship between exposure to polychlorinated biphenyls and the development of malignant melanoma. Efforts should be made to obtain both confirmatory experimental and epidemiological evidence; in particular, continuing follow-up of survivors of the Yusho episode is necessary. In the meantime, for practical purposes, polychlorinated biphenyls should be regarded as if they were carcinogenic to humans."
£IAR18 18,84(78)

SAMPLING/PREPARATION/ANALYSIS

air-EC-GC	Det: 0.01mg/m^3	£NSHAM 1,244(77)
air-EC-GC	Det: 0.01mg/m^3	£NSHAM 1,253(77)

RECOMMENDATIONS/LEGAL MECHANISMS

JPN	REG	aq:imi - ML:ND	EAJLR* -,-(76)	RED Nov(79)
JPN	REG	aq:emi: - PL:0.003mg/l	EAJLR* -,-(76)	RED Nov(79)
SUN	REG	air:occ - MAC:1mg/m^3 Eff: 1 Jan(77)	£ILOOE -,69(77)	RED Nov(79)
SWE	REG	hmn:food(from sel water areas) marketing - PRO Eff: 1 Apr(79)	STLIF* -,-(79)	RED Nov(79)
USA	-	aq:imi - 1ng/l	CCIAS* -,50(78)	RED Nov(79)
USA	REG	aq:emi(sel ind) - PRO Eff: 2 Feb(78)	FEREAC 42,6555(77)	RED Nov(79)
USA	REG	aq:emi - HQ:4.54kg/24H Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)
USA	REG	hmn,ani:food - limits	FEREAC 42,52819(77)	RED Nov(79)
USA	REG	hazardous substance Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED Nov(79)
USA	REC	air:occ - TWA:1µ/m^3	£NSHSS -,-(79)	RED Nov(79)
USA	REC	occ:blood testing required; medical warning of adverse effects to be given to women, workers of child bearing age and nursing mothers	£NSHSS -,-(79)	RED Nov(79)

3.16.2 POLYCHLORINATED BIPHENYL(AROCLOR 1254)

IRPTC NU: 000049
CAS NU: 11097-69-1
DEF: A polychlorinated biphenyl with a chlorine content of 54%, composed of 11% TETRA-, 49% PENTA-, 34% HEXA- and 6% HEPTACHLOROBIPHENYLS (RTECS 1977)

SYN: AROCHLOR 1254 * AROCLOR 1254 * CHLORIERTE BIPHENYLE, CHLORGEHALT 54%(DEU) * CHLORODIPHENYL(54% Cl) * CLORODIFENILI,CLORO 54%(ITA) * DIPHENYLE CHLORE, 54% DE CHLORE(FRA) * NCI C02664 * TQ1360000(RTECS)

DEN: 1.54g/ml,25°C
BP: 256-390°C
VP: 1.03 x 10^{-5}kPa(7.71 x 10^{-5}mmHg)25°C
AQSOL: 12µg/l,25°C

IMPUR: TETRACHLORODIBENZOFURANS * PENTACHLORODIBENZOFURANS * HEXACHLORODIBENZOFURANS £IAR18(78)NATUAS 256,305(75)

PRODUCTION/CONSUMPTION

USA	3.9tt-p(73)	1.7tt-p(72)	
USA	6.2tt-p(70)	3.8tt-p(65)	
USA	2.8tt-c(74)	5.6tt-c(70)	

£IAR18(78)CCPCB* -,4(76) £EPPBB -,471(76)

USES

Capacitors
Transformers
Hydraulics/lubricants
Plasticizers
Adhesives
Wax extenders
Dedusting agents
Inks
Cutting oils
Pesticide extenders
Sealants and caulking compounds

£EPPBB -,4(76)

PATHWAYS INTO THE ENVIRONMENT

load USA 1.2tt(70); 0.14tt(74) £EPPBB 2,288(76)

CONCENTRATIONS

aq,est	USA,SEcst	0.6µg/l GC(av)(69-71)	AECTCV 3(1),22(75)
sed,est	USA,SEcst	2.33mg/l GC(av)(69-71)	AECTCV 3(1),22(75)
inv,est	USA,SEcst	0.81mg/kg GC(av)(69-71)	AECTCV 3(1),22(75)
fsh,est	USA,SEcst	3.99mg/kg GC(av)(69-71)	AECTCV 3(1),22(75)
fsh,mar	USA,NEcst	0.10-1.45mg/kg wwt GC(75)	BRMPB* -,51(75)
plt,est	USA,SEcst	ND GC(71)	AECTCV 3(1),22(75)
crs,est	USA,SEcst	<6.9mg/kg GC(71)	AECTCV 3(1),22(75)
mol,est	USA,SEcst	<0.49mg/kg GC(71)	AECTCV 3(1),22(75)
mol,mar	USA,Wcst	3.8mg/kg dwt XE(74)	MPNBAZ 10,50(79)

PHOTODEGRADATION

-, sun	-/3Wk	lower chlorinated biphenyls -/-	BECTA6 8(3),153(72)

ENVIRONMENTAL FATE

air to aq,mar	USA	1000t(72)	CDPCB* -,-(76)
air to aq,mar	USA,SWcst	1800kg/Y(73-74)	PCPCB* -,-(75)

BIOCONCENTRATION FACTOR

fsh	-, -	31000/ss,wwt	£NRCPC(78)
fsh	flow,1µg/l	37000/28D,-	BECTA6 6(2),113(72)

CLEARANCE TIME

fsh,-	61%/84D	BECTA6 6(2),113(72)

MAMMALIAN METABOLITES

- hydroxylated products	£NRCPC -,32(78)

MAMMALIAN TOXICITY ARRAY

0.025mg/kg	4Wk	orl-rat	LVR:bcm			£NRCPC(78)TXAPA9 23(1),112(72)
0.05mg/kg	9Mo	orl-mnk	END:fnc			£NRCPC(78)FEPRA7 34(3),321(75)
0.18mg/kg	8Wk	orl-rbt	LVR,HEM:siz	END:str	IMM:fnc,str	TXAPA9 32(3),587(75)
0.2mg/kg	9Mo	orl-mnk	REP:fnc			£NRCPC(78)FEPRA7 34(3),321(75)
0.4mg/kg	135D	orl-pig	GIT:fnc			£NRCPC(78)ENVPAF 12,211(77)
0.5mg/kg	2Y	orl-rat	LVR:neo			£NSHPC(77)FEREAC 42,6532(77)
1mg/kg	P	orl-dog	FET:str			£NSHPC -,98(77)
5mg/kg	52Wk	orl-rat	HEM:bcm			£NRCPC(78)AECTCV 4(4),404(76)
50mg/kg	21D	orl-rat	SON:bhv-siz			BECTA6 22(6),761(79)
1295mg/kg	1x	orl-rat	LD50			FCTXAV 12,63(74)
2000mg/kg	1x	orl-mus	LD50			£IAR18(78)FKIZA4 60,544(69)

1.5mg/m3	31WkI	ihl-rat	LVR:str	£NSHPC(77)AIHQA5 17,204(56)
5mg/m3	4Mo	ihl-hmn	SKN:ifl	£NSHPC(77)MELAAD 45,131(54)

CARCINOGENICITY

eval:"Five polychlorinated biphenyl mixtures have been tested in mice and/or rats only by oral administration. .....Aroclor 1254 are carcinogenic in mice.....; all induced benign and malignant liver-cell tumours."
£IAR18 18,84(78)

MUTAGENICITY

rat-orl	150mg/kg	5D	PHN:nef	£DHEPC(76)FCTXAV 13,507(75)
rat-orl	150mg/kg	5D	CHR:nef	£DHEPC(76)BECTA6 13,14(75)
brd- -	-	-	CHR:cng	£IAR18(78)EVHPAZ 1,103(72)

NEUROTOXICITY/BEHAVIOUR

brd-orl	(200mg/kg diet)	7D	SON:bhv	£NRCPC(78)ENVPAF 6,21(74)
brd-orl	(100mg/kg diet)	12Wk	SON:bcm	£NRCPC(78)TXAPA9 29(1),110(74)
brd-tpl	-	-	SON:bhv	£NRCPC(78)JWMAA9 35(2),313(71)

REPRODUCTION

mnk-orl	0.06mg/kg	-	REP:fnc	FET:dth	£NRCPC(78)CJCMAV 37(4),391(73)
rat-orl	1mg/kg	2GN	FET:dth		£NSHPC(77)FCTXAV 12,63(74)

TERATOGENICITY

mnk-orl	0.06mg/kg	-	FET:str	£NRCPC(78)CJCMAV 37(4),391(73)
rat-orl	100mg/kg	7-15tDP	FET:nef	£IAR18(78)FCTXAV 12,63(74)

AQUATIC TOXICITY

mcr,mar	1µg/l	3D		ret	MBIOAJ 49,93(78)
mcr,pop,frs	1.0µg/l	96H		ret	JPROAR 19,636(72)
fsh,frs	1µg/l	3D		rep	PCPCB* -,282(75)
inv,pop,mar	1µg/l	-		pop	CMSCAY 18,19(74)
mol	5µg/l	24Wk		ret	AECTCV 3(1),22(75)
fsh	5µg/l	2Wk		LVR:bcm	AECTCV 3(1),22(75)
mcr,mar	5µg/l	24H		bcm	NATUAS 240,356(72)
fsh,frs	0.01mg/l	4Wk		str,dth(95%)	PSEGF* 27,420(73)
crs	0.09mg/l	48H		LC50	PCPCB* -,282(75)
crs	10.0mg/l	1.5H		bhv	BECTA6 12(2),253(74)
fsh	1000mg/kg	1x	orl	LVR:str,bcm	JENPT* 2(4),953(79)

3.16.3 POLYCHLORINATED BIPHENYL (PHENOCLOR DP6)

IRPTC NU: 000050
DEF: A biphenyl with an average of about six chlorine atoms per molecule (equivalent to 59% chlorine by weight) £WHOPC 2,-(76)

SYN: PHENOCLOR DP6 * PHENOCLOR DP-6

IMPUR: TETRACHLORODIBENZOFURANS * PENTACHLORODIBENZOFURANS *
CHLORINATED NAPHTHALENES £IAR18(78)FCTXAV 9,625(70)
HEXACHLORODIBENZOFURANS £IAR18(78)NATUAS 256,305(75)

MAMMALIAN TOXICITY ARRAY

100mg/kg 26D orl-rat LVR:bcm,siz HEM:siz £WHOPC(78)TXAPA9 17,656(70)

PRIMARY IRRITATION

rbt-skn SKN:irr £NSHPC(77)TXAPA9 19,617(71)

3.17 SELENIUM

3.17.1 SELENIUM (generic)

IRPTC NU: 000051
DEF: Selenium and its compounds (specific compounds not defined)

PRODUCTION/CONSUMPTION

WLD	1100t-p(73)		
AUS	4t-p(73)	2t-p(68)	2t-p(64)
BEL+LUX	48t-p(73)	24t-p(68)	39t-p(64)
CAN	271t-p(73)	288t-p(68)	211t-p(64)
FIN	5t-p(73)	7t-p(68)	7t-p(64)
JPN	358t-p(73)	181t-p(68)	148t-p(64)
MEX	39t-p(73)	1t-p(68)	3t-p(64)
PER	8t-p(73)	6t-p(68)	8t-p(64)
SWE	82t-p(73)	76t-p(68)	82t-p(64)
USA	284t-p(73)	274t-p(68)	408t-p(64)
USA	348t-p(72)	565t-p(69)	287t-p(68)
YUG	43t-p(73)	10t-p(68)	4t-p(64)

£IARC9 9,247(75) £NASSE -,30(76) £EPASE 4,7(7

PRODUCTION PROCESS(ES)

By-product of the electrolytic refining of copper £IARC9(75)ELKEM* 17,809(6

USES

Additive in natural and synthetic rubbers
Additive to improve machinability and reduce porosity of steels
Catalysts, oxidizing and reducing agents
Electronic devices
Feed additives
Fungicide
Glass manufacture
Paint, plastic and ceramic industry
Pharmaceutical and cosmetic products
Photoelectric cells
Photocopy machines
Pigments
Rectifiers
Selenium coated photoreceptors
Veterinary medicines

£EPASE 4,12,(75) £IARC9 -,247(7

PATHWAYS INTO THE ENVIRONMENT

natur to aq mar	WLD	7200t/Y	MSCOM* 2,43(76)
wst to aq, mar	USA,Wsbd	17.1t/Y	SCCWR* -,57(76)
wst to air	USA	900t/Y	£EPASE 4,17(75)
wst to soil	USA	2600t/Y	£EPASE 4,17(75)

CONCENTRATIONS

aq,mar	WLD	<6µg/l	£NASSE -,24(76)
aq,mar	WLD	0.03-2mg/l	£EPASE(75)ROSEI* -,-(64)
aq,drk	-	0.05-0.33mg/l	£EPASE(75)ROSEI* -,-(64)
aq,frs	-	0.2µg/l(av)	£NASDW(77)SEQFS* -,461(74)
aq,drk	USA	8µg/l(av)	£NASDW(77)JAWWA5 55,619(63)
aq,drk	DEU,AUS	<1-5.3µg/l	£NASDW(77)JAWWA5 55,619(63)
aq,mar	USA,Ecst	0.11mg/l AA	BECTA6 21,53(79)
aq,mar	PACo,NW	0.12µg/l FS(76)	JOSJP* 33,23(77)
aq,mar	CAN,Ncst	1µg/l GC	NOAAR* 8,372(78)
aq,mar	USA,NWcst	5.2ng/l GC(76)	NOAAR* 8,372(78)
aq,est	GBR,Scst	19µg/l EC-GC(74)	MSCOM* 1,101(75)
air	USA,NEcty	1-6.1ng/m^3	£NASSE -,26(76)
air,part,mar	USA,Ecst	0.38-3.3ng/m^3 AA(73)	KUGSO* -,378(76)
soil	-	0.1-2mg/kg(av)	£NASDW(77)SEQFS* -,461(74)
sed,mar	USA,SEcst	1.44mg/kg wwt AA	BECTA6 21,53(79)
sed,mar	CAN,Ncst	0.4-0.47mg/kg GC(76)	KUGSO* -,378(76)
sed,mar	BERs	0.01-0.09mg/kg GC(75)	KUGSO* -,378(76)
sed,est	GBR,Scst	6.6mg/kg wwt (74)	MSCOM* 1,101(75)
food	-	0.16-9.14mg/kg	£EPASE(75)ROSEI* -,-(64)
food,plt	-	6-387µg/kg(av)	£EPASE(75)JONUAI 100,1383(70)
food,ani	-	224µg/kg(av)	£EPASE(75)JONUAI 100,1383(70)
food,mar	-	532µg/kg(av)	£EPASE(75)JONUAI 100,1383(70)
plt	-	50-260µg/kg(av)	£NASDW(77)SEQFS* -,461(74)
mcr,frs	USA,lak	0.1-1.2mg/kg	£EPASE(75)MPNBAZ 2(5),69(71)
mam,mar	CAN,Ncst	16.35mg/kg wwt(75)	ATICAB 31,75(78)
fsh,mar	INDo,E	0.24-44.3mg/kg	SDKHAK 26,251(78)
mol,mar	USA,SEcst	0.54mg/kg wwt AA	BECTA6 21,53(79)
mol,mar	USA,NNEcst	0.2-0.4mg/kg wwt EC-GC	MSCOM* 1,101(75)
mol,est	DEU,Ncst	5.6mg/kg dwt AA(73)	JRACBN 37,927(76)
crs,mar	USA,SEcst	0.77mg/kg wwt AA	BECTA6 21,53(79)
inv,mar	USA,SEcst	0.49mg/kg wwt AA	BECTA6 21,53(79)
inv,mar	MEDs,E	5.1mg/kg dwt AA(74)	MPNBAZ 7(8),143(77)
mcr,mar	MEDs,E	2.4mg/kg dwt AA(74)	CERBO* -,63(77)

ADSORPTION

soil,pH8.1,3.37‰ sal	-,20%/90H	MPNBAZ 10,157(79)

EVAPORATION

aq	21.1%/90H	MPNBAZ 10,157(79)

MODEL ECOSYSTEM STUDIES

trr	£EPASE(75)ROSEI* -,-(64)

ENVIRONMENTAL FATE

aq,rvr to aq,mar	-	8tt/Y	£NASDW(77)SCIEAS 173,233(71)
air to aq,mar	Ns	105t/Y	ICESR* E:17,-(76)
air to aq,mar	Ns	125t/Y(74-76)	MSCOM* 5,175(79)

MAMMALIAN TOXICITY ARRAY

1µg/kg	10D	- rat	HEM:str,bcm	MDMIAZ 30(1),63(78)
-	OCC	- hmn	SKN,HEM:str REP:fnc	£EPASE(75)ROSEI* -,-(64)
-	-	- hmn	SKN:str-sns	£EPASE(75)ROSEI* -,-(64)
-	-	- hmn	SKN:str FET:str	£EPASE(75)ROSEI* -,-(64)

POTENTIATION

- zinc	£EPASE(75)ROSEI* -,-(64)

AQUATIC TOXICITY

mol	50.1mg/l	7D	LC50	WREJJ* -,-(77)

SAMPLING/PREPARATION/ANALYSIS

urn-turbidimetry	Det:0.017mg/l(samp 300ml)	£NSHAM 1,124(77)
air-reaction kinetic analysis	Det:0.6µg/m^3(samp 90 l)	£NSHAM 1,181(77)
air-AAS	Det:0.10mg/m^3(samp 360 l)	£NSHAM 3,S190(77)

RECOMMENDATIONS/LEGAL MECHANISMS

EEC	REC	aq:drk - 0.01mg/l	£EPASE(75)£NATOM -,-(76)	RED Nov(79)
DEU	REC	air:occ - MAK:0.1mg Se/m^3	DFSK** -,34(79)	RED Nov(79)
JPN	REC	air:occ - PL-TWA:0.1mg/m^3	£ILOOE -,187(77)	RED Nov(79)
SWE	REC	air:occ - ML-TWA:0.1mg/m^3	£ILOOE -,187(77)	RED Nov(79)
USA	REG	aq:drk - MPC:0.01mg/l AAS Eff:24 Jun(77)	FEREAC 40,59570(75)	RED Nov(79)
USA	REG	aq:drk(bottled) - MPC:0.01mg/l	FEREAC 42,14325(77)	RED Nov(79)
USA	REG	air:occ - TWA:0.2mg Se/m^3	FEREAC 39,23540(74)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:0.2mg Se/m^3	ACGIH* -,27(79)	RED Nov(79)
USA	must be disposed of in closed containers		£EPASE(75)£NATOM -,-(76)	RED Nov(79)

3.17.2 SELENIC ACID,DISODIUM SALT

IRPTC NU: 000052
CAS NU: 13410-01-0 MOLFM: Na2O4Se MOLWT: 188.94
STRFM: Na2SeO4 WLN: NA2 SE-O4

SYN: DISODIUM SELENATE * P-40 * SEL-TOX SSO2 and SS2O * SODIUM SELENATE *
VS6650000 (RTECS) * 018851 1 (ECDIN)

DEN: 3.2g/ml
AQSOL: 840g/l, 35°C

USES

feed additive
insecticide
veterinary medicine

£IARC9(75)12VXA5 -,965(68)

MAMMALIAN METABOLITES

rat	trimethylselenium ion	£NASDW(77)JONUAI 104,306(74)
rat	dimethylselenide	£NASDW(77)JBCHA3 195,277(52)

MAMMALIAN TOXICITY ARRAY

0.2mg/kg	100D	orl-rat	LVR:ifl-dth	£IARC9(75)HARJR* -,153(67)
0.6mg/kg	LT	orl-mus	emr	£NASDW(77)AEHLAU 24,66(72)
2.5mg/kg	1x	orl-rat	LD50	AFDOAQ 15,122(51)
4mg/kg	13D	ipr-rat	SKL:str	£NASDW(77)CATRBZ 7,318(71)
4mg/kg	1x	orl-rbt	LD50	PCOC** -,1057(66)
5mg/kg	1x	orl-hmn	LDLo	27ZTAP 3,131(69)

CARCINOGENICITY

rat-orl	0.4mg/kg	>1Y	inc	£IARC9(75)JONUAI 101,1531(71)
mus-orl	0.6mg/kg	-	nef	£IARC9(75)AEHLAU 24,66(72)

3.18 THALLIUM

3.18.1 THALLIUM (generic)

IRPTC NU: 000053
DEF: Thallium compounds (specific compound not defined)

HAZ: UN CLASS 6.1

USES

rodent poison
lenses,plates and prisms
fungicide
low-range glass thermometers
seaparation of mineralogic specimens
photoelectric cells
high-density liquids
special glasses
Se rectifiers
insect proofing
phosphor activator

14CYAT 2,1138(63)

CONCENTRATIONS

aq,mar	-	0.01mg/l		SKIBJ* -,-(73)
air,part,mar	USA,Wcst	15-193pg/m^3	AA(73)	KUGSO* -,378(76)
air,part,mar	USA,Ecst	14-188pg/m^3	AA	KUGSO* -,378(76)
fsh,mar	USA,NEcst	ND	AAS	JEMBAM 9(1),29(72)
mol,mar	DEU/DDR,Ncst	26µg/kg	dwt AA(73)	JRACBN 37,927(76)
mol,est	DEU,Ncst	0.02mg/kg	dwt AA(73)	JRACBN 37,927(76)

ENVIRONMENTAL FATE

air to aq,mar	Ns	30t/Y(74-76)	MSCOM* 5,175(79)

MAMMALIAN TOXICITY ARRAY

-	ACC	-hmn	CNS:cng -dth	AREJM* -,124(74)
-	-	-hmn	SON,PNS,SKN,GIT,HEM,CVS,SNS-sns	IJCPB5 10(1),1(74)

AQUATIC TOXICITY

mcr,mar	2.0mg/l	15M	bcm	MBIOAJ 29,99(75)
crs,mar	10mg/l	96H	LC50	SHFIL* 22,-(71)

SAMPLING/PREPARATION/ANALYSIS

air-AAS	Det: 210µg/m3	£NSHAM 1,173(77)
air-AAS	Det: 34µg/m^3(samp 540 l)	£NSHAM 3,S306(77)

RECOMMENDATIONS/LEGAL MECHANISMS

DEU	REC	air:occ - MAK:0.1mg Tl/m^3	DFSK** -,35(79) RED Nov(79)
USA	REC	air:occ - TLV-TWA:0.1mg Tl/m^3	ACGIH* -,29(79) RED Nov(79)

3.18.2 THALLIUM

IRPTC NU: 000054
CAS: 7440-28-0 MOLFM: Tl MOLWT: 204.4
STRFM: Tl WLN: Tl

SYN: RAMOR * 003861 0 (ECDIN)

MP: 304°C DEN: 12g/ml
BP: 1447-1467°C

PRODUCTION/CONSUMPTION

WLD	10-12t/Y	STEVA8 4,185(75)

PRODUCTION PROCESS(ES)

Precipitation of crude thallium onto Zn or Al	14CYAT -,1138(67)
Electrolysis of carbonate, sulphate or perchlorate solutions	14CYAT -,1138(67)

3.19 ZINC

3.19.1 ZINC (generic)

IRPTC NU: 000055
DEF: Zinc and its compounds (specific compound not defined)

PRODUCTION/CONSUMPTION

WLD	6020tt-p(77)	5877tt-p(73)	4353tt-p(65)
WLD	5046tt-p(75)	5180tt-p(70)	4324tt-p(66)
WLD	4610tt-p(71)	4970tt-p(69)	4120tt-p(67)
ASIAexSUN	986tt-p(75)	895tt-p(70)	616tt-p(66)
EEC	1106tt-p(75)	1166tt-p(70)	942tt-p(66)
EEC	981tt-p(71)	1122tt-p(69)	825tt-p(67)
EEC	1355tt-c(72)	1261tt-c(70)	1066tt-c(67)
EFTA	194tt-p(75)	134tt-p(70)	66tt-p(66)
EUR-E	352tt-p(75)	298tt-p(70)	282tt-p(66)
EURexSUN	1848tt-p(75)	1753tt-p(70)	1397tt-p(66)
EURother	196tt-p(75)	154tt-p(70)	107tt-p(66)
NAm	1031tt-p(75)	1359tt-p(70)	1410tt-p(66)
OCEA	243tt-p(75)	270tt-p(70)	203tt-p(66)
SAm	135tt-p(75)	105tt-p(70)	85tt-p(66)
SUN	690tt-p(75)	610tt-p(70)	510tt-p(66)
BEL	225tt-p(75)	235tt-p(70)	252tt-p(66)
BEL+LUX	213tt-p(71)	260tt-p(69)	227tt-p(67)
CAN	427tt-p(75)	1359tt-p(70)	1410tt-p(66)
DEU	295tt-p(75)	301tt-p(70)	208tt-p(66)
DEU	253tt-p(71)	280tt-p(69)	180tt-p(67)
FRA	203tt-p(75)	251tt-p(70)	229tt-p(66)
FRA	218tt-p(71)	253tt-p(69)	187tt-p(67)
ITA	177tt-p(75)	134tt-p(70)	77tt-p(66)
ITA	140tt-p(71)	131tt-p(69)	88tt-p(67)
JPN	702tt-p(75)	681tt-p(70)	450tt-p(66)
MEX	154tt-p(75)	81tt-p(70)	59tt-p(66)
POL	243tt-p(75)	65tt-p(70)	193tt-p(66)
PRK	138tt-p(75)	90tt-p(70)	75tt-p(66)
USA	454tt-p(77)	583tt-p(73)	994tt-p(65)
USA	450tt-p(75)	865tt-p(70)	1005tt-p(66)
USA	690tt-p(72)	1000tt-p(69)	910tt-p(67)
BEL+LUX	145tt-c(72)	137tt-c(70)	119tt-c(67)
DEU	413tt-c(72)	396tt-c(70)	303tt-c(67)
FRA	264tt-c(72)	220tt-c(70)	202tt-c(67)
ITA	203tt-c(72)	178tt-c(70)	141tt-c(67)
USA	1295tt-c(72)	1252tt-c(69)	1130tt-c(67)

CECME* -,-(77) UNYS2* -,-(78)

USES

copper alloys
galvanizing
light alloys
rolled and wire drawn zinc
sheet products

CECME* -,66(77)

PATHWAYS INTO THE ENVIRONMENT

natur	WLD	720tt/Y	£GESAM 2,-(76)

CONCENTRATIONS

aq,drk	USA,NE,cty	223µg/l(av)	£NASDW(77)JAWWA5 67,593(75)
aq,drk	USA,cty	<5.46mg/l	£NASDW(77)JAWWA5 67,593(75)
aq,frs	USA	64µg/l(av)	£EPAQC(76)USDI2* -,-(67)
aq,mar	WLD	<10µg/l	£EPAQC -,-(76)
aq	NOR	313µg/l XF(72-75)	ENVPAF 15,101(78)
aq,mar	MEDsNW	1.9-7µg/l ASV(74)	MPNBAZ 7(1),9(76)
aq,mar	ISR,cst	43.6µg/l AAS(74)	ESTHAG 11,265(77)
sed,est	GBR	455mg/kg dwt AAS(74)	JMBAAK 58,89(78)
aq,mar	HKG,cst	0.18mg/l AAS	MPNBAZ 10,56(79)
aq,mar	IRL,NEcst	3-26µg/l AAS(75)	MPNBAZ 10,86(79)
aq,mar	USA,SEcst	4.11mg/l AA	BECTA6 21,53(79)
aq,mar	NOR,Wcst	0.1-0.61mg/l AAS(76)	JEMBAM 37,271(79)
aq,mar	USA,NWcst	0.3µg/l ASV	NOAAR* 8,199(78)
aq,est	USA,Wcst	7.5mg/l AAS(75)	ESTHAG 13,425(79)
aq,est	GBR,NEcst	0-50mg/l AAS(77)	MPNBAZ 10,170(79)
aq,part,mar	NOR,Wcst	0.53µg/l AAS(76)	JEMBAM 37,271(79)
aq,part,mar	USA,NWcst	165-352mg/m^3 XF(77)	NOAQR* 3,32(78)
aq,part,frs	USA,NWcst	129-187mg/kg XF(77)	NOAQR* 3,32(78)
air,mar	BEL,cst	34-625ng/m^3 XE(72-77)	ATENBP 13,267(79)
sed,mar	HKG,cst	2mg/kg AAS	MPNBAZ 10,56(79)
sed,mar	USA,SEcst	26.8mg/kg wwt AA	BECTA6 21,53(79)
sed,mar	BERs	2.5-23.9mg/kg(75-76)	NOAAR* 8,199(78)
sed,mar	USA,NWcst	5.2-39mg/kg dwt(75-76)	NOAAR* 8,199(78)
sed,mar	ARCo	0.9-6mg/kg AAS(76)	NOAAR* 8,199(78)
sed,mar	ISR,cst	7.0mg/kg dwt AAS(74)	ESTHAG 11,265(77)
sed,mar	ISR,cst	80mg/kg AAS(73-74)	MPNBAZ 9(1),10(78)
sed,mar	MEDsN	70.6mg/kg dwt AAS(73)	AMLIR* -,129(-)
ani,mar	-	6-1500mg/kg	£EPAQC(76)NTAC** -,-(68)
mol,mar	ITA,NW,cst	381mg/kg dwt AAS(75)	24NPAY 6,179(78)
mol,mar	YUG	178µg/kg dwt(77)	GFCMR* 3,-(78)
mol,mar	ITA	250mg/kg AAS(76)	BSIBAC 53(6),471(77)
mol,mar	GBR,SW,cst	360mg/kg dwt(74)	CCWAR* -,-(77)
fsh,mar	MEDsNE	25.4mg/kg(75-76)	RVOMAY 49,41(78)
fsh,mar	MEDsN	21.53mg/kg(74)	QUMEAG 13,114(74)
fsh,mar	ISR,cst	27.2mg/kg dwt AAS(74)	ESTHAG 11,265(77)
mcr,mar	KOR	95mg/kg(74)	JOSK** 12,41(77)

mcr,mar	NOR	6950mg/kg dwt XF(74)	ENVPAF 15,101(78)
mcr,mar	MEDs	413mg/kg dwt AAS(74)	AMLIR* 187,110(76)
mam,mar	BERs	8-227mg/kg dwt(77)	NOAAR* 8,199(78)
mol,mar	BERs,S	81-156mg/kg dwt(76)	NOAAR* 8,199(78)
mol,mar	USA,NWcst	50-340mg/kg dwt(77)	NOAAR* 8,199(78)
mol,mar	USA,SEcst	103.39mg/kg wwt AA	BECTA6 21,53(79)
fsh,mar	USA,NWcst	27mg/kg dwt (77)	NOAAR* 8,199(78)
crs,mar	USA,SEcst	648mg/kg wwt AA	BECTA6 21,53(79)
crs,mar	USA,NWcst	115-202mg/kg dwt(77)	NOAAR* 8,199(78)
crs,mar	BERs,S	104-188mg/kg dwt(76)	NOAAR* 8,199(78)
plt,mar	BERs,S	8-22mg/kg dwt(76)	NOAAR* 8,199(78)
plt,mar	USA,NWcst	5-25mg/kg dwt	NOAAR* 8,199(78)
mcr,mar	HKG,cst	32mg/kg AAS	MPNBAZ 10,56(79)

ADSORPTION

clay	18-23°C,pH7.7-8.2	-,99%/3D	GCACAK 9,1(56)

MODEL ECOSYSTEM STUDIES

aq-trr		ESTHAG 13,546(79)

ENVIRONMENTAL FATE

aq,mar to air	WLD	33tt/Y	KUGSO* -,378(76)
soil to air	WLD	14tt/Y	KUGSO* -,378(76)
air to aq,mar	Ns	16tt/Y(74-76)	MSCOM* 5,175(79)
aq,frs to aq,mar	BALS	132.867t/Y	AMBOS* 5,-(77)
aq,mar to sed	BALs	4tt/Y	ICESR* -,-(77)
air to aq,mar	USA,SE,cst	150t/Y	CCWAR* -,-(77)
soil to aq,mar	USA,SE,cst	100t/Y	CCWAR* -,-(77)
air to aq,mar	USA,SEcst	200t/Y	GCACAK 40,573(76)
aq,frs to aq,mar	USA,SEcst	1000t/Y	GCACAK 40,573(76)
soil to aq,mar	USA,SEcst	36t/Y	GCACAK 40,573(76)
aq,mar to sed	USA,SEcst	340t/Y	GCACAK 40,573(76)

AQUATIC TOXICITY

mcr,mar	15µg/l	24H	bcm	NATUAS 277,292(79)
inv,egg,mar	0.03mg/l	24H	ret	PSMBAG 24,9(77)
mol	125µg/l	5D	rep	MBIOAJ 31,227(75)
mol,lar	195µg/l	8D	ret	MBIOAJ 41,179(77)
crs	0.4mg/l	96H	LC50	AECTCV 6(2/3),315(77)
plt,pad,mar	0.5mg/l	-	ret	ECMSC6 7,531(78)
mcr	1.0mg/l	39D	cel	HELOAY 30,682(77)
mol	1.6mg/l	10M	fnc	MPNBAZ 7,228(76)
mcr	4mg/l	-	ret	RVOMAY 39,109(75)
mol,mar	4mg/l	5D	LC50	AECTCV 7,73(78)
mol	5.2mg/l	96H	LC50	BECTA6 17,137(77)
fsh,mar	7.2mg/l	96H	str	AJMFA4 27,137(76)

crs	10.0mg/l	120H	osm	MBIOAJ 30,13(75)
fsh	10.0mg/l	2Wk	LVR:bcm	JFRBAK 30,560(73)
crs,lar	30mg/l	60H	LC50	RVOMAY 28,27(72)
plt,mar	250mg/l	17H	oxy	ECMSC6 7,531(78)
fsh	375mg/l	9D	LC50	RVOMAY 28,27(72)

SAMPLING/PREPARATION/ANALYSIS

air-AAS	Det: 4.2µg/m^3(samp 0.24m^3)	fNSHAM 1,173(77)

RECOMMENDATIONS/LEGAL MECHANISMS

JPN	REG	aq:emi - PL:5mg/l	EAJLR* -,-(76) RED Nov(79)
USA	REC	aq:drk 5mg/l	fEPAQC -,245(76) RED Nov(79)
USA	REG	aq:drk(bottled) - MPC:5.0mg/l	FEREAC 42,14325(77)RED Nov(79)

3.19.2 ZINC CHLORIDE

IRPTC NU: 000056
CAS NU: 7646-85-7 MOLFM: Cl2Zn MOLWT: 136.27
WLN: Zn G2

SYN: BUTTER OF ZINC * CHLORURE DE ZINC(FRA) * ZH1400000(RTECS) * ZINC BUTTER * ZINC(CHLORURE DE)(FRA) * ZINC DICHLORIDE * ZINCO(CLORURO DI)(ITA) * ZINKCHLORID(DEU) * ZINKCHLORIDE(NLD) * 2331(UN Number) * 004162 3 (ECDIN)

MP: 283°C DEN: 2.91g/ml
BP: 732°C
HAZ: UN CLASS 8
AQSOL: 4.32kg/l,25°C

MAMMALIAN TOXICITY ARRAY

2mg/kg	5Mo	orl-mus	HEM,REP:car		MIMEAO 55(38),1504(64)
4.8mg/kg	20D	ipr-rat	URS:mlt		BSIBAC 42,465(66)
6.3mg/kg	20D	ipr-rat	CNS:mlt		AIAEA2 73,189(68)
50mg/kg	1x	orl-hmn	LDLo		27ZTAP 3,154(69)
200mg/kg	1x	orl-gpg	LD50		FOREAE 7,313(42)
350mg/kg	1x	orl-rat	LD50		FOREAE 7,313(42)
500mg/kg	1x	orl-rat	GIT,LVR:str-dth		AEXPBL 226,424(55)
-	-	skn-hmn	SKN-irr		FOMDAK 40,245(57)
-	1x	orl-chd	GIT:fnc,ifl	LVR:str CNS:fnc-sns,dth	NYSJAM -,1848(62)
-	OCC	skn-hmn	SON:bhv-sns,siz		JAMAAP 108,383(37)
80mg/m^3	2M	ihl-hmn	PUL:irr-sns		JRAMAI 103,119(57)
120mg/m^3	2M	ihl-hmn	SNS,PUL:irr-sns		JRAMAI 103,119(57)
120000mg/m^3	30M	ihl-hmn	PUL:mlt	SNS:irr CNS,LVR,URS:uns-sns,dth	LANCAO 249,368(45)
-	-	ihl-man	PUL:fnc	HRT:siz	BJRAAP 18(216),396(45)

CARCINOGENICITY

mus-orl	2mg/kg	5Mo	HEM,REP:car	MIMEAO 55(38),1504(64)

MUTAGENICITY

mcr - nef		MUREAV 31(3),185(75)

NEUROTOXICITY/BEHAVIOUR

rat-ipr	6.3mg/kg	20DI	SON:msc PNS:str	AIAEA2 73,189(68)

PRIMARY IRRITATION

rbt-eye	EYE:str	AJOPAA 76(1),137(73)

REPRODUCTION

rat-orl	250mg/kg	2GN	nef	JBCHA3 74,85(27)

AQUATIC TOXICITY

fsh	5.37mg/l	96H	LC50	£EPAQC(76)AWPOAZ 10,453(66)

RECOMMENDATIONS/LEGAL MECHANISMS

SWE	REC	air:occ - ML-TWA:1mg/m^3	£ILOOE -,219(77)	RED	Nov(79)
SWE	REC	poisonous substance Eff: 22 Dec(78)	STNAF* 5,-(78)	RED	Nov(79)
USA	REG	aq:emi - HQ:2270kg/24H Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED	Nov(79)
USA	REG	air:occ - TWA:1mg(fume)/m^3	FEREAC 39,23540(74)	RED	Nov(79)
USA	REC	air:occ - TLV-TWA:1mg/m^3	ACGIH* -,31(79)	RED	Nov(79)
USA	REC	air:occ - TLV-STEL:2mg/m^3	ACGIH* -,31(79	RED	Nov(79)
USA	REG	hazardous substance Eff: 12 Jun(78)	FEREAC 43,10489(78)	RED	Nov(79)

3.19.3 ZINC SULPHATE (generic)

IRPTC NU: 000057
DEF: Zinc sulphate hydrous and anhydrous (hydration state not defined)

SYN: BONAZEN * BUFOPTO ZINC SULFATE * NAT. ZINKOSITE * OP-THAL-ZIN *
SULFURIC ACID,ZINC SALT(1:1) * WHITE COPPERAS * WHITE VITRIOL *
ZINC SULFATE * ZINC VITRIOL * ZINKOSITE

MAMMALIAN TOXICITY ARRAY

2.9mg/kg	1x	orl-hmn	GIT:fnc	JAHBE* -,-(75)
429mg/kg	1x	orl-hmn	dth	AREJM* -,241(74)

AQUATIC TOXICITY

fsh,juv	2.2mg/l	48H	LC50	£EPAQC(76)AABIAV 53,33(64)
ins	16mg/l	10D	LC50	£EPAQC(76)JWPFA5 41(1),280(69)
fsh	40mg/l	96H	LC50	£EPAQC(76)PFCUAY 30,203(68)

3.19.4 ZINC SULFATE(1:1)

IRPTC NU: 000058
CAS NU: 7733-02-0 MOLFM: O4SZn MOLWT: 161.43
WLN: ZN S-04

SYN: BONAZEN * BUFOPTO ZINC SULFATE * NAT.ZINKOSITE * OP-THAL-ZIN *
SULFURIC ACID, ZINC SALT(1:1) * WHITE COPPERAS * WHITE VITRIOL *
ZH5260000(RTECS) * ZINC SULFATE * ZINC VITRIOL * ZINKOSITE *
017933 4 (ECDIN)

MP: 740°C dec DEN: 3.54g/ml

MAMMALIAN TOXICITY ARRAY

6.17mg/kg	5D	scu-rbt	UNS:neo	COREAF 236,1387(53)
29mg/kg	1x	ipr-mus	LD50	COREAF 256,1043(63)
50mg/kg	1x	orl-hmn	LDLo	27ZTAP 3,154(69)
106mg/kg	-	orl-hmn	HEM:prs	BMJOAE 1,1390(77)

AQUATIC TOXICITY

fsh,juv	1.1mg/l	96H	LC50	£EPAQC(76)BECTA6 12,193(64)
fsh	10mg/l	48H	LC50	£EPAQC(76)CUSCAM 32(8)363(63)

RECOMMENDATIONS/LEGAL MECHANISMS

USA	REG	aq:emi - HQ:454kg/24H Eff: 12 Jun(78)	FEREAC 43,10489(78) RED Nov(79)
USA	REG	hazardous substance Eff: 12 Jun(78)	FEREAC 43,10489(78) RED Nov(79)

3.19.5 ZINC SULFATE HEPTAHYDRATE (1:1)

IRPTC NU: 000059
CAS NU: 7446-20-0 MOLFM: 04SZn.7H20 MOLWT: 287.57

SYN: SULFURIC ACID, ZINC SALT(1:1),HEPTAHYDRATE * NUZ * WHITE VITRIOL *
ZINC SULFATE * ZINC SULPHATE * ZINC VITRIOL * ZH5300000(RTECS)

MP: 50°C DEN: 1.96g/ml
BP: 280°
AQSOL: 1.7kg/l

AQUATIC TOXICITY

fsh	0.87mg/l	96H	LC50	£EPAQC(76)AWPOAZ 10,453(66)

3.19.6 ZINC OXIDE

IRPTC NU: 000060
CAS NU: 1314-13-2 MOLFM: ZnO MOLWT: 81.37
WLN: Zn O

SYN: ACTOX 14 * ACTOX 16 * ACTOX 216 * AMALOX * AZODOX *
CADOX XX 78 * CALAMINE * CHINESE WHITE * C.I.77947 *
C.I. PIGMENT WHITE 4 * CYNKU TLENEK(POL) * EMANAY ZINC OXIDE *
EMAR * FELLING ZINC OXIDE * FLOWERS OF ZINC * GREEN SEAL-8 *
HUBBUCK'S WHITE * KADOX 15 * KADOX-25 * KADOX 72 * NAT.
ZINCITE * OZIDE * OZLO * PERMANENT WHITE * PHILOSOPHER'S
WOOL * POWDER BASE 900 * PROTOX 166 * PROTOX 168 * PROTOX 169 *
PROTOX TYPE 166 * PROTOX TYPE 167 * PROTOX TYPE 168 * PROTOX
TYPE 169 * PROTOX TYPE 267 * PROTOX TYPE 268 * RC-ZINK OXIDE 64 *
RED-SEAL-9 * SNOW WHITE * WHITE SEAL-7 * WHITE ZINC * WHITE ZINC
OXIDE * XX203 * ZH4810000(RTECS) * ZINCITE * ZINCOID *
ZINC OXIDE FUME * ZINC WHITE * 003875 7 (ECDIN)

MP: 1975°C DEN: 5.61g/ml
AQSOL: 1.6mg/l,29°C

PRODUCTION/CONSUMPTION

ASIAexSUN	54780t-p(75)	67460t-p(72)	61850t-p(69)
EURexSUN	193840t-p(75)	226870t-p(73)	201150t-p(69)
NAm	234350t-p(75)	213010t-p(72)	204560t-p(69)
OCEA	10500t-p(75)	8430t-p(72)	8740t-p(69)
SAm	5830t-p(75)	6140t-p(72)	5130t-p(69)
AUS	11530t-p(74)	8430t-p(72)	8740t-p(69)
JPN	57000t-p(78)	59000t-p(76)	51000t-p(75)

UNYS1* -,-(77)

MAMMALIAN METABOLITES

hmn	zinc chloride	AREJM* -,241(74)

MAMMALIAN TOXICITY ARRAY

200mg/kg	6Wk	orl-rat	LVR:bcm	£NSHZN(75)ABBPAP 73,509(63)
250mg/kg	1x	itr-rat	PUL:ifl,str	£NSHZN -,32(75)
500mg/kg	1x	orl-hmn	LDLo	27ZTAP 3,153(69)
630mg/kg	1x	orl-rat	LD50	ITIIT* -,565(75)
-	-	orl-hmn	GIT:ifl	AREJM* -,241(74)
-	OCC	- -hmn	SKN:all	JIDHAN 17,147(35)
60mg/m^3	OCC	ihl-hmn	LVR:bcm GIT:str-sns,siz	£NSHZN(75)WILEAR 26,141(73)
65mg/m^3	5H	ihl-hmn	ANS:fnc	£NSHZN(75)JIDHAN 9,98(27)
100mg/m^3	-	ihl-hmn	PUL:irr,fnc ANS:fnc-sns	£NSHZN(75)AHYGAJ 72,358(10)
110mg/m^3	15M	ihl-rat	ANS:fnc HEM:str	£NSHZN(75)JIDHAN 10,56(28)
747mg/m^3	10.5M	ihl-hmn	ANS:fnc HEM:str SON:bhv	£NSHZN(75)JIDHAN 9,88(27)
1024mg/m^3	9DI	ihl-gpg	PUL:irr HRT:fnc-siz	£NSHZN(75)XPHBAO 157,1(26)
-	OCC	ihl-hmn	PUL:str	£NSHZN -,18(75)

SAMPLING/PREPARATION/ANALYSIS

air-XRD	Det: 1mg/m^3(samp 25 l)	£NSHAM 1,222(77)

RECOMMENDATIONS/LEGAL MECHANISMS

DEU	REC	air:occ - MAK 5mg/m^3	DFSK** -,38(79)	RED Nov(79)
SUN	REG	air:occ - MAC:6mg/m^3 Eff:1 Jan(77)	£ILOOE -,219(77)	RED Nov(79)
USA	REG	air:occ - TWA:5mg(fume)/m^3	FEREAC 39,23540(74)	RED Nov(79)
USA	REC	air:occ - TLV-TWA:5mg/m^3	ACGIH* -,31(79)	RED Nov(79)
USA	REC	air:occ - TLV-STEL:10mg/m^3	ACGIH* -,31(79)	RED Nov(79)

3.20 REFERENCES FOR DATA PROFILES ORDERED BY ABBREVIATION

The majority of the abbreviations in this list are CAS CODENS. When no CODEN was found for a particular reference, pseudocodens were prepared by the IRPTC as described on page 29. CODENS appear without asterisks while pseudocodens can be distinguished by the fact that they include one or more asterisk. When a pounds sign appears with an abbreviation, the document cited has been reviewed by a panel of experts. These abbreviations may be listed as the sole reference when the secondary document is being cited or they may preceed a primary reference indicating that the primary reference was cited in a particular secondary document reviewed by a panel of experts.

AABIAV Annals of Applied Biology
Biochemical Society, P.O. Box 32, Commerce Way, Whitehall Industrial Estate, Colchester, CO2 8HP, England

ABBPAP Acta Biochemica et Biophysica
Academiae Scientarum Hungaricae, Kultura, P.O. Box 149, Budapest 62, Hungary

ACCM1* American Cyanamide Company (1955)
Report on Malathion, American Cyanamide Company, New York, New York, USA

ACCM2* American Cyanamide Company (1967)
Malathion - Successive Generation Studies with Rats - Interim Report No. 67-203, Central Medical Dept., American Cyanamide Company, New York, NY USA

ACCM3* American Cyanamide Company (1968)
Malathion - Successive Generation Studies with Rats - Final Report No. 68-64, Central Medical Dept., American Cyanamide Company, New York, NY USA

ACCOP* American Cyanamide Company
Toxicological Information - Cyanamid Organophosphate Pesticides, ed. 3, American Cyanamide Company, New York, NY USA

ACGIH* American Conference of Government Industrial Hygienists, 1971

ACSSS* ACS Symposium Series
Bioaccumulation of Arsenicals, Chapter 7, in Arsenical Pesticdes, E.A. Woolson, ed., 1975, ACS Symp. Ser. 7

ACLRBL Annals of Clincial Research
The Finnish Medical Society, Duodecim, Runeberginkatu 47A, 0260 Helsinki 26, Finland

ADAGA7 Advances in Agronomy
Academic Press, 111 5th Ave., New York, N.Y. USA 10003

ADLI** Human Safety and Environmental Aspects of Major Surfactants, a report to the Soap and Detergent Association, Arthur D. Little Inc., May 31 1977

ADVEA4 Acta Dermato-Venereologica
Korolinska Sjukhuset, S-10401 Stockholm 60, Sweden

AECTCV Archives of Environmental Contamination and Toxicology
Springer-Verlag, 175 5th Ave., New York, N.Y. USA 10010

AEEXAH Acta Embryologiae Experimentalis
(Supersedes Acta Embryol. Morphol. Exp.), Via Archirafi 18, 90123 Palermo, Italy

AEHA** US Army Environmental Hygiene Agency Report
(Edgewood Arsenal, MD 21010)

AEHLAU Archives of Environmental Health.
(American Medical Associatiamon Press, Headington Hill Hall, Oxford OX3 OEW, England)

AEMBAP Advances in Experimental Medicine and Biology
Plenum Publishing Corporation, 227 W 17th St., New York, NY USA 10003

AEXPBL Archiv fuer Experimentelle Pathologie und Pharmakologie
(Leipzig, Germany)(Springer-Verlag, Heidelberger Pl. 3, D-1 Berlin 33, Germany)

AFDOAQ Association of Food and Drug Officials of the US, Quarterly Bulletin
(Editorial Committee of the Association, P.O. Box 20306, Denver, CO 80220)

AFPSAU Advancing Frontiers of Plant Sciences
Impex India, 2/18 Ansari Rd, Delhi 6, India

AHBAAM Archiv fuer Hygiene und Bakteriologie
(Urban und Schwarzenberg, Pettenkoferst 18, D-8000 Munich 15, Germany)

AHBPAX Acta Hydrobiologica
Ars-Polona - RUCH, P.O. Box 154, Warsaw 1, Poland

AHJOA2 American Heart Journal
(C.V. Mosby, 11830 Westline Industrial Dr., St. Louis, MO 63141)

AHRTAN Archiv za Higijenu Rada i Toksikologiju
(English translation: Archives of Industrial Hygiene and Toxicology, Belgrade)(Zagreb, Yugoslavia)

AHYBA4 Archiv fuer Hydrobiologie
E. Schweizerbart'sche, Verlagsbuchhandlung, Johannestr. 3A, D-7000 Stuttgart 1, Germany

AHYGAJ Archiv fuer Hygiene
(Urban und Schwarzenberg, Pettnekoferst 18, D-8000 Munich 15, Germany)

AIAEA2 Archivio Italiano di Anatomia e di Embriologia
Sansoni Edizioni Scientifiche, Via A. Lamarmora 45, 50121 Florence, Italy

AIHAAP American Industrial Hygiene Association Journal
(The Association, 14125 Prevost, Detroit, MI 48227)

AIHOAX Archives of Industrial Hygiene and Occupational Medicine
(Chicago IL) For publisher information see AEHLAU

AIHQA5 American Industrial Hygiene Association Quarterly
(Baltimore MD) For publisher information see AIHAAP

AIMEAS Annals of Internal Medicine
(American College of Physicians, 4200 Pine St., Philadelphia, PA 19104)

AIMPCT Annales de l'Institut Michel Pacha
Institut Michel Pacha, Laboratoire Maritime de Physiologie, 83 Tamaris-sur-Mer, France

AIOM** Annales de l'Institut Oceanographique Masson
120 Boulevard St-Germain, 75280 Paris, Cedex 06

AIPBAY Archives Internationales de Physiologie et de Biochimie
(Vaillant-Carmanne, SA Editeur. 4 Pl. St. Michel, Liege, Belgium)

AIPHAI Archives Internationales de Physiologie
(Liege, Belgium) For publisher information see AIPBAY

AJBSAM Australian Journal of Biological Sciences
Commonwealth Scientific and Industrial Research Organization, 314 Albert St., P.O. Box 89, E. Melbourne, Victoria, Australia

AJDCAI American Journal of Diseases of Children
(American Medical Association, 535 N. Dearborn St., Chicago, Il. 60610)

AJMDAW American Journal of Mental Deficiency
(Formerly Journal of Psychoasthenics), American Association on Mental Deficiency, 49 Sheridon Ave., Albany, N.Y. 12210

AJMFA4 Australian Journal of Marine and Freshwater Research
For publisher information see AJBSAM

AJMSA9 American Journal of the Medical Sciences
(Charles B. Slack Inc., 6900 Grove Rd., Thorofare, NJ 07086)

AJOGAH American Journal of Obstetrics and Gynecology
(C.V. Mosby, 11830 Westline Industrial Dr., St. Louis, MO 63141)

AJOPAA American Journal of Opthalmology
Opthalmic Publishing Co., 160 E. Grand Ave., Chicago, Ill. 60611

AJPAA4 American Journal of Pathology
(Harper & Row, Medical Dept., 2350 Virginia Ave., Hangerstown, MD 21740)

AJVRAH American Journal of Veterinary Research
(American Veterinary Medical Association, 600 S. Michigan Ave., Chicago, IL 60605)

AKEDAX Archiv fuer Klinische und Experimentelle Dermatologie
Springer-Verlag, Heidelberger Pl. 3, D-1 Berlin 33, Germany

ALLIAM Allionia
Universita di Torino, Istituto ed Orto Botanico, Turin, Italy

ALPDAR Advances in Lipid Research
Academic Press, 111 5th Avenue, New York, NY USA 10003

AMAHA5 Acta Microbiologica Academiae Scientarum Hungaricae
Akademiai Kiado, P.O. Box 24, Budapest 502, Hungary

AMBOCX Ambio
A Journal of the Human Environment, Research and Management.
Universitetsforlaget, Blindern, Oslo 3, Norway or Universitetsforlaget, P.O. Box 142, Boston, Mass. 02113

AMBOS* Ambio Special Report
(For publisher information see Ambio)

AMCPT* Dougherty W. et al. (1973)
The Effect of Carbaryl on Reproduction in Rhesus Monkeys, unpublished report from the Institute of Experimental Pathology and Toxicology, Albany Medical College, USA

AMIHAB Archives of Industrial Health
(Chicago, IL) For publisher information see AEHLAU

AMLIR* Admiralty Materials Laboratory UK Interim Report (1970)
Freegarde M. and Hatchett C.G., The Ultimate Fate of Crude Oil at Sea

AMPMAR Archives des Maladies Professionelles de Medicine du Travail et de Securite Sociale
(Masson et Cie, eds., 120 Blvd St-Germain, P-75280 Paris 06, France)

AMSVAZ Acta Medica Scandinavica
(Almqvist & Wiksell, P.O. Box 159, 26 Gamla Brogatan, S-101 22 Stockholm, Sweden)

ANASAB Anaesthesia
(Blackwell Scientific Publications, Osney Mead, Oxford OX2 OEL, England)

ANCHAM Analytical Chemistry
American Chemical Society Publication, 1155 16th St., Philadelphia, PA 19104)

ANDRO* Andrologia
Grosse Verlag GmbH, Kurfuerstendamm 152, 1000 Berlin 31, W. Germany

ANREAK Anatomical Record
(Wistar Institute Press, 3631 Spruce St., Philadelphia, PA 19104)

ANSUA5 Annals of Surgery
J.B. Lippincott Co., E. Washington Sq., Philadelphia, Pa., USA 19105

ANYAA9 Annals of the New York Academy of Sciences
(The Academy, Exec. Director, 2 E. 63rd St., New York, NY 10021)

AOBIAR Archives of Oral Biology
Pergamon Press Ltd., Headintong Hill Hall, Oxford OX3 OEW, England

AOHVS* Arbete och Haelsa-Vetenskaplig skriftserie Arbetskyddsverket 10026 Stockholm, Sweden

AOLVAE Archivio di Oceanografia e Limnologia
Riva Sette Martiri, Castello 1364/A, Venice, Italy

AONKAP Archiv fuer Klinische und Experimentelle Ohren-Nasen-Kehlkopheilkunde
Berlin

APCRAW Advances in Pest Control Research
New York. (Discontinued)

APIC** American Petroleum Institute Conference
(1801 K St., N.W., Washington DC 20006)

APIM** American Petroleum Industry Monographs
(1801 K St., N.W., Washington DC 20006)

APMBAY Applied Microbiology
American Society for Microbiology, 1913 St., N.W., Washington D.C. USA 20006

APTOA6 Acta Pharmacologica et Toxicologica
(Munksgaard, 35 Norre Sogade, DK 1370 Copenhagen K, Denmark)

APTSAI Acta Pharmacologica et Toxicologica, Supplementum.
(Munksgaard, 35 Norre Sogade, DK 1370 Copenhagen K., Denmark)

ARBME* Arbetarskyddsstyrelsens Meddelands
National Board of Occupational Safety and Health
(Arbetarskyddsstyrelsen) 10026 Stockholm, Sweden

ARCLAS Studii si Cercetari de Biologie (Cluj)
Academia Republicii Populare Romine, Filiala Cluj, (Academy of the People's Republica of Romania, Cluj Branch, Studies and Research in Biology). Discontinued

AREJM* Arena J.M. (1974)
Poisoning - Toxicology, Symptoms, Treatments, 3rd Edition, Charles C. Thomas, Springfield, Illinois

AROPAW Archives of Opthalmology
(American Medical Association, 535 N. Dearborn St., Chicago, IL 60610)

ARPAAQ Archives of Pathology
(American Medical Association, 535 N. Dearborn St., Chicago, Il 60610)

ARSUAX Archives of Surgery
(American Medical Association, 535 N. Dearborn St., Chicago, Il 60610)

ARTODN See ATXKA8

ARZFAN Aerztliche Forschung
Munich (Discontinued)

ARZWA6 Aerztliche Wochenschrift
(Berlin, Germany) For publisher information see INTEAG

ATENBP Atmospheric Environment
Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 OEW, England)

ATICAB Arctic
Arctic Institute of North America, 3458 Redpath St., Montreal 109, Que., Canada

ATXKA8 Archiv fuer Toxicologie or Archives of Toxicology
(Springer-Verlag, Deidelberger Pl. 3, D-1 Berlin 33, Germany)

AVFSAO Archiv fuer Fischereiwissenschaft
H. Heenman KG, Bessermerstrasse 83, 1 Berlin 42, Germany

AWPOAZ Air and Water Pollution
(Formerly Int. J. Air Wat. Pollut.) Superseded by Wat. Res. and Atmos. Envir., which see

AXVMAW Archiv fuer Experimentelle Veterinaermedizin
S. Hirzel Verlag, Postfach 506, 701 Leipzig, E. Germany

BAUHP* Baumert H.P. (1976)
The Effect of Heavy Metal Inhalation on Cell Number and Metabolism of Alveolar Macrophages of the Mammal Lung, Report to CEC, August 1976

BBRCA9 Biochemical and Biophysical Research Communications
Academic Press, 111 5th Avenue, New York, N.Y. USA 10003

BCPCA6 Biochemical Pharmacology
(Pergamon Press, Headington Hill Hall, Oxford OX3 OEW, England)

BEBMAE Byulleten Eksperimental'noi Biologii i Meditsiny.
(Bulletin of Experimental Biology and Medicine). v/o "Mexhdunarodnaya Kniga," Kuznetskii Most 18, Moscow G-200 USSR)

BECTA6 Bulletin of Environmental Contamination and Toxicology.
(Springer-Verlag, 175 5th Ave., New York, NY 10010)

BGBL** Bundesgesetzblatt
Umweltbundesamt, Bismarckplatz 1, D-1000 Berlin 23, Federal Republic of Germany

BIBUBX Biological Bulletin
Marine Biological Laboaratory, Woods Hole, Mass. 02543, or Wheldon & Wesley Ltd., 2-4 Arthur St., New Oxford St., London WC2, England

BIIHAS Bulletin of the National Institute of Industrial Health (Jap) Rodo Eisei Kenkyujo Kenkyu Hokoku, Kawasaki, Japan

BIJOAK Biochemical Journal
(Biochemical Society, P.O. Box 32, Commerce Way, Whitehall Industrial Estate, Colchester, CO2 8HP, England)

BIORC* Bionetics Research Corporation (1969)
Evaluation of the Carcinogenic, Teratogenic and Mutagenic Activity of Selected Pesticides and Industrial Chemicals in Mice and Rats, Contract PH43-64-57 and 43-67-735 to National Cancer Institute, available NTIS PB No. 223-158

BIRAR* Biology Research - Annual Report
Kanford Atomic Products Operations, Richland, Washington D.C.

BIREBV Biology of Reproduction
Society for the Study of Reproduction, Academic Press, 111 5th Avenue, New York, N.Y.

BJCAAI British Journal of Cancer
Lewis H.K. & Co, 136 Gower St., London WC1E 6BS, England

BJDEAZ British Journal of Dermatology
Blackwell Scientific Publications, Osney Mead, Oxford OX2 OEL, England

BJIMAG British Journal of Industrial Medicine.
British Medical Journal, 1172 Commonwealth Ave., Boston, MA 02134

BJPCAL British Journal of Pharmacology and Chemotherapy
McMillan Journals, Brunel Rd., Basingstoke, Hants, England

BJRAAP British Journal of Radiology
British Institute of Radiology, 32 Welbeck St., London

BJSSF* Bulletin of the Japanese Society of Scientific Fisheries
Nippon Suisan Gakkaishi, Nippon Suisan Gakkai, c/o Tokyo Suisan Daigaku, 4-5-7 Konan Minato-ku, Tokyo, Japan

BLLIAX Bratislavske Lekarske Listy.
(PNS-Ustredna Expedicia Tlace, Gottwaldovo namestie 48/V11. Bratislave, Czechoslavia)

BLOOAW Blood
American Society of Hematology, Grune and Stratton Inc., 111 5th Ave., New York, N.Y. 10003

BMDBL* Bulletin of the Mount Desert Island Biological Laboratory
Salsbury Cove, Maine 04672 USA

BMJOAE British Medical Journal.
(British Medical Journal, 1172 Commonwealth St., Boston, MA 02134)

BNSKAK Bunseki Kagaku
Nippon Bunseki Kagakkai, c/o Tokyo Kogyo Shikensho, 1-1-15, Hon-machi, Shibuya-ku, Tokyo, Japan

BOGAA5 Botanical Gazette
University of Chicago Press, 5801 S. Ellis Ave., Chicago Ill. USA 60637

BOUQJ* Bouquiaux J. (1973)
Mercury and Cadmium in the Environment, first results of an enquiry on a European Colloquium: Problems of the Contamination of Man and his Environment by Mercury and Cadmium, Luxembourg, July 1973

BPBFA4 Biochemie und Physiologie der Pflanzen
VEB Gustav Fischer Verlag, Postfach 53, Wollgrasweg 49, 7000 Stuttgart-Hohenheim, Germany

BSIBAC Bollettino della Societa Italiano di Biologia Sperimentale
Casa Editrice Libraria V. Idelson, Via Alcide de Gasperi 55, 80133 Naples, Italy

BUEL** Brussels University Environmental Laboratory
Study of Possible Environmental Influence of PDMS (in an aqueous emulsion) used as Antifoam for Sewage Treatment Plants, by Prof. Wollast

BWHOA6 Bulletin of the World Health Organization.
(The Organization, 1211 Geneva 27, Switzerland)

CABUK* Swaine D.J. (1955)
The Trace Element Content of Soils, Commonwealth Agricultural Bureau, England, p.29

CAFGAX California Fish and Game
Office of Procurement, Document Section, P.O. Box 20191, Sacramento, California 95820

CAR3L* Lehr R.E. (1978)
The Bay Region Theory of Polycyclic Aromatic Hydrocarbon-induced Carcinogenicity, in: Carcinogenesis Vol. 3, Polynuclear Aromatic Hydrocarbons, Raven Press, New York, N.Y.

CAR3S* Slaga T.J. et al. (1978)
Tumour Initiating and Promoting Activities of Various Benzo(a)Pyrene Metabolites in Mouse Skin, in: Carcinogenesis Vol. 3, Polynuclear Aromatic Hydrocarbons, Raven Press, New York, New York

CASSI6 Chemical Abstracts Service Source Index
1907-1974 Cumulative, American Chemical Society Chemical Abstracts Service, 1975, Ohio State University, Columbus, Ohio

CATRBZ Calcified Tissue Research
Springer-Verlag, Neuenheimer Landst 28-30, D-6900 Heidelberger 1, Germany

CBPBB8 Comparative Biochemistry and Physiology Part B
Pergamon Press, Headington Hill Hall, Oxford OX3 OEW, England

CBSST* Commonwealth Bureau of Soil Science and Technology, Technical Communication, England

CCCDE* CRC (1976)
Cadmium in the Environment, 2nd Edition, Chemical Rubber Co., Cleveland, Ohio

CCECAU Critical Reviews in Environmental Control.
Chemical Rubber Co., 18901 Cranwood Pky., Cleveland, Ohio, USA 44128

CCEHG* Kolbye A.C. Jr. (1970)
Testimony Presented at the Hearings before the Subcommittee on Energy, Natural Resources and the Environment, of the Committee on Commerce on the Effects of Mercury on Man and the Environment, p.30-40, part 1, Serial 91-72, 91st Congress, 2nd Session

CCHEC* CRC (1973)
Handbook of Environmental Control, Vol. III, Water Supply and Treatment, Bond R.G., Straub C.P. and Prober eds., Chemical Ruber Co. Press, Cleveland, Ohio

CCIAS* CCI (1978)
Toxic Substances Control Sourcebook, McRae A. and Whelchel L., eds., Centre for Compliance Information, Aspen Systems Corporation, USA

CCPCB* Hutzinger O. et al. (1974)
The Chemistry of PCBs, Chemical Rubber Co., Cleveland, Ohio

CCWAR* Southern California Coastal Water Research Project
Annual Report, S. California Coastal Research Programme, El Segundo, California

CDPCB* Nisbet I.C.T. (1976)
Criteria Document for PCBs, Rpeort No. EPA 440/9-76-021, US Environmental Protection Agency, Office of Water Planning Standards, Washington D.C.

CECAR* CEC Annual Report
Commission of the European Communities, Joint Research Centre, Italy

CECCD* CEC (1977)
Evaluation of the Impact of Cadmium on the Health of Man, A Preparatory Study for Establishing Criteria for Cadmium, Commission of the European Communities, Directorate General for Employment and Social Affairs, Health and Safety Directorate, Luxembourg

CECDS* CEC (1976)
Noxious Effects of Dangerous Substances in the Aquatic Environment, Final Report, Commission of the European Communities, September 1976, Copenhagen

CECME* CEC-EOA (1977)
Metallic Effluents of Industrial Origin in the Marine Environment, The Commission of the European Communities/European Oceanic Association

CENEAR Chemical and Engineering News.
American Chemical Society, 1155 16th st., N.W., Washington, DC 20036

CERBO* Journees d'etudes sur les Pollutions Marines
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice, France

CFREAK Commercial Fisheries Review
US Government Printing Office, Supt. of Doc., Washington D.C. USA 20402

CFWSW* Circular of the Wildlife and Fisheries Service
Washington D.C.

CHINAG Chemistry and Industry
Society of Chemical Industry, 14 Belgrave Sq., London SW1X 8PS, England

CHREAY Chemical Reviews
American Chemical Society, 1155 16th St., N.W., Washington D.C. 20036

CHWKA9 Chemical Week.
(Formerly Chem. Ind. Week), McGraw-Hill Publications, 330 W 42nd St., New York, NY USA 10036

CIEMM* Marchand M. (1977)
Methyl-Mercure dans les Moules de la Cote Nord-Ouest Mediterraneene: Observations Preliminaires, Journees d'Etudes sur la Pollution Marine, Protection du Littoral Mediterraneen, Commission International pour l'Exploration scientifique de la Mer Mediterranee, Monaco, p.89-92

CISUAQ Circulation Supplement
American Heart Association, Publishing Director, 44 E 23rd St., New York, N.Y. 10010

CJBOAW Canadian Journal of Botany
National Research Council of Canada, Ottawa, K1A OR6, Ont., Canada

CJCMAV Canadian Journal of Comparative Medicine.
360 Bronson Ave., Ottawa, K1R 6J3, Ontario, Canada

CJMIAZ Canadian Journal of Microbiology
National Research Council of Canada, Ottawa, K1A OR6, Ont., Canada

CJZOAG Canadian Journal of Zoology.
(Formerly Can. J. Res., Sect. D.) National Research Council of Canada, Ottawa, K1A OR6, Ontario, Canada

CLTNO* Adema D.M.M. (1976)
Acute Toxiciteitstoetsen mit 1,2-Dichloroethaan, Fenol, Acrylonitril en Alkylbenzeen Sulfonaat in Zeewater, Centraal Laboratorium TNO, Delft (Report No. ND-Nand D 76/1)

CMAJAX Canadian Medical Association Journal.
CMA House, Box 8650 Ottawa, K1G 0G8, Ontario, Canada

CMSCAY Contributions in Marine Science
University of Texas Marine Science Institute, Port Aransas, Texas 78373

CNJGA8 Canadian Journal of Genetics Cytology
Tr. Dr. H. Baenziger, Forage Section, Ottawa Research Station, Central Experimental Farm, Ottawa, K1A 0C6, Canada

CNREA8 Cancer Research.
Williams & Wilkins, 428 E. Preston St., Baltimore, MD 21202

CONCA* CONCAWE (1979)
The Oil Companies' International Study Group for Conservation of Clean Air and Water - Europe Report Nr. 1/79 "Published Regulatory Guidelines of Environmental Concern to the Oil Industry in Western Europe," Den Haag, Netherlands

CONDE* Contact Dermatitis
Copenhagen, Denmark

COREAF Comptes Rendues Hebdomadaires des Seances
Academie des Sciences, Paris, France

CPEDAM Clinical Pediatrics
Lippincott J.B., E. Washington Sq., Philadelphia, PA 19105

CPLSAY Canadian Journal of Plant Science
Agricultural Institute of Canada, 151 Sister St., Suite 907, Ottawa, Ont., K1P 5H4

CPSCAL Chesapeake Science
Natural Resources Institute, University of Maryland, Chesapeake Biological Laboratory, Solomons, Md 20742

CRAFG* Poole R.L. and Willis M. (1970)
Effects of Some Pesticides on Larvae of the Market Crab, Cancer magister and the Red Crab, Cancer Productus, and a Bioassay of industrial wastes with Crab Larvae, State of California Resources Agency, Dept. of Fish and Game, Marine Resources Laboratory, Menlo Park

CTOXAO Clinical Toxicology.
(Dekkar, Marcel, 305 E. 45th St., New York, NY 10017)

CUSCAM Current Science.
(Current Science Association, Mgr. Raman Research Institute, Bangalore 6, India)

DBEUM* Dermatosen in Beruf und Umwelt
Aulendorf, Germany

DERAAC *Dermatologica*
S. Karger AG, Arnold Boecklin St.25, CH-4000 Basel 11, Switzerland

DESRAY Deep Sea Research
Changed to Deep-Sea Res. Oceanogr. Abstr., Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 OEW, England

DFFKAN Deutsche Forschungsgemeinschaft, Farbstoff-Kommission, Mitteilungen
Franz Steiner Verlag GmbH, Bahnhofstr. 39, 6200 Wiesbaden, Federal Republic of Germany

DFSK** *Deutsche Forschungsgemeinschaft*
Senats-Kommission zur Prufung Gesundheitsschadlicher Arbeitsstoffe, Mitteilung XV, "Maximale Arbeitsplatzkonzentrationen 1979", Bonn, Federal Republic of Germany

DHEWC* Sullivan R.J. (1969)
Preliminary Air Pollution Survey of Chromium and its Compounds, US Dept. of Health, Education and Wlfare, Raleigh, N.C. p.75

DLLBL* Moyer B.R. and Budinger (1974)
Cadmium Levels in the Shoreline Sediments of San Francisco Bay, Donner Laboratory and Lawrence Berkeley Laboratory, Berkeley, California

DMWOAX Deutsche Medizinische Wochenschrift.
(Georg Thieme Verlag, Postfach 732, Herdweg 63, 7000 Stuttgart, Germany)

DOLPM* Dolinger P.M. and Fitch W.L.
Carbaryl, Monograph No. 1, Environmental Health Evaluations of California Restricted Insecticides, Peter M. Dolinger Associates, Chemical Regulatory Consultants, Menlo Park, California 94025

DOWA1* Humiston C.G. et al. (1975)
A 90-Day Oral Toxicity Study incorporating Acrylonitrile in the Drinking Water of Rats, prepared for the Manufacturing Chemists Association by Toxicology Research Laboratory, Dow Chemicals USA, Midland, Michigan

DOWA2* Murray et al. (1976)
Teratologic Evaluation of Acrylonitrile Monomer given to Rats by Gavage, prepared for the Manufacturing Chemists Association by Toxicology Research Laboratory, Dow Chemical USA, Midland, Michigan

DOWA3* Quast J.F. et al. (1975)
A Six Month Oral Toxicity Study Incorporating Acrylonitrile in the Drinking Water of Purebred Beagle Dogs, prepared for the Manufacturing Chemists Association by Toxicology Research Laboratory, Dow Chemicals USA, Midland, Michigan

DOWA4* Quast J.F. et al. (1977)
Toxicity of Drinking Water Containing Acrylonitrile (AN) in Rats: Results after 12 Months, prepared for the Manufacturing Chemists Association by Toxicology Research Laboratory, Dow Chemicals USA, Midland, Michigan

DOWA5* Young J.D. et al. (1977)
The Thermacokinetic and Metabolic Profile of ^{14}C-Acrylonitrile Given to Rats by Three Routes, prepared for the Manufacturing Chemists Association, by Toxicology Research Laboratory, Dow Chemicals USA, Midland, Michigan

DOWSF* Dow Corning Bulletin 22-069b-01 (1974)
Information about Silicone Fluids

DWRCP* Tucker R.K. and Crabtree D.G. (1970)
Handbook of Toxicity of Pesticides to Wildlife, Bureau of Sport Fisheries and Wildlife, Denver Wildlife Research Centre, Resource Publication No. 84, June 1970

EAJLR* EAJ (1976)
Environmental Laws and Regualtions in Japan
Envrionment Agency, Japan

ECAPD* Environment Canada (1974)
National Inventory of Sources and Emissions of Asbestos, Beryllium, Lead and Mercury, Summary of emmissions for 1970, Air Pollution Control Directorate, Rep. 3-AP-74-1, p.19

ECIWD* Leah T.D. (1976)
Environmental Contaminants Inventory Study No. 3, the Production, Use and Distribution of Lead in Canada, Envrionment Canada, Inland Waters Directorate, Burlington, Ontario, Rep. Ser. No. 41, p.94

ECMSC6 Estuarine and Coastal Marine Science
Academic Press Inc. Ltd, 24-28 Oval Rd., London NW1 7DX, England

ECNEAZ Electroencycphalography and Clinical Neurophysiology
Elsevier Publishing Co., P.O. Box 211, Amsterdam C,
Netherlands

ECOLB* Ecological Bulletin
Swedish Natural Science Research Council, Sveavaegen
166 VIII, S-11346, Stockholm, Sweden

ELKEM* Elkin E.M. and Margrave J.L. (1968)
Selenium, in: Kirk R.E., Othmer D.F. eds., Encyclopedia
of Chemical Technolog y, 2nd ed., Vol. 17, John Wiley
and Sons, New York, N.Y.

ENCON* Environmental Conservation
Elsevier Sequoia S.A., Box 851, CH-1001 Lausanne 1, Switzerland

ENDKAC Endokrinologie.
Johann Ambrosius Barth Verlag, Postfach 109, Salomonst
18b, 701 Leipzig, E. Germany

ENPBBC Environmental Physiology and Biochemistry
Munksgaard, 35 Norre Sogade. DK 1370, Copenhagen K,
Denmark

ENVPAF Environmental Pollution.
Applied Science Publishing Ltd., 22 Rippleside Commer
Estate, Barking, Essex, England

ENVRAL Environmental Research.
(Academic Press, 111 5th Ave., New York, NY 10003)

EPAAC* EPA (1973)
Air Quality Data for Metals 1968 and 1969, Research
Triangle Park, N.C. p.5-9,5-13

EPACD* EPA/ORNL (1978)
Reviews of the Environmental Effects of Pollutants: IV Cadmium,
Health Effects Research Laboratory, Office of Research
and Development, U.S. Environmental Protection Agency,
Cincinnati, Ohio 45268

EPACR* EPA/ORNL (1978)
Reviews of the Environmental Effects of Pollutants: III
Chromium, Health Effects Research Laboratory, Office
of Research and Development, U.S. Environmental Protection
Agency, Cincinnati, Ohio 45268

EPACV* Davies P.H. and Everhart W.H. (1973)
Effects of Chemical Variations in Aquatic Environments,
III Lead Toxicity to Rainbow Trout and Testing Application
Factor Concept, EPA-R3-73-011c, p.81

EPADR* EPA (1975)
National Interim Primary Drinking Water Regulations, US Environmental Protection Agency, Office of Water Supply

EPANG* Patrick R., Boot T. and Larson R. (1975)
The Role of Trace Elements in Management of Nuisance Growths, EPA 660/2-75-008, US Environmental Protection Agency, Cornvallis, Ore.

EPAPD* EPA (1975)
Handbook for Pesticide Disposal by Common Chemical Methods, Environmental Protection Agency, Washington D.C.

EPAPP* von Rumker et al. (1974)
Production, Distribution, Use and Environmental Impact Potential of Selected Pesticides, EPA 540/1-74-001, Office of Pesticide Programs, Environmental Protection Agency, Washington D.C.

EPASP* Liu D.H.W. and Lee J.H. (1975)
Toxicity of Selcted Pesticides in the Bay Museel, Mytilus Edilus, US Environmental Protection Agency, Office of Research and Development, Cornvallis, Ore., EPA 660/3-75-016

EPASS* Page A.L. (1974)
Fate and Effects of Trace Elements in Sewage Sludge when applied to Agricultural Lands, EPA-670/2-74-005, US Environmental Protection Agency, Cincinnati, Ohio, p.96

EPAWA* EPA (1974)
The Worlds Air Qaulity Management Standards Vol 1, The Air Quality Management Standards of the World, including United States Federal Standards, EPA-650/9-75-001-a, US Environmental Protection Agency

EPAWO* Weinstein N.J. (1974)
Waste Oil Recycling and Disposal EPA-670/2-74-052

EPAWP* Lawless E. et al (1972)
The Pollution Potential in Pesticide Manufacturing, Pesticide Study Series 5, Office of Water Programs, Environmental Protection Agency, Washington D.C

EPAWQ* EPA (1973)
Water Quality Criteria 1972, National Academy of Sciences and National Academy of Engineering, US Environmental Protection Agency, Washington DC

EPERS* Walker W.W. (1980)
Insecticide Persistence in Natural Seawater as Affected by Salinity, Temperature and Sterility, US Environmental Protection AGency, Office of Research and Development, Gulf Breeze, Florida

EPRDB* Bourquin A.W. (1975)
Microbial Malathion Interaction in Artificial Salt-Marsh Ecosystems, US Environmental Protection Agency, Office of Research and Development, Cornvallis, Oregan, EPA 660/3175-035

EPRDC* Caldwell R.S. (1977)
Biological Effects of Pesticides on the Dungeness Crab, Gulf Breeze, Florida, US Environmental Protection Agency, Office of Research and Development

EQSFAP Environmental Quality and Safety.
(Academic Press, 111 5th Ave., New York, NY 10003)

ERCOB* Ecological Research Committee Bulletin
Swedish Natural Science Research Council, Sveavagen 166 VIII, S-11346 Stockholm, Sweden

ERNFA7 Ernaehrungsforschung
Wissenschaft und Praxis, Akademie-Verlag GmbH, Leipziger St. 3-4, 108 Berlin, E. Germany

ESKGA2 Journal of Hygienic Chemistry
Eisei Kagaku, Nippon Yagugakkai, 1-1 Hongo 4 chome, Bunkyo-ku, Tokyo, Japan

ESTHAG Environmental Science and Technology.
American Chemical Society Publications, 1155 Sixteenth St., NW Washington, D.C. USA 20036

EVHPAZ Environmental Health Perspectives, DHEW Publication No. (NIH) 74-218, U.S. Department of Health, Education and Welfare, Public Health Service, National Institute of Health

EXMPA6 Experimental and Molecular Pathology.
Academic Press, 111 5th Ave., New York, NY 10003

EXPEAM Experientia.
Birkhaeuser Verlag, P.O. Box 34, Elisabethenst 19, CH-4010, Basel, Switzerland

EXPTAX Experimentelle Pathologie
VEB Gustav Fischer Verlag, Postfach 176, Villengang 2, 69 Jena, E. Germany

FAOPY* FAO (1978)
1977 FAO Production Yearbook, Vol. 31, Food and Agriculture Organization of the UN, Rome, Italy

FATOAO Farmakologiia i Toksikologiia.
v/o "Mezhdunarodnaya Kniga," Kuznetskii Most 18, Moscow G-200, U.S.S.R.

FBCCAC Fisheries Research Board of Canada, General Series Circular, Ottawa, Ontario, Canada

FCTXAV Food and Cosmetics Toxicology.
Pergamon Press, Headington Hill Hall, Oxford OX3 OEW, England

FDABF* FDA (1977)
Compliance Program Evaluation: FY1974, Total Diet Studies (7320.08), Food and Drug Administration, Bureau of Foods, Washington D.C.

FDRL** Food and Drug Research Laboratories (1967)
Studies of the Effects of Dow Corning 360 Medical Grade Fluid (MDX-4-4011) on Reproduction in Rats and Rabbits, unpublished, courtesy of Dow Corning Corporation

FEPRA7 Federation Proceedings, Federation of American Societies for Experimental Biology.
9659 Rockville Pike, Bethesda, MD 20014

FEREAC Federal Register.
U.S. Government Printing Office, Sup. of Doc., Washington DC 20402

FESTAS Fertility and Sterility
American Fertility Society, 1608 13th Ave., S. Birmingham, AL 35205

FHCYAI Folia Histochimica et Cytochemica
Ars-Polona - RUCH, P.O. Box 154, Warsaw 1, Poland

FIRL** FIRL (1976)
Villaume W. et al
Scwartz H., Petroleum Distillates, a Monograph prepared for Consumer Product Safety Commission, Bureau of Biomedical Science, Bethesda, Naryland, by the Franklin Institute Research Laboratories, Philadelphia, Pennsylvania

FISUM* Fisch und Umwelt
Gustav Fischer Verlag, Stuttgart, Germany

FKIZA4 Fukuoka Igaku Zasshi.
(Fukuoka Medical Journal). Formerly Fukuoka Ika Daigaku Zasshi, Fukuoka Igakkai, c/o Kyushu Daigaku Igakubu, Tatekasu Fukuoka-shi, Fukuoka, Japan

FLUOA4 Fluoride
International Society for Fluoride Research Inc., P.O. Box 692, Warren, Mich. 48090

FNSCA6 Forensic Science
Elsevier Sequola SA, P.O. Box 851, CH-1001 Lausanne 1, Switzerland

FOADT* Food Additive Tables (1975)
Bigwood E.J. et al. eds., Elsevier Scientific Publishing Co., Amsterdam/Oxford/New York

FOMDAK Folia Medica
Via Raffaele de Caesare 31, Naples, Italy

FOREAE Food Research
(Champaign, IL) Institute of Food Technologists, Subscrip. Dept., Suite 2120, 221 N. La Salle St., Chicago, IL 6061)

FRAZA* Frazer A. (1970)
Studies on Silicone Antifoam Compound MS Antifoam M: IV, 80 Week Feeding Study on Mice, unpublished, courtesy of Dow Corning International

FRYEC* Frye C. (1978)
Transcription of Presentation given in August 1978 in Karlsruhe on Experimental Chemistry of PDMs

FSASAX Fette, Seifen, Anstrichmittel
Industrieverlag von Hernhaussen KG, Roedingsmarkt 24, 2 Hamburg 11, Germany

FSYBAY Fishery Bulletin
Government Printing Office, US Marine Fisheries Service, Fishery Bulletin, Washington D.C

FZRSAV Plant Physiology
(Fiziologiya Rastenii) v/o "Mehzdunarodnaya Kniga", Kuznetskii Most 18, Moscow, G-200 USSR

GARRM* Garrels R.M. et al. (75)
Chemical Cycles and the Global Environment, William Kaufmann Inc., Los Altos, Calif., p.206

GBERL* Bookhout C.G., Costlow J.D.Jr. (1974)
Effects of Mirex, Methoxychlor and Malathion on Development of Crabs, EPA-600/3-76-007, US Environmental Protection Agency, Office of Research and Development, Gulf Breeze Environmental Research Laboratory, Oak Ridge, Tenn.

GCACAK Geochimica et Cosmochimica Acta
Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 OEW, England

GCACI* GCA Corporation (1973)
National Emissions Inventory of Sources and Emissions of Chromium, EPA-450/3-74-012, US EPA Research Triangle PARK, NC, p.33

GEMIAA Geologie en Mijnbouw
Geology and Mining, NV Princo, Postbus 9, Culembourg 21, Netherlands

GFCMR* GFCM (1978)
Report No. 3, (Circ. Gen. Fish. Coun. Mediterr. No. 7). General Fisheries Council for the Mediterranean, Joint FAO (GFCM) UNEP coordinated project on pollution in the Mediterranean, Rome, Italy

GISAAA Gigiena i Sanitariya.
(English Translation is HYSAAV). (v/o "Mezhdunarodnaya Kniga," Kuznetskii Most 18, Moscow G-200, U.S.S.R.)

GSCME* Geological Survey of Canada (1971)
Mercury in the Natural Environment, A Review of Recent Work

GTPZAB Gigiena Truda i Professional'nye Zabolevaniia.
(v/o "Mezhdunarodnaya Kniga," Kuznetskii Most 18, Moscow G-200, U.S.S.R.)

GZMSAH Godisen Zbornik na Medicinskiot Fakultet vo Skopje.
(Yearbook of the Medical Faculty of Skopje)
Medicinski Fakultet, Univerzitet na Socijalisticka Republika Makedonija, Skopje, Yugoslavia

HARJR* Harr J.R. et al. (1967)
Selenium Toxicity in Ratss II, Histopathology, in: Muth O.H. ed., Selenium in Bio-Medicine, Ari Publishing Co., Westport, Conneticut

HAUTAW Hautarzt
Zeitschrift fuer Dermatologie, Venerologie und Verwandte Gebiete. Springer-Verlag, Heidelberger Pl. 3, D-1 Berlin 33, Bermany

HBRAR* Olson P.A. (1958)
Comparative Toxicity of G(VI) and Cr(III) in Salmon, Hanford Biological Research Annual Report for 1957, HW-53500, Richland, Washington, p215-218

HDWPH* Zoetman B.C.J. and Brinkmann F.J.J. (1975)
In "Hardness of Drinking Water and Public Health", European Colloquium, Luxembourg 21-23 May 1975.

HEADF* Heath D.F. (1961)
Organophosphorus Poisons, Pergamon Press Ltd., Headington Hill Hall, Oxford, OX3 OEW, England

HELOAY Helgolaender Wissenschaftliche Meeresuntersuchungen
Biologische Anstalt Helgoland, Palmaille 9, 2 Hamburg 50, Germany

HEREAY Hereditas
Toernqvist, J.L., Book Dealers, S-26122 Landskrona, Sweden

HMAE** Doi R. and Ui J. (1975)
The Distribution of Mercury in Fish and its Forms of Occurence in Heavy Metal in the Aquatic Environment, Krenkel P.A. ed., Pergamon Press, Oxford, England, p.197

HMSOF* HMSO (1949)
Industrial Fluorosis, a report to the Fluorosis Committee, His Majesty's Stationery Office UK

HMSOL* HMSO (1974)
Lead in the Environment and its Significance to Man, a report of an inter-departmental working group on heavy metals pollution, paper no. 2, p.47

HUMAA7 Humangenetik.
(Springer Verlag, Neuenheimer Landst 28-30, D-6900 Heidelberger 1, Germany)

HYDRB8 Hydrobiologia
Dr. W. Junk NV, 13 van Stolkweg, The Hague, Netherlands

IAANBS Internationales Archiv fuer Arbeitsmedizin.
(Springer-Verlag, Heidelberger Pl. 3, D-1 Berlin 33, Germany)

IAEAF* IAEA (1974)
Comparative Studies of Food and Environmental Contamination, International Atomic Energy Agency, Vienna, Austria

IAEAR* IAEA
Activities of the International Laboratory of Marine Radioactivity, International Atomic Energy Agency, Monaco

IAEHDW International Archives of Occupational and Environmental Health
Internationales Archiv fuer Arbeits- und Umwelt Medizin
Springer Verlag, Heidelberger Pl. 3, D-1, Berlin 33, Germany

IAPWAR International Journal of Air and Water Pollution.
(Formerly Int. J. Air Pollut.), Pergamon Press, Headington Hill Hall, Oxford OX3 OEW, England

IARCC* Maltoni C. (1976)
Occupational Chemical Carcinogenesis: New Facts, Priorities and Perspectives, International Agency for Research on Cancer, Lyon, France

ICEAS* Rossman T.G. et al. (1976)
Effects of Arsenite on DNA Repair in Escherichia coli, International Conference on Environmental Arsenic, Fort Lauderdale, Florida

ICESC* ICES Cooperative Research Report
International Council for the Exploration of the Sea, Charottenlund, Denmark

ICESR* ICES C.M. Pap. Rep.
International Council for the Exploration of the Sea, Charlottenland, Denmark

IEPAA* Illinois Environmental Protection Agency
File on Acrylonitrile Spill of 12/23/74 near Mapleton, Ill.

IFRDR* Institute of Freshwater Research Drothninghohn, Report

IGKEAO Igaku Kenkyu.
(Medical Research), Daido-Gakkan shuppan-bu, c/o Kyushu Daigaku Igakubu, Hoigaku Kyoshitsu, Fukuoka, Japan

IGMPAX Igiena Moderna
(Modern Hygiene) Amministrazione dell'Igiene Moderna, Tipografia "La Commerciale", Piazza Pontida II, Fidenza, Parma, Italy

IIEQ** Illinois Institute for Environmental Quality
Determination of Maximum Permissible Levels of Selected Chemicals that exert Toxic Effects on Plants of Economic Importance in Illinois, IIEQ, Chicago

IJCPB5 International Journal of Clinical Pharmacology, Therapy and Toxicology
Urban and Schwartzenberg, Pettenkoferst 18, D-8000 Munich 15, Germany

IJEAA3 International Journal of Environmental Analytical Chemistry
Gordon & Breach Science Publishers Inc., 440 Park Ave. S., New York, N.Y. USA 10016

IJEBA6 Indian Journal of Experimental Biology
Hillside Rd., New Delhi 110012, India

IJMDAI Israel Journal of Medical Sciences.
(Formed by merger of Isr. J. Exp. Med. & Isr. Med. J.), Intercontinental Medical Books Corporation, 581 Park Ave S, New York, USA 10016

INHEAO Industrial Health.
(2051 Kizukisumiyoshi-cho, Nakahara-ku, Kawasakai, Japan)

INMEAF Industrial Medicine.
(Chicago, IL) For publisher information see IOHSAS

INWWAH Industrial Water Wastes
Chicago

IPAI** IPAI (1976)
Survey of Legislation, Fluoride and othe Emissions, Environmental Committee of the INternational Primary Aluminium Institute, New Zealand House, London, England

ITIIT* ITII (1975)
Toxic and Hazardous Industrial Chemicals Safety Manual for Handling Disposal with Toxic and Hazardous Data, The International Technical Information Institute, Tokyo, Japan

JAFCAU Journal of Agricultural and Food Chemistry.
(American Chemical Society Publications, 1155 16th St., N.W., Washington, DC 20036)

JAHBE* Jahresbericht
Bd. 8, Gesellschaft zur Forderung der Lufthygiene und Silkoseforschung e V., Dusseldorf, Verlag W. Gerodet, Essen, Germany

JAMAAP Journal of the American Medical Association.
(American Medical Assoc., 535 N. Dearborn St., Chicago IL 60610)

JANCA2 Journal of the Association of Official Analytical Chemists
Association of Official Analytical Chemists, Box 540, Benjamin Franklin Sta., Whasington D.C. 20044

JANSAG Journal of Animal Science.
(Bus Mgr. American Society of Animal Science, 425 Illinois Bldg, 113 N. Neil St., Champaign, IL 61820)

JAOCA7 Journal of the American Oil Chemists Society
American Oil Chemists Society, 508 South 6th St., Champaign, Ill. 61820

JAPEAI Journal of Applied Ecology
Blackwell Scientific Publications Ltd., Osney Mead, Oxford, OX2 OEL, England

JAWWA5 Journal of the American Water Works Association
American Water Works Association, 2 Park Ave., New York, N.Y. 10016

JBCHA3 Journal of Biological Chemistry
American Society of Biological Chemists Inc., 428 E Preston St., Baltimore, MD 21202

JDREAF Journal of Dental Research.
(American Dental Association, Sub. Dep., 211 E. Chicago Ave., Chicago IL 60611)

JEENAI Journal of Economic Entomology
(Entomological Society of America, 4603 Calvert Rd., College Park, MD 21201)

JEMBAM Journal of Experimental Marine Biology and Ecology
North-Holland Publishing Co., P.O. Box 3489, 305-311 Keizersgracht, Amsterdam C, Netherlands

JENPT* Journal of Environmental Pathology and Toxicology
American College of Toxicology, Pathotox Publishers Inc., 2405 Bond St., Park Forest South, Ill. 60466

JEVQAA Journal of Environmental Quality.
American Society of Agronomy, 677 S. Segoe Rd., Madison, Wis 53711

JFIBA9 Journal of Fish Biology
Academic Press Inc. Ltd., 24-28 Oval Rd., London NW1 7DX, England

JFMAAQ Journal of the Florida Medical Association
PO Box 2411, 735 Riverside Ave, Jacksonville, Florida 32203

JFMCAW Journal Francais de Medecine et chirurgie thoraciques
Paris, France (Discontinued)

JFOAA2 Journal of the Science of Food and Agriculture
Society of Chemical Industry, 14 Belgrave Aq., London
SW1X 8PS, England

JFRBAK Journal of the Fisheries Research Board of Canada
Information Canada, 171 Slater St., Ottawa, K1A 059,
Ont., Canada

JHEMA2 Journal of Hygiene, Epidemology, Microbiology and
Immunology.
(Avicenum, Zradvotnicke Nakladatelstvi, Malostranske namesti
28, Prague 1, Czechoslovakia)

JIDEAE Journal of Investigative Dermatology
Williams and Wilkins Co., 428 E Preston St., Baltimore,
MD, USA 21202

JIDHAN Journal of Industrial Hygiene
Baltimore MD/New York (For publisher information see
AEHLAU

JIHTAB Journal of Industrial Hygiene and Toxicology.
(Baltimore MD/New York) For publisher information see
AEHLAU)

JMBAAK Journal of the Marine Biological Association of the
United Kingdom
Cambridge University Press, P.O.Box 92, Bentley House,
200 Euston Rd., London NW1 2DB, England

JMMRAO Journal of Marine Research
Sears Foundation for Marine Research, Bingham Ocenaographic
Laboratory, Yale University, New Haven, 520 Conn. 06520

JMSSAN Journal of the Mississippi Academy of Scinces
Secy-Tr, Mississippi Academy of Sciences, Drawer CQ,
State College, Miss. 39762

JNCIAM Journal of the National Cancer Institute.
(U.S. Government Printing Office, Supt. of Doc., Washington
DC 20402)

JNENAD Journal of Neuropathology and Experimental Neurology.
Mrs Joseph H. Globus, Executive Ed., 630 W 168th St.,
New York, NY 10032

JOBAAY Journal of Bacteriology
American Society for Microbiology, 1913 1st St., N.W.
Washington DC 20006

JOCDAE Journal of Chronic Diseases
Pergamon Press Inc., Maxwell House, Fairview Park, Elmsford, N.Y. 10523

JOCMA7 Journal of Occupational Medicine.
(Industrial Medical Association, 150 N. Wacker Dr., Chicago, IL 60606)

JONUAI Journal of Nutrition.
(Wistar Institute Press, 3631 Spruce St., Philadelphia, PA 19104)

JOSJP* Journal of the Oceanographic Society of Japan
c/o Ocean Research Institute, University of Tokyo, Minamidai, 1-15-1, Nakano-ku, Tokyo 164, Japan

JOSK** Journal of the Oceanolographic Society of Korea
Dept. of Ocenaography, College of Natural Sciences, Seoul, National University, Seoul, 151, Korea

JOTRA5 Journal of Trauma.
Williams and Wilkins Co., 428 E Preston St., Baltimore
Md, USA 21202

JPCAAC Journal of the Air Pollution Control Association
Air Pollution Control Association, 4400 5th Ave., Pittsburghm
Pa. 15213

JPETAB Journal of Pharmacology & Experimental Therapeutics.
(Williams & Wilkins Co., 428 E. Preston St., Baltimore, MD 21202)

JPNEA* Takeuchi T. and Eto K (1975)
Minamata Disease; Chronic Occurrence from Pathological Viewpoints p.28-62, Studies on Health Effects of Alkylmercury in Japan, Japan Environment Agency

JPROAR Journal of Protozoology
Allen Press, 1041 New Hampshire St., Lawrence, Kans., USA 66044

JPTLAS Journal of Pathology
Longman Group Ltd., Journals Division, 43-45 Annandale St., Edinburgh EH7 4AT, Scotland

JRACBN Journal of Radioanalytical Chemistry
Elsvier Sequoia SA, P.O. Box 851, CH-1001 Lausanne 1, Switzerland

JRAGAY Journal of the Royal Agricultural Society of England
John Murray (Publishers) Ltd., Abermarle St., London, England

JRAMAI Journal of the Royal Army Medical Corps
Royal Army Medical College, Millbank, London SW1, England

JRMGAQ Journal of Range Management
2120 S. Birch St., Denver, Colo. 80222

JRPFA4 Journal of Reproduction & Fertility.
(Blackwell Scientific Publications Ltd., Osney Mead, Oxford OX2 OEL, England)

JTEHD6 Journal of Toxicology and Environmental Health.
(Washington DC)

JWMAA9 Journal of Wildlife Management.
Executive Director, The Wildlife Society, Suite S-176, 3900 Wisconsin Ave, NW Washington DC 20016

JWPFA5 Journal of the Water Pollution Control Federation.
(Formerly Sewage Ind. Wastes), 3900 Wisonsin Ave, Washington DC 20016

KABI** KABI
Cisobitan, Product Information Guide, AB KABI, Division Recip., S-112 87 Stockholm, Sweden

KDYIA5 Kidney International
Springer-Verlag, 175 5th Ave., New York, N.Y. USA 10010

KUGSO* Duce R.A. et al. (1976)
Sesquiannual Progress Report to the National Science Foundation, Office of Ocean Exploration, Kingston University of Rhode Island, Graduate School of Oceanography, Narragansett Marine Laboratory

KUMJAX Kumamoto Medical Journal
Kumamoto, Daigaku Igakubu, Library, Kumamoto, Japan

LAACAR Laboratory Animal Care
Joliet, IL.

LANCAO Lancet
7 Adam St., London WC2N 6AD, England

LAUMAL Lavoro Umano
(Human Labour) Riviera di Chiaia 207, 90121 Naples, Italy

LIFSAK Life Sciences
Pergamon Press, Maxwell House, Fairview Park, Elmsford, N.Y. 10523

MAFFF* Portmann J.E. and Wilson K.W. (1971)
The Toxicity of 140 Substances to the Brown Shrimp and Other Marine Animals, Shellfish Inf. Leaflet, No. 22, Ministry of Agriculture, Fish and Food, Fish Lab., Burnham-on-Crouch, Essex, England

MAZNP* Mazmanidi N.P. (1973)
Diasamidze and Zambachidze, Oil Effects on Some Species of Molluscs and Carustacea in the Black Sea

MBIOAJ Marine Biology.
International Journal on Life in Oceans and Coastal Waters, Springer-Verlag, Heidelberger Pl. 3, D-1 Berlin, Germany

MDMIAZ Medycyna Doswiadczalna i Mikrobiologia
Plenum Publishing Corp., 227 W 17th St., New York, N.Y. USA 10011

MEDIAV Medicine.
Analytical Reviews of Internal Medicine, Dermatology, Neurology, Pediatrics & Psychiatry, Williams & Wilkins Co., 428 E Preston St., Baltimore Md, USA 21202

MELAAD Medicina del Lavoro.
Via S. Barnaba, 8 Milan, Italy

MELSB* Bishop J.N. and Neary B.P. (1976)
Mercury Levels in Fish from Northwestern Ontario, 1970-75, Inorganic Trace Contaminants SEction, Ministry of the Environment, Rexdale, Ontario, Laboratory Services Branch

MEPAAX Medycyna Pracy.
Ars-Polona-RUSH, P.O. Box 154, Warsaw 1, Poland

MEWEAC Medizinische Welt
FK Schattauer Verlag, Lenzhalde 3, Stuttgart, Germany

MIKBA5 Mikrobiologiya
v/o "Mezhdunarodnaya Kniga", Kuznetskii Most 18, Moscow G-200 USSR

MIMEAO Minerva Medica
Edizioni Minerva Medica, Casella Postale 491, Turin, Italy

MIRBR* Mironov O.G. (1972)
Biological Resources of the Sea and Oil Pollution
Moscow, Pischevaya Promyshlennost, p.105

MIROP* Mironov O.G. (1972a)
Effects of Oil Pollution on the Flora and Fauna of the Black Sea, in: Marine Pollution and Sea Life, M. Ruivo ed., London, Fishing News (Books) Ltd., p.222

MOHAH* Mohammed A.H. and Chandler M.E.W. (1976)
Cytological Effects of Sodium Fluoride on the Mitotic and Meiotic Chromosomes of Mice. Preprint

//MORH* Morley H.V. (1975)
Private Communication, Environmental Quality, Canada Department of Agriculture, Ottawa, K1A OC6

MPNBAZ Marine Pollution Bulletin.
Macmillan Journals Ltd., Brunel Rd., Basingstoke, Hants, England

MPSL** Kuhnhold W.W. (1972)
The Influence of Crude Oils on Fish Fry, in: Marine Pollution and Sea Life, M. Ruivo ed., West Byfleet, Surrey, U.K., Fishing News (Books) Ltd., p.315

MRIMC* Lee et al. (1975)
Mammalian Toxicity of Munition Compounds, Phase 1, Acute Oral Toxicity, Primary Skin and Eye Irritation, Dermal Sensitization and Disposition and Metabolism, Report No 1, AD BO111501, Midwest Research Institute, prepared for US Army Medical Research & Development Command, Washington DC

MSCOM* Marine Science Communications
Marcel Dekker Journals
270 Madison Ave., New York, N.Y. 10016

MUFVH* Moderne Unfallverhutung
Vulkan Velag, Dr. W. Classen Haus der Technik, 4300 Essen, Germany

MUREAV Mutation Research.
Elsevier Publishing, P.O. Box 211, Amsterdam C, Netherlands

MURJJ* Murray J.J. ed. (1976)
Fluorides in Caries Prevention, John Wright and Sons, Bristol, England

MYEAAG Minerals Yearbook
US Govcernment Printing Office, Supt. of Doc., Washington D.C. USA 20402

NATUAS Nature.
(Wm. Byrd Press, 2901 Byrdhill Rd., Richmond, VA 23228)

NATWAY Naturwissenschaften
(Springer-Verlag, HeidelbergerPl. 3, D-1 Berlin 33, Germany)

NCITR* National Cancer Institute Carcinogenesis Technical Report Series
Bethesda, MD

NCNSA6 National Academy of Sciences, National Research Council, Chemical Biological Coordination Center, Review. (Washington DC)

NDCHG* Jones H.R. (1971)
Mercury Pollution Control, Noyes Data Corporation, New Jersey, USA

NDPFAI Nachrichtenblatt fuer den Deutschen Pflanzshutzdienst.
VEB Deutscher Landwirtschaftsverlag, Reinhardtstrasse 14, Berlin, E. Germany

NEJMAG New England Journal of Medicine.
(Boston MA)

NELPH* Vind H.P. and Hochman H. (1960)
Toxicity of Chemicals to Marine Borers, US Naval Engineering Laboratory, Port Huenerne, California

NEPHAV New Phytologist
Blackwell Scientific Publications Ltd., Osney Mead, Oxford OX2 OEL, England

NFGJAX New York Fish and Game Journal
New York Conservation Dep., Albany, N.Y. 12226

NHTIA7 Nordisk Hygienisk Tidskrift
Prof. Gideon Gehardsson, Sekreterare i Foereningen foer Omgivninghygiene, Svenska Arbetsgivarefoereningen, Box 16120, 10323 Stockholm 16, Sweden

NOAAR* US National Oceanic and Atmospheric Administration
Outer Continental Shelf Environmental Assessment Program, Annual Report of the Principle Investigators, Boulder, Colorado

NOAQR* US National Oceanic and Atmospheric Adminsitration
Outer Continental Shelf Environment Assessment Program, Quarterly Report of the Principle Investigators, Boulder, Colorado

NOARV* US National Oceanic and Atmospheric Administration
Outer Continental Shelf Environment Assessment Program,
Program Review of Research supported under the NOAA
OCSEAP, Boulder, Colorado

NONAA2 Notulae of the Academy of Natural Sciences of Philadelphia
Academy of Natural Sciences of Philadelphia, 19th and
the Parkway, Philadelphia, Pa. 19103

NSFPR* Bowen V.T. (1971)
A study Programme to Identify Problems Related to Oceanic
Environmental Quality. Progress REport to NSF-IDOE
(GX-25334) December 10, 1971, National Science Foundation,
Washington D.C.

NTAC** NTAC (1968)
Water Quality Criteria, Federal Water Pollution Control
Administration, Washington D.C.

NTISA* Miller L.M. and Vuillaume J.E. (1978)
Investigation of Selected Potential Environmental Contaminants:
Acrylonitrile, US Environmental Protection Agency, National
Technical Information Service, Springfield, Virginia

NTISC* Deaven L.L. and Campbell E.W. (1976)
Effects of Cadmium on Karotype Stability in Chinese
Hamster Ovary Cells; progress report Jan 1 - June 30,
1976, US National Technical Information Service Report
LA-6451-PR

NURIBL Nutrition Reports International
Geron-X Inc., P.O. Box 1108, Los Altos, Calif. 94022

NYSJAM New York State Journal of Medicine
Medical Society of the State of New York, Editorial and
Circulation Office, 750 3rd Ave., New York, N.Y. 10027

NZJSAB New Zealand Journal of Science
Dept. of Scientific and Industrial Research, Publications
Officer, Box 8018, Wellington, N.Z.

OBEMT* O'Berg M.T. (1977)
Epidemologic Study of Workers Exposed to Acrylonitrile
- Preliminary Results, E.I. Dupont de Nemours & Co.,
Wilmington, Delaware

OBRRD* O'Brien R.D. (1967)
Insecticides - Action and Metabolism, Academic Press,
New York

OCMAN* Ocean Management
Elsevier Scientific Publishing Co., Box 211, Amsterdam, Netherlands

OJEC** Official Journal of the European Communities
Commission of the European Comunities

OJSCA9 Ohio Journal of Science
445 King Ave., Columbus, Ohio 43201

OKNOAR Okeanologiya
(Oceanology) v/o "Mehzdunarodnaya Kniga", Kuznetskii Most 18, G-200 Moscow, USSR

ONCOBS Oncology.
(Karger, S.AG, Arnold-Boecklin-St 25, CH4000, Basel 11, Switzerland)

OPUUAD Okhrana Prirody na Urale
Akademiya Nauk SSR, Ural'skii Filial, Sverdlovsk

ORNLB* Bondietti E.A. et al. (1974)
Toxic Metals in Sediments, in: Ecology and Analysis of Trace Contaminants, ORNL/NSF/EATC-6, Oak Ridge National Laboratory, Oak Ridge, Tenn.

ORNLC* Fulkerson W. and Goehler H.E. (1973)
Cadmium, the Dissipated Element, Oak Ridge National Laboratory, Oak Rdige, Tennessee

ORNLM* Matti C.S. et al. (1975)
Cycling of Mercury and Cadmium in an Old Field Ecosystem during one Growing Season, ORNL/NSF/EATC-10, Oak Ridge National Laboratory, Oak Ridge, Tennessee

OSOMAE Oral Surgery, Oral Medicine, Oral Pathology
C.V. Mosby C., St. Louis, Mo. 63141, USA

OUBUC* Buchanan D.V. (1970)
Effects of the Insecticide Sevin on the Dungeness Crab, Cancer magister Dana, M.S. Thesis, Oregan State University, Dept. of Fisheries and Wildlife, Cornvallis, Ore.

OUBUT* Butler J.A. (1968)
Effects of the Insecticide Sevin on the Cockle Clam Clinocardium nuttalli (Conrad), M.S. Thesis, Oregan State University, Dept., of Fisheries and Wildlife, Cornvallis, Oregan

PAMIAD Pathologia et Microbiologia
Karger S. AG, Arnold-Boecklin St. 25, CH-4000 Basel, Switzerland

PCPC** Proceedings of the Clean Air Congress
M.M. England and W.T. Bercy Eds., Academic Press Inc. Ltd., 24-28 Oval Rd., London NW1 7DX, England

PCOC** Pesticide Chemicals Official Compendium (1966)
Association of the American Pesticide Control Officials, Inc. (Topeka, Kansas)

PCECS* Proceedings of the CEC-EPA-WHO International Symposium Paris, 24-28 June, 1974, Commission of the European Communities, Luxembourg

PCPCB* Proceedings of the National Conference on Polychlorinated Biphenyls
US Environmental Protection Agency, Office of Toxic Substances, Washington D.C.

PCPOS* Proceedings of the Joint Conference on the Prevention of Oil Spills Washington D.C., March 13-15 1973, American Petroleum Institute

PEEOP* Proceedings of the Symposium on the Ecological Effects of Oil Pollution on Littoral Communities, Insitute of Petroleum, London

PEHPB* Proceedings of the International Symposium on Environmental Health Aspects of Lead, Amsterdam, Oct. 2-6 1972, European Atomic Energy Community Report EUR 5004d-e-f

PEMJAA Pesticides Monitoring Journal.
US Government Printing Office, Supt. of Doc., Washington DC USA 20402

PEXSAO Proceedings of Industrial Waste Conference
Engineering Bulletin of Purdue University, Engineering Extension Series, Purdue University, Lafayette, Ind. 47907

PFCUAY Progressive Fish and Culturist
US Government Printing Office, Supt. of Doc., Wahsington D.C. USA 20402

PFEPH* Proceedings of a Symposium on the Fate and Effects of Petroleum Hydrocarbons in Marine Organisms and Ecosystems
Pergamon Press Ltd., Headington Hill Hall, Oxford, OX3 OEW England

PFSHAZ Proceedings of the Florida State Horticultural Society
Florida State Horticultural Society Library, P.O. Box 553, Lake Alfred, Fla.

PGWTA2 Progressive Water Technology
Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 OEW, England

PHBHA4 Physiology and Behaviour
Brain Research Publications Inc., Highbridge Terrace, Fayetteville, N.Y.

PHMCAA Pharmacologist
American Society for Therapeutics, 9650 Rockville Pike, Bethesda MD 20014

PHPLAI Physiologica Plantarum
Munksgaard, 35 Norre Sogade, DK 1370 Copenhagen K, Denmark

PHSPR* Laskin S. (1972)
Research in Environmental Sciences, Ninth Annual Report of Progress, US Public Health Service, Washington, D.C p.92

PICLA* Proceedings of the International Committee on Laboratory Animals Symposium, Gustav Fischer Veralg, Stuttgart, Germany 1973

PICN** Proceedings of the International Congress of Nutrition
Hamburg, Germany

PIHFA* Proceedings of the Annual Meeting of the Industrial Hygiene Foundation of America

PMJMAQ Proceedings of the New Jersey Mosquito Extermination Association
Secy, N.J. Mosquito Extermination, c/o Rutgers University, P.O. Box 231, New Brunswick, N.J. 80903

PNASA6 Proceedings of the National Academy of Sciences of the United States of America.
(The Academy, Printing and Publishing Office, 2101 Constitution Ave., Washington, DC 20418)

PMSWM* Proceedings of the Gulf Coast Conference on Mosquito Suppression and Wildlife Management
National Mosquito Control - Fish and Wildlife Management Coordinating Committee, Wahsington D.C.

PNSFAN Proceeding of the National Shellfisheries Association
National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Oxford, Md. 21654

PRGAC* Proctor and Gamble Co.

PRLBA4 Proceedings of the Royal Society of London Series B Biological Series, The Society, 6 Carlton House Terrace, London SW14 5AG, England

PRLFAG Pracovni Lekarstvi
(Occupational Medicine)
PNS-Ustredna Expedice Tisku, Jindriska 14, Prague 1, Czech.

PRMBP* Physiological Responses of Marine Biota to Pollutants Vernberg et al. eds. Academic Press Inc. Ltd., 24-28 Oval Rd, London NW1 7DX, England

PRSCS* Proceedings of the Royal Society of Canada Symposium Royal Society of Canda

PSBEA4 Pflanzenschutzberichte
Bundesanstalt fuer Pflanzenschutz, Trunnerstr. 5, Vienna 2, Austria

PSBWQ* Proceedings of the Symposium presented by the Standing Committee on the Scientific Basis for Water Quality Criteria of the International Joint Commission's Research Advisory Board March 11-12 1975, Burlington, Ontario, Canada

PSEBAA Proceedings of the Society for Experimental Biology and Medicine.
(Academic Press, 111 5th Ave., New York, NY 10003)

PSMBAG Publications of the Seto Marine Biological Laboratory
Seto Marine Biological Laboratory, Sirahama, Wakayama, Japan

PSMME* Proceedings of the Symposium on Mercury in Man's Environment 15-16 February 1971, Ottawa, Canada, Royal Society of Canada

PSNBS* Proceedings of a Symposium and Workshop held at NBS Gaithersburg, Maryland, Coordinator: Junghans, R.C.

PSQUAP Psychiatric Quarterly.
State Hospitals Press, Utica, NY 13502

PTPCE* Proceedings of the International Conference on the Transport of Persistent Chemicals in Aquatic Ecosystems, Ottawa, Ont., May 1-3 1974

PTSEL* Thompson J.F. ed. (1974)
Analysis of Pesticide Residues in Human and Environmental Samples - A Compilation of Methods Selected for Use in Pesticide Monitoring Programs, U.S. Environmental Research Centre, Pesticides and Toxic Substances Effects Laboratory, Research Triangle Park, North Carolina

PWPME* Background Papers for a Workshop on Inputs, Fates and Effects of Petroleum in the Marine Environment (1973)
Ocean Affairs Board, National Academy of Sciences, Washington D.C.

PYCOAD Phycologia
Atlantic Regional Laboratory, 1411 Oxford St., Halifax, NS. Can.

QPMVAW Qualitas Plantarum et Materiae Vegetabiles
Dr W Junk bv Publishers, 13 van Stolkweg, The Hague, Netherlands

QUMEAG Quaderni Merceologia
Istituto di Merceologia sell'Universita di Bologna, Bologna, Italy

RCOCB8 Research Communications in Chemical Pathology and Pharmacology.
(PJD Publications, 10 Oakdale Dr., Westbury, NY 11590)

RENEAM Revue Neurologique
Masson et Cie, ed., 120 Blvd St-Germain, P-75280 Paris, Cedex 06, France

RENJL* Renfo J.L. et al (1974)
Methylmercury and Inorganic Mercury: Uptake, Distribution and Effects on Osmoregulatory Mechanisms in Fishes, Vernberg F.J. and Vernberg W.B. eds., Pollution and Physiology of Marine Organisms, Academic Press, New York, N.Y.

REVHA3 Reviews on Environmental Health
Scientific Publications Division, Freund Publishing House Ltd., P.O. Box 35010, Tel-Aviv, Israel

RIPMAG Revue des Travaux de l'Institut Scientifique et Technique des Peches Maritimes
Institut Scientifique et Technique des Peches Maritimes, 59 Ave. Raymond-Poincare, Paris 16, France

RKDBA5 Journal of Science of Labour (Tokyo)
Part 2, (formerly Rep. Inst. Sci. Labour, Tokyo), Rodo Kagaku Kenkyusho, 1544 Sugao, Takatsu-ku 213, Kanagawa, Japan

RLYMAE Revue Lyonnaise de Medecine
(absorbed by Lyon. Med.) Editions Paul Chatelain, 63 rue de la Republique, 69 Lyon 2, France

ROSEI* Rosenfeld I. and Beath O.A. (1964)
Selenium: Geobotany, Biochemistry, Toxicity and Nutrition, Academic Press, New York

RPCMB2 Revue de Pathologie Comparee et de Medicine Experimentale
Editions Medicales et Scientifiques, eds., Boite Postale 100, Paris 17, France

RRBCAD Revue Roumaine de Biochimie.
Rompresfilatelia, POB 2001, Calea Grivitei 64-66, Bucharest, Rom.

RREVAH Residue Reviews.
(Springer-Verlag, 175 5th Ave., New York, NY 10010)

RVOMAY Revue International d'Oceanographie medicale
Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Parc de la Cote, Ave. Jean-Lorrain, Nice, France

RYKHAK Rybnoe Khozyaistvo
v/o "Mehzdunarodnaya Kniga", Kuznetskii Most 18, G-200 Moscow, USSR

SACSA* SACSA (1977)
Impact of Organosilicon Compounds on the Aquatic Environment, The European Centre on Silicons, Oslo Commission Secretariat, Standing Advisory Committee for Scientific Advice, Stockholm, Sweden

SAX*** Sax (1957)
Dangerous Properties of Industrial Materials

SBIOAH Soil Biology and Biochemistry
Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 OEW, England

SCCWR* Schafer H.A. (1977)
Characteristics of Municipal Wastewater Discharges, 1976 Southern California Coastal Water Research Project, El Segundo, California

SCHWL* Schwartz L. et al (1957)
Occupational Diseases of the Skin (3rd ed.), Lea and Febiger, Philadelphia, Pennsylvania

SCIEAS Science.
(American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, DC 20005)

SCPEAT Science et Peche
Institut Scientifique et Technique des Peches Maritimes, La Noe, Route de la Joneliere, 44 Nantes, France

SDKHAK Journal of the Shimonoseki University of Fish
Susisan Daigakko Kenkyu Hokuko, Suisan Daigakko, Yoshimi, Shimonoseki, Japan

SEQFS* Cannon H.L. (1974)
Natural Toxicants of Geological Origin and their Availability to Man, in: White P.L., Robbins D. eds., Symposium on Environmental Quality in Food Supply, Futura Publ.

SERLP* Storrs P.N., Pearson E.A., Selleck R.E. (1966)
A comprehensive Study of San Francisco Bay, Final Report, Vol V., UC Sanitray Engineering Research Laboratory Publicaion No. 67-2, p.140

SETCA* Strik J.J.T.W. et al (1975)
Toxicity of Chromium (VI) in Fish, with special reference to Organowieghts, Liver and Plasma Enzyme Activites, Blood Parameters, and Histological Alterations, in: Sublethal Effects of Txic Chemicals in Aquatic Animals, J.H. Koeman and J.J.T.W. Strik, eds., Elsevier Scientific Publications, Amsterdam, p.31

SHCC** Shell Chemical Co. (unpublished)

SHFIL* Shellfish Information Leaflet
UK Ministry of Agriculture and Fisheries

SIWAAQ Sewage and Industrial Wastes
(formerly Sewage Works J.), Washington DC

SKIBJ* Skinner B.J. and Turekian K.K. (1973)
Man and the Ocean, Prentice-Hall, Englewood Cliffs, New Jersey

SKIZAB Sikoku Igaku Zasshi
Tokushima Daigaku Igakubu, Kumamoto-cho, Tokushima, Japan

SMJOAV Southern Medical Journal
Southern Medical Association, 2601 Highland Ave., Birmingham, Alabama 35025

SOHLD* Sohacki L.D. (1968)
Dynamics of Arsenic in the Aquatic Environment, Ph.D. thesis, Michigan State University, Lansing, Mich.

SOSCAK Soil Science
Williams and Wilkins Co., 428 E Preston St., Baltimore, Md. USA 21202

SSSAA8 Soil Science Society of America, Proceedings
Soil Science Society of America, 677 S Segoe Rd., Madison, Wis, USA 53711

STEAE* Coello W.F. et al (1974)
Ecological Effects of Lead in Auto-Exhaust, in: Survival in Toxic Environments, M.A.Q. Kahn and J.P. Bederka eds., Academic Press, New York p.499

STEVA8 Science of the Total Environment.
(Elsevier Publishing, P.O. Box 211, Amsterdam C, Netherlands)

STLIF* Statens Livsmedelsverks Forfattningssamling
Box S-75126 Upsala, Sweden

STNAF* Statens Naturvardsverks Forfattningssamling
Statens Naturvards (the National Swedish Environment Protection Board), Solna, Sweden

STRHAV Staub-Reinhaltung der Luft
VDI-Verlag GmbH, Postfach 1139, 4 Duesseldorf 1, Germany

SUKBAJ Suomen Kemistilehti B
(Finnish Chemical Journal)
Suomen Kemian Seura, P. Hesperiankatu 3 B 10, SF-00260 Helsinki 26, Finland

SVENF* Svensk Forfattningssamling
Statens Naturvardsverk, Solna, Sweden

SVIJL* Svirbely P.G. and Floyd E.P. (1961)
Toxicological Studies of Acrylonitrile Adiponitrile and B-B'-Oxydipropionitrile III. Chronic Studies, Meeting Paper, AINA-ACSIH, Detroit, Michigan

SYAV** Anon. (1977)
Safety Yearbook, Veiligheidsinstituut, Amsterdam

TAFSAI Trans American Fisheries Society
Executive Director of the American Fisheries Society, 4th Floor Suite, 1319 18th St., Washington D.C. 20036

TAMSAJ Trans American Microscopical Society
American Microscopical Society, P.O. Box 368, Lawrence, Kans. 66044

TAOSAT Trans American Opthalmological Society
University of Toronto Press, Front Campus, Toronto 5, Ont., Canada

TERZAP Trudy Instituta Ekologii Rasternii i Zhivotmykh
Akademiya Nauk SSr, Nauchnyi Tsentr., Institut Ekologii Rastenii i Zhivotnykh, Sverdlovsk, USSR

TETHBG Tethys
Station Marine d'Endoume, rue de la Batterie des Lions, 13007 Marseilles 7, France

THACD* Thawley C.D. (1975)
Toxic Interactions among Lead, Zinc, and Cadmium with Varying Levels of Dietary Calcium and Vitamin D in Rats, Thesis, University of Guelph, Guelph, Ontario

THJUAP Thalassia jugoslavica
Centre for Marine Research "Rudjer Boskovic" Institute, P.O. Box 1016, 41001 Zagreb, Yugoslavia

TIDZAH Journal of the Tokyo Medical College
Tokyo Ika Daigaku Zasshi, 1-412 Higashi Okubo, Shinjuku-ku, Tokyo, Japan

TIUSAD Tin and its Uses
(Greenford, England) Columbus, OH

TJADAB Teratology
Journal of Abnormal Development
Wistar Institute Press, 3631 Spruce St., Philadelphia, Pa. 19107

TJSCAU Texas Journal of Science
University of Texas Printing Division, Austin, Texas, USA

TMMOI* Leland et al. (1974)
Factors Affecting Distribution of Lead and Other Trace Elements in Sediments of Southern Lake Michigan, in: Trace Metals and Metal-Organic Interactions in Natural Waters, P.C. Singer ed., Ann Arbor Science Publishers, Ann ARbor, Mich. p.89-129

TOMWA* Tompkins W.A. (1966)
Sevin Residues in Marine and Freshwater Aquatic Organisms, Report of the Surveillance Program conducted in connection with an application of Carbaryl (Sevin) for the Control of Gypsy Moth on Cape Cod, Publ. No. 547, Mass.

TREWAF Tokyo Toritsu Eisei Kenkyusko Kenkyo Nempo
Tokyo Toritsu Eisei Kenkyusko, 24-1,3-chome, Hyakunin-cho, Shinjuku-ku, Tokyo, Japan

TSKHAY Bulletin of the Freshwater Fisheries Research Laboratory of Tokyo
Tansuiko Suisan Kenkyusho Kenkyu Hokoku Suisan-cho
Tansui-ku Suisan Kenkyusho, Hino-machi Minamatoma-gun, Tokyo, Japan

TSTSAA Trudy Stavropol'skogo Sel'skokhozyaistvennogo Instituta
Stavropol'skii Sel'skokhozyaistvennyi Institut, Stavropol, USSR

TSUBT* Tsubaki T. and Irukayama K. eds. (1977)
Minamata Disease (Methylmercury Poisoning in Minamata and Niigata, Japan), New York, Elsevier Scientific Publishing Co. Kodansha Ltd.

TTMKBR Trudy Kazanskogo Instituta Kraevoi Patologii
Akademia Meditsinkikh Nauk SSR, Gosudarstvennyi Nauchno-Issledovatel'skii i Proektnyi Institut po Obogashcheniyu Rud Tsvetnykh Metallov "Razmekhanob", Alma-Ata USSR

TUAUA3 Tennessee Agricultural Experiment Station Bulletin
University of Tennessee, Knoxville, Tenn. 37916

TXAPA9 Toxicology and Applied Pharmacology.
(Academic Press, 111 5th Ave., New York, NY 10003)

TXCYAC Toxicology
(Elsevier Publishing, P.O. Box 211, Amsterdam C., Netherlands)

UCIMR* Clendenning K.A. (1960)
Laboratory Investigations, North W.J., The Effects of Discharge on Kelp, quarterly progress report 1, October 1 - December 31, 1959, University of California, Institute of Marine Resources, IMR Ref. 60-10

UCFD** Union Carbide Final Draft (1974)
Metabolism of Sevin Insecticide
Union Carbide SA, Geneva, Switzerland

UCTR** Union Carbide Technical Report (1973)

UGLAAD Ugeskrift for Laeger
Den Almindelige Danske Laegeforening, Kristianiagade 12A, 2100 Copenhagen, Denmark

UKDHS* UK DHSS (1979)
Lead in Food Regulations, Ministry of Agriculture, Fisheries and Food, Dept. of Health and Social Security and the Welsh Office, London (press notice)

UKDOE* UK Department of the Environment
London, Englan

UKDOT* UK DOT (1979)
Lead in Petrol, an Assessment of the Feasibility and Costs of Further Action to Limit Lead Emissions from Vehicules, Dept of Transport, Vehicule Standards and Engineering Division, London

UNYS1* UN (1977)
Yearbook of Industrial Statistics, 1975 Edition, Vol. II: Commodity Production Data, United Nations, Geneva, Switzerland

UNYS2* UN (1978)
Yearbook of Industrial Statistics, 1976 Edition, Vol. II: Commodity Production Data, United Nations, Geneva, Switzerland

UOECM* Neri L.C. et al (1977)
Chemical Content of Canadian Drinking Water Related to Cardiovscular Health, University of Ottawa, Dept. of Epidmiology and Community Medicine, Ottawa, Ont. p.223

USDI1* US Department of the Interior
Fish and Wildlife Circular 199, US Dept. of the Interior, Washington D.C

USDI2* US Department of the Interior (1967)
Trace Metals in Water of the United States, US Dept. of the Interior, Federal WAter Pollution Control Administration, Cincinnati, Ohio

USDI3* US Department of the Interior
Effects of Pesticides on Aquatic Animals in the Estuarine and Marine Environment, Annual Progress Report, US Dept. of the Interior, Bureau of Sport, Fisheries and Wildlife, Fish Pesticide Lab, Columbia, Missouri

USDOA* US Department of Agriculture
Quantitites of Pesticide used by Farmers in 1966, Agriculture Economic Report 179, Department of Agriculture

USDOL* US Department of Labour
Workplace Standards Administration, Bureau of Labour Standards, Material Safety Data Sheet

USGSP* Shacklette H.T. et al. (1971)
Elemental Composition of Surficial Materials in the Conterminous United States, Geological Survey Paper 574-d, US Government Printing Office, Washington D.C.

VEOFA6 Vestnik Oftal'mologii
v/o "Mezhdunarodnaya Kniga", Kuznetskii Most 18, Moscow G-200 USSR

VIMBAC Veroeffentlichungen des Instituts fuer Meeresforschung in Bremerhaven
Institut fuer Meeresforschung, Am Handelshfen 12, 285 Bremerhaven, Germany

VPITAR Voprosy Pitaniya.
(v/o "Mezhdunarodnaya Kniga," Kuznetskii Most 18, Moscow G-200, U.S.S.R.)

VTTNAO Vatten
Foeringen foer Vattenhygien, Fack, 102, 60 Stockholm 4, Sweden

WALDB* Waldbott (1978)
Fluoridation, the Great Dilemma, Coronado Press Inc., Lawrence, Kansas

WAPLAC Water, Air and Soil Pollution
D. Reidel Publishing Co., P.O. Box 17, Dordrecht, Netherlands

WATRAG Water Research
Pergamon Press, Headington Hill Hall, Oxford, OX3 OEW, England

WHOAC* WHO Conference on Intoxication due to Alkymercury Treated Seed, Baghdad, 1974

WHOTAC WHO Technical Report Series
World Health Organization, Geneva, Switzerland/New York

WILEAR Wiadmosci Lekarskie
(Medical News) Ars Polona - RUCH, P.O. Box 154, Warsaw 1, Poland

WOICD* Kerfoot W.B. (1973)
Cadmium Accrual in a Flowing Marine Microcosm
In: The Use of Flowing Biological Systems in Aquaculture, Sewage Treatment, Pollution Assay and Food-Chain Studies, J.H. Ryther ed., Woodshole Oceanographic Institution, Woods Hole, Mass.

WOITR* Woods Hole Oceanographic Institute Technical Report
Woods Hole, Mass.

WPRC** Water Pollution Research in Canada
University of Toronto, Toronto, Ont., Canada

WREJJ* Wrench J.J. (1977)
Biochemical Aspects of the Uptake of Mercury and Selenium by the Native British Oyster (Ostrea Edulis), Ph.D. Thesis, Southampton University, Dept. of Oceanography, England

WSWOAC Water Sewage Works
Scranton Publishing Co. Inc., 434 S Wabash, Chicago Ill. 60605

XAESAN US Atomic Energy Commission Symposium Series
National Technical Information Service, 5285 Port Royal Rd., Springfield, Va USA 22151

XIPPAN US Geological Survey Profession Report
Government Printing Office, Supt. of Doc., Washington D.C.

XPHBAO Public Health Bulletins, United States Public Health Service. (Washington DC)

YKGKAM Yukagaku
Nippon Yukagaku Kyokai, c/o Yushi Kogyo Kaikan 3-13-11 Nihonbashi, Chuo-ku, Tokyo, Japan

ZAARAM Zentralblatt fuer Arbeitsmedizin und Arbeitsschutz.
(Dr. Dietrich Steinkopff Verlag, Saalbaustr 126100 Darmstadt, Germany)

ZANCA8 Zeitschrift fuer Analytische Chemie
Wiesbaden. Changed to Fresenius' Z. Anal. Chem.

ZAPOAK Zeitschrift fuer Allgemeine Mikrobiologie
Akademie Verlag GmbH, Leipziger St. 3-4, 108 Berlin, E. Germany

ZAPPAN Zentralblatt fuer Allgemeine Pathologische Anatomie
VEB Gustav Fischer Verlag, Postfach 176, Villengang 2, 69 Jena, E. Germany

ZEKIA5 Zeitschrift fuer Kinderheilkunde
Springer-Verlag, Heidelberger Pl. 3, D-1 Berlin 33, Germany

ZERNAL Zeitschrift fuer Enaerhrungswissenschaft
Steinkopff Verlag, Postfach 1008, 6100 Darmstadt, Germany

ZEVMA4 Zentralblatt fuer Veterinaermedizin
Paul Parey, Linderst 44-47, 1000 Berlin 61, Germany

ZHYGAM Zeitschrift fuer die Gesamte Hygiene und Ihre Grenzgebiete,
VEB Verlag Volk und Gesundheit, Neue Gruenstrasse 18,
102 Berlin, E. Germany

ZLUFAR Zeitschrift fuer Lebensmittel-Untersuchung und-Forschung.
(Springer-Verlag, Heidelberger, Pl. 3, D-1 Berlin 33, Germany)

ZSPPAD Zeitschrift fuer Pflanzenphysiologie
Gustav Fischer Verlag, Postfach 53, Wollgrasweg 49, 7000
Stuttgart-Hohenheim, Germany

6IHM** Fabricius G., Walber K. and Hilscher W.
Storungen der Embryonalenentwicklung durch Cadmium,
paper presented at the 6th International Hygienetagung,
Mainz, 1976

11FYAN Fluorine Chemistry
Academic Press Inc. 111 5th Ave., New York, N.Y. USA
10003

12VXA5 Stecher P.G. et al.
"The Merck Index: An Encyclopedia of Chemicals and
Drugs," Rahway, New Jersey, Merck, 1968.

14CYAT Patty, F.A.
"Industrial Hygiene and Toxicology," 2nd Ed., New York,
Interscience, 1963

16MWC* Boyce A.P. and Verne J.J.
Toxicity of Arsenite Debarkers to Deer in Michigan, Report
No 2025 presented at the 16th Midwest Wildlife Conference,
St. Lois, Missouri, Dec. 1954

20PYAB Carcinogenesis, a Broad Critique (1967)
A collection of papers presented at the Annual Symposium
on Fundamental Cancer Research, 20th, University of
Texas, M.D. Anderson Hospital and Tumour Institute,
Houston, Texas, 1966

21OWA5 Proceedings of the University of Missouri's Annual Conference on Trace Substances in Environmental Health, University of Missouri Conference Committee, Mo 65201

24NPAY Marine Chemistry
Printing and Publications Office, National Academy of Sciences, 2101 Constitution Ave., NW, Washington D.C 20418

24UTAD Onkologiya
Informatsionen Byuletin, Prilozhenie (Natsionalen Kongres po Onkologiya, Sbornik Dokladi, 1st, Sofia, Bulagria, Oct 22-24, 1969)

27ZTAP Gleason et al. (1968)
Clinical Toxicology of Commercial Products - Acute Poisoning, 3rd Ed., Baltimore, Williams and Wilkins, 1968

£CECCD CEC (1978) Criteria (Dose/Effect Relationships) for Cadmium. Report of a Working Group of Experts prepared for the Commission of the European Communities, Directorate-General for Employment and Social Affairs, Health and Safety Directorate, Luxembourg

£CECOP CEC (1977) Criteria (Dose/Effect Relationships) for Organophosphorus Pesticides. Report of a Working Group of Experts prepared for the Commission of the European Communities, Directorate-General for Social Affairs, Health and Safety Directorate, Luxembourg

£CECPB CEC (1978)
Directive on the Lead Content of Petrol 1978.06.29 78/611/EEC-OJL 197/19, 1978.07.22, Commission of the European Communities

£DHEPC DHEW (1976) Final Report of the Subcommittee on the Health Effects of Polychlorinated Biphenyls and Polybrominated Bipehnyls, Department of Health, Education and Welfare, Washington, D.C.

£DHEWP US DHEW (1969)
Report of the Secretary's Commission on Pesticides and their Relationship to Environmental Health, US Department of Health, Education and Welfare, Washington D.C.

£EPAAH EPA (1976)
The Environmental Fate of Selected Polynuclear Aromatic Hydrocarbons, Office of Toxic Substances, US Environmental Protection Agency, WAshington D.C.

£EPALS EPA (1975)
Assessment of Liquid Siloxanes (Silicones), Environmental Protection Agency, Office of Toxic Substances, Washington D.C

£EPAPB EPA (1977)
Assessment of Toxic Chemicals - Lead, Environmental Protection Agency, Cincinnati, Ohio

£EPAQC EPA (1976) Quality Criteria for Water, U.S. Environmental Protection Agency, Washington, D.C.

£EPASE EPA (1975)
Preliminary Investigation of Effects on the Environment of Boron, Indium, Nickel, Selenium, Tin, Vanadium and their Compounds, Vol. IV Selenium, Office of Toxic Substances, Environmental Protection Agency, Washington D.C. 20460

£EPASN EPA (1975)
Preliminary Investigation of Effects on the Environment of Boron, Indium, Nickel, Selenium, Tin, Vanadium and their Compounds, Vol V Tin, Office of Toxic Substances, Environmental Protection Agency, Washington D.C. 20460

£EPHG1 EPA (1977)
Status Assessment of Toxic Chemicals - Mercury, Environmental Protection Agency, Cincinnati, Ohio

£EPHG2 EPA (1971)
Proposed National Emission Standards for Hazardous Air Pollutants, Asbestos, Beryllium, Mercury, Environmental Protection Agency, Washington D.C.

£EPPBB EPA (1976)
PCBs in the United States, Industrial Use and Environmental Distribution, Taks 1, Final Report, Environmental Protection AGecny, Office of Toxic Substances, Washington, D.C.

£EPPPO EPA (1975)
Scientific and Technical Assessment Report on Particulate Polycyclic Organic Matter (PPOM), Environmental Protection Agency, Washington D.C.

£FAOP1 FAO/WHO (1964) Evaluation of the Toxicity of Pesticide Residues in Food, Report of a joint meeting of the FAO Committee on Pesticides in Agriculture and the WHO Expert Committee on Pesticide Residues, Food and Agriculture Organization of the United Nations, Rome, Italy

£FAOP2 FAO/WHO (1967) Evaluation of Some Pesticide Residues in Food, Report of a joint meeting of the FAO Working Party and the WHO Expert Committee on Pesticide Residues, Food and Agriculture Organization of the United Nations, Rome, Italy

£FAOP3 FAO/WHO (1975) 1973 Evaluation of some Pesticide Residues in Food, Report of a joint meeting of the FAO Working Party of Experts on Pesticide Residues and the WHO Expert Committee on Pesticide Residues, Food and Agriculture Organization of the United Nations, Rome, Italy

£FAOP4 FAO/WHO (1977)
1975 Evaluations of Some Pesticide Residues in Food, Report of a Joint Meeting of the FAO Working Party of Experts on Pesticide Residues and the WHO Expert Committee on Pesticide Residues, Food and AGriculture Organization of the United Nations, Rome, Italy

£FAOP5 FAO/WHO (1971)
1970 Evaluations of Some Pesticide Residues in Food, REport of a Joint Meeting of the FAO Working Party and the WHO Expert Committee on Pesticide Residues, Food and Agriculture Organization of the United Nations, Rome, Italy

£FAOP6 FAO/WHO (1978)
Pesticide Residues in Food - 1977 Evaluations, Report of a joint meeting of the FAO Working Party of Experts on Pesticide Residues and the WHO Expert Committee on Pesticide Residues, Food and Agriculture Organization of the United Nations, Rome, Italy

£FAOP7 FAO/WHO (1968)
1967 Evaluations of Some Pesticide Residues in Food, Food and Agriculture Organization of the United Nations, Rome, Italy

£GESAM GESAMP Reports and Studies
Joint Group of Experts on the Scientific Aspects of Marine Pollution

£IAEHG IAEA (1972)
Mercury Contamination in Man and His Environment, Technical Report Series No. 137, International Atomic Energy Agency, Vienna, Austria

£IARC1 IARC (1972)
Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man, Vol. 1, International Agency for Research on Cancer, Lyon, France

£IARC2 IARC (1973)
Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man, Vol. 2, International Agency for Research on Cancer, Lyon, France

£IARC3 IARC (1974)
Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Vol. 3, International Agency for Research on Cancer, Lyon, France

£IARC7 IARC (1974)
Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man, Vol. 7, International Agency for Research on Cancer, Lyon, France

£IARC9 IARC (1975)
Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man, Vol. 9, International Agency for Research on Cancer, Lyon, France

£IAR11 IARC (1976)
Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man, Vol. 11, International Agency for Research on Cancer, Lyon, France

£IAR12 IARC (1976)
Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man, Vol. 12, International Agency for Research on Cancer, Lyon, France

£IAR18 IARC (1978)
Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, Vol. 18, International Agency for Research on Cancer, Lyon, France

£IAR19 IARC (1979)
Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Humans, Vol. 19, International Agency for Research on Cancer, Lyon, France

£ILOOE ILO (1977)
Occupational Exposure Limits for Airborne Toxic Substances, Occupational Safety and Health Series, International Labour Office, Geneva, Switzerland

£NASAS NAS (1977) Arsenic, A Report of the Committee on Medical and Biologic Effects of Environmental Pollutants, National Academy of Sciences, Washington, D.C.

£NASDW NAS (1977) Drinking Water and Health, A Report of the Committee on Safe Drinking Water, National Academy of Sciences, Washington, D.C.

£NASHG NAS (1978)
An Assessment of Mercury in the Environment, Environmental Studies Board, Commission on Natural Resources, National Resarch Council, National Academy of Sciences, Washington D.C.

£NASPA NAS (1976) Pest Control: An Assessment of Present and Alternative Technologies, Vol. I, Report of the Executive Committee, National Academy of Sciences, Washington, D.C.

£NASPB NAS (1972)
Lead - Airborne Lead in Perspective, National Academy of Sciences, WAshington D.C.

£NASPM NAS (1975)
Petroleum in the Marine Environment, National Academy of Sciences, Washington D.C.

£NASPO NAS (1972)
Biologic Effects of Atmospheric Pollutants, Particulate Polycyclic Organic Matter, National Academy of Sciences, Washington D.C.

£NASRF NAS (1971) Fluorides, A Report of the Committee on Biologic Effects of Atmospheric Pollutants, National Academy of Sciences, Washington, D.C.

£NASSE NAS (1976)
Medical and Biological Effects of Environmental Pollutants, National Academy of Sciences, National Research Council, Washington D.C.

£NATOM NATO (1976)
Disposal of Hazardous Wastes: Manual of Hazardous Substances in Special Wastes, No. 55, Federal Environment Agency on behalf of Federal Ministry of the Interior, North ATlantic Treaty Organization, West Berlin

£NRCAS NRCC (1978)
Effects of Arsenic in the Canadian Environment, a report prepared by the Associate Coimmittee on Scientific Criteria for Environmental Quality, National Research Council of Canada, Ottawa

£NRCCD NRCC (1979)
Effects of Cadmium in the Canadian Environment, Associate Committee on Scientific Criteria for Environmental Quality, National Research Council of Canada, Ottawa

£NRCCF NRCC (1977)
Environmental Fluoride, a report prepared by the Associate Committee on Scientific Criteria for Environmental Quality, National Research Council of Canada, Ottawa

£NRCCR NRCC (1976)
Effects of Chromium in the Canadian Environment, National Research Council of Canada, Ottawa

£NRCPC NRCC (1978)
Polychlorinated Biphenyls: Biological Criteria for an Assessment of their Effects on Environmental Quality, a report prepared by the Associate Committee on Scientific Criteria for Environmental Quality, National Research Council of Canada, Ottawa

£NRPBA NRCC (1978)
Effects of Lead in the Canadian Environment - 1978 Executive Report, National Research Council of Canada, Ottawa

£NRPBB NRCC (1978)
Effects of Lead in the Environment - 1978 Quantitative Aspects, National Research Council of Canada, Ottawa

£NRPBC NRCC (1973)
Lead in the Environment, National Research Council of Canada, Ottawa

£NSHAF NIOSH (1977)
Criteria for a Recommended Standard...Occupational Exposure to Asphalt Fumes, National Institute for Occupational Safety and Health, Cincinnati, Ohio

£NSHAM NIOSH (1977)
NIOSH Manual of Analytical Methods, 2nd Edition, National Institute for Occupational Safety and Health, Cincinnati, Ohio

£NSHAN NIOSH (1978)
Criteria for a Recommended Standard...Occupational Exposure to Acrylonitrile, National Institute for Occuaptional Safety and Health, Cincinnati, Ohio

£NSHCA NIOSH (1976)
Criteria for a Recommended Standard...Occupational Exposure to Carbaryl, National Institute for Occupational Safety and Health, Cincinnati, Ohio

£NSHCD NIOSH (1976)
Criteria for a Recommended Standard...Occupational Exposure to Cadmium, National Institute for Occupational Safety and Health, Cincinnati, Ohio

£NSHCR NIOSH (1975)
Criteria for a Recommended Standard...Occupational Exposure to Chromium (VI), National Institute for Occuaptional Safety and Health, Cincinnati, Ohio

£NSHHS NIOSH (1977)
Hospital Occuaptional Health and Safety - Based on Principles and Guidelines from the NISOH Hospital Service Study, DHEW (National Institute for Occuapational Health and Safety) Publication No. 77-141, Cincinnati, Ohio

£NSHIF NIOSH (1975)
Criteria for a Recommended Standard...Occupational Exposure to Inorganic Fluorides, National Institute for Occupational Safety and Health, Cincinnati, Ohio

£NSHMA NIOSH (1976) NIOSH Criteria for a Recommended Standard... Occupational Exposure to Malathion, National Institute for Occupational Safety and Health, Cincinnati, Ohio

£NSHOT NIOSH (1976)
NIOSH Criteria for a Recommended Standard.... Occuaptional Exposure to Organotin Compounds, National Institute for Occuaptional Safety and Health, Cincinnati, Ohio

£NSHPB NIOSH (1976)
Health Effects of Occupational Lead and Arsenic Exposure, A Symposium, National Institute for Occupational Safety and Health, Us Dept. of Health, Education and Welfare, Washington D.C.

£NSHPC NIOSH (1977)
Criteria for a Recommended Standard...Occupational Exposure to Polychlorinated Biphenyls, National Institute for Occupational Safety and Health, Cincinnati, Ohio

£NSHSS NIOSH (1979)
Summary of NISOH Recommendations for Occuaptional Health Standards, National Institute for Occupational Safety and Health, Cincinnati, Ohio

£NSHZN NIOSH (1975)
NIOSH Criteria for a Recommended Standard....Occuaptional Exposure to Zinc Oxide, National Institute for Occuaptional Safety and Health, Cincinnati, Ohio

£OECDB OECD (1973)
Polychlorinated Biphenyls and their Use and Control, OECD Environmetnal Directorate, Organization for Economic Cooperation and Development, Paris, France

£OECDJ OECD (1976)
Utilization and Environmental Levels of Certain Chemical Substances, a case study report from Japan, Paris, Environmental Directorate

£OECHG OECD (1974)
Mercury and the Environment, Studies of Mercury Use, Emission, Biological IMpact and Control, Organization for Economic Cooperation and Development, Paris, France

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3.21 REFERENCES FOR DATA PROFILES ORDERED BY FULL TERM

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Bioaccumulation of Arsenicals, Chapter 7, In Arsenical Pesticides, E.A. Woolson ed., 1975, ACS Symp. Ser. 7

Acta Biochemica et Biophysica — ABBPAP
Academiae Scientarum Hungaricae, Kultura, P.O.Box 149, Budapest 62, Hungary

Acta Dermato-Venereologica — ADVEA4
Korolinska Sjukhuset, S-10401 Stockholm 60, Sweden

Acta Embryologiae Experimentalis — AEEXAH
(supersedes Acta Embryol. Morphol. Exp)
Via Archirafi 18, 90123 Palermo, Italy

Acta Hydrobiologica — AHBPAX
Ars-Polona - RUCH, P.O. Box 154, Warsaw 1, Poland

Acta Medica Scandinavica — AMSVAZ
(Almqvist & Wiksell, P.O. Box 159,
26 Gamla Brogatan, S-101 22 Stockholm, Sweden)

Acta Microbiologica Academiae Scientarum Hungaricae — AMAHA5
Akademiai Kiado, P.O. Box 24, Budapest 502, Hungary

Acta Pharmacologica et Toxicologica — APTOA6
(Munksgaard, 35 Norre Sogade,
DK 1370 Copenhagen K, Denmark)

Acta Pharmacologica et Toxicologica, Supplementun — APTSAI
(Munksgaard, 35 Norre Sogade,
DK 1370 Copenhagen K, Denmark)

Adema D.M.M. (1976) — CLTNO*
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Admiralty Materials Laboratory U.K. Interim Report (1970) — AMLIR*
Freegarde M. and Hatchett C.G.
The Ultimate Fate of Crude Oil at Sea

Advances in Agrononomy ADAGA7
Academic Press, 111 5th Ave., New York, N.Y. USA 10003

Advances in Experimental Medicine and Biology AEMBAP
Plenum Publishing Corporation, 227 W 17th St.,
New York, N.Y. USA 10003

Advancing Frontiers of Plant Sciences AFPSAU
Impex India, 2/18 Ansari Rd, Delhi 6, India

Advances in Lipid Research ALPDAR
Academic Press, 111 5th Avenue, New York, N.Y. USA 10003

Advances in Pest Control APCRAW
New York. Discontinued

Aerztliche Forschung ARZFAN
Munich. (Discontinued)

Aerztliche Wochenschrift ARZWA6
(Berlin, Germany) For publisher information see INTEAG

Air and Water Pollution AWPOAZ
(Formerly Int. J. Air Wat. Pollut.). Superseded by Wat.
Res. and Atmos. Envir., which see.

Allionia ALLIAM
Universita di Torino, Istituto ed Orto Botanico,
Turin, Italy

Ambio AMBOCX
A Journal of the Human Environment, Research and Management.
Universitetsforlaget, Blindern, Oslo 3, Norway or
Universitetsforlaget, P.O. Box 142, Boston, Mass. 02113

Ambio Special Report AMBOS*
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American Cyanamide Company, New York, N.Y. USA

American Cyanamide Company (1955) ACCM1*
Report on Malathion, American Cyanamid Company, New York, New York

American Cyanamide Company ACCOP*
Toxicological Information - Cyanamid Organophosphate Pesticides, ed. 3, American Cyanamide Company, New York, N.Y. USA

American Heart Journal AHJOA2
(C.V. Mosby, 11830 Westline Industrial Dr., St. Louis, MO 63141)

American Industrial Hygiene Association Journal AIHAAP
(The Association, 14125 Prevost, Detroit, MI 48227)

American Industrial Hygiene Association Quarterly AIHQA5
(Baltimore, MD) For publisher information see AIHAAP

American Journal of Diseases of Children AJDCAI
(American Medical Association, 535 N. Dearborn St., Chicago, IL 60610)

American Journal of the Medical Sciences AJMSA9
(Charles B. Slack Inc., 6900 Grove Rd., Thorofare, NJ 07086)

American Journal of Mental Deficiency AJMDAW
(Formerly Journal of Psychoasthenics), American Association on Mental Deficiency, 49 Sheridon Ave., Albany, N.Y. 12210

American Journal of Obstetrics and Gynecology AJOGAH
(C.V. Mosby, 11830 Westline Industrial Dr., St. Louis MO 63141)

American Journal of Opthalmology AJOPAA
Opthalmic Publishing Co., 160 E Grand Ave, Chicago, Ill. 60611

American Journal of Pathology AJPAA4
(Harper & Row, Medical Dept., 2350 Virginia Ave., Hangerstown, MD 21740)

American Journal of Veterinary Research AJVRAH
(American Veterinary Medical Association, 600 S. Michigan Ave., Chicago, IL 60605)

American Petroleum Institute Conference APIC**
(1801 K St., N.W., Washington DC 20006)

American Petroleum Institute Monographs APIM**
(1801 K St., N.W., Washington DC 20006)

Anaesthesia (Blackwell Scientific Publications, Osney Mead, Oxford OX2 OEL, England)	ANASAB
Analytical Chemistry American Chemical Society Publication, 1155 16th St., NW, Washington D.C. USA 20036	ANCHAM
Anatomical Record (Wistar Institute Press, 3631 Spruce St., Philadelphia, PA 19104)	ANREAK
Andrologia Grosse Verlag GmbH, Kurfuerstendamm 152, 1000 Berlin 31, W. Germany	ANDRO*
Annals of Applied Biology (Biochemical Society, P.O. Box 32, Commerce Way, Whitehall Industrial Estate, Colchester, CO2 8HP, England)	AABIAV
Annals of Clinical Research The Finnish Medical Society, Duodecim, Runeberginkatu 47A, 0260, Helsinki 26, Finland	ACLRBL
Annales de l'Institut Michel Pacha Institut Michel Pacha, Laboratoire Maritime de physiologie, 83 Tamaris-sur-Mer, France	AIMPCT
Annals of Internal Medicine (American College of Physicians, 4200 Pine St., Philadelphia, PA 19104)	AIMEAS
Annales de l'Institut Oceanographique Monaco Masson, 120 Boulevard St-Germain, 75280 Paris, Cedex 06	AIOM**
Annals of the New York Academy of Sciences (The Academy, Exec. Director, 2 E. 63rd St., New York, NY 10021)	ANYAA9
Annals of Surgery J.B. Lippincott Co., E. Washinton Sq., Philadelphia, Pa. USA 19105	ANSUA5
Anon. (1977) Safety Yearbook, Amsterdam, Veiligheidsinstituut	SYAV**
Applied Microbiology American Society for Microbiology, 1913 I St., NW, Washington D.C. USA 20006	APMBAY

Arbetarskyddsstyrelsens Meddelande National Board of Occupational Safety and Health, (Arbetarskyddsstyrelsen), 10026 Stockholm, Sweden	ARBME*
Arbete och Haelsa-Vetenskaplig Skriftserie Arbetskyddsverket, S-10026 Stockholm, Sweden	AOHVS*
Archives of Environmental Contamination and Toxicology Springer-Verlag, 175 5th Ave., New York, N.Y. USA 10010	AECTCV
Archives of Environmental Health (American Medical Association, 535 N. Dearborn St., Chicago, IL 60610)	AEHLAU
Archiv fuer Experimentelle Pathologie und Pharmakologie (Leipzig, Germany)(Springer-Verlag, Heidelberger Pl. 3, D-1 Berlin 33, Germany)	AEXPBL
Archiv fuer Experimentelle Veterinaermedizin S. Hirzel Verlag, Postfach 506, 701 Leipzig, E. Germany	AXVMAW
Archiv fuer Fischereiwissenschaft H. Heenman KG, Bessermerstrasse 83, 1 Berlin 42, Germany	AVFSAO
Archiv za Higijenu Rada i Toksikologiju (English translation: Archives of Industrial Hygiene and Toxicology, Belgrade)(Zagreb, Yugoslavia)	AHRTAN
Archiv fuer Hydrobiologie E. Schweizerbart'sche, Verlagsbuchhandlung, Johannestr. 3A, D-7000 Stuttgart 1, Germany	AHYBA4
Archiv fuer Hygiene (Urban und Schwarzenberg, Pettenkoferst 18, D-8000, Munich 15, Germany)	AHYGAJ
Archiv fuer Hygiene und Bakteriologie (Urban und Schwarzenberg, Pettenkoferst 18, D-8000 Munich 15, Germany)	AHBAAM
Archives of Industrial Health (Chicago IL) For publisher information see AEHLAU	AMIHAB
Archives of Industrial Hygiene and Occupational Medicine (Chicago, IL) For publisher information see AEHLAU	AIHOAX
Archives Internationales de Physiologie et de Biochimie (Vaillant-Carmanne, SA, Editeur, 4, Pl. St. Michel, Liege, Belgium)	AIPBAY
Archives Internationales de Physiologie (Liege, Belgium) For publisher information see AIPBAY	AIPHAI

Archivio Italiano di Anatomia e di Embriologia Sansoni Edizioni Scientifiche, Via A. Lamarmora 45, 50121 Florence, Italy	AIAEA2
Archiv fuer Klinische und Experimentelle Dermatologie Springer-Verlag, Heidelberger Pl. 3, D-1 Berlin 33, Germany	AKEDAX
Archiv fuer Klinische und Experimentelle Ohren-Nasen-Kehlkopfheilkunde Berlin	AONKAP
Archives des Maladies Professionelles de Medecine du Travail et de Securite Sociale (Masson et Cie, eds. 120 Blvd. St-Germain, P-75280 Paris 06, France)	AMPMAR
Archivio di Oceanografia e Limnologia Riva Sette Martiri, Castello 1364/A, Venice, Italy	AOLVAE
Archives of Opthalmology (American Medical Association, 535 N. Dearborn St., Chicago, IL 60610)	AROPAW
Archives of Oral Biology Pergamon Press Ltd., Headington Hill Hall, Oxford OX3 OEW, England	AOBIAR
Archives of Pathology. (American Medical Association, 535 N. Dearborn St., Chicago, IL 60610)	ARPAAQ
Archives of Surgery. (American Medical Association, 535 N. Dearborn St., Chicago, IL 60610)	ARSUAX
Archiv fuer Toxicologie or Archives of Toxicology (Springer-Verlag, Heidelberger, Pl 3, D-1 Berlin 33, Germany)	ATXKA8 or ARTODN
Arctic Artic Institute of North America, 3458 Redpath St., Montreal 109, Que., Can.	ATICAB
Arena J.M. (1974) Poisoning - Toxicology, Symptoms, Treatments, 3rd Edition, Charles C. Thomas, Springfield, Illinois	AREJM*
Association of Food and Drug Officials of the US, Quarterly Bulletin (Editorial Committee of the Association, P.O. Box 20306, Denver, CO 80220)	AFDOAQ

Atmospheric Environment ATENBP
Pergamon Press Ltd., Headington Hill Hall, Oxford
OX3 OEW, England

Australian Journal of Biological Sciences AJBSAM
(Formerly Aust. J. Sci. Res. Ser. B.)
Commonwealth Scientific and Industrial Research
Organization, 314 Albert St., P.O. Box 89, E. Melbourne,
Victoria, Australia

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Organization, 314 Albert St., P.O. Box 89, E. Melbourne,
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Whitehall Industrial Estate, Colchester, CO2 8HP, England)

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Academic Press, 111 5th Ave., New York, N.Y. USA 10003

Biochemical Pharmacology. BCPCA6
(Pergamon Press, Headington Hill Hall,
Oxford OX3 OEW, England)

Biochemie Physiologie der Pflanzen BPBFA4
VEB Gustav Fischer Verlag, Postfach 53, Wollgrasweg 49,
7000 Stuttgart-Hohenheim, Gemany

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Marine Biological Laboratory, Woods Hole, Mass. 02543,
or Wheldon & Wesley Ltd., 2-4 Arthur St., New Oxford St.,
London WC2, England

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American Society of Hematology, Grune and Stratton Inc., 111 5th Ave., New York, N.Y. 10003

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Casa Editrice Libraria V. Idelson, Via Alcide de Gasperi 55, 80133 Naples, Italy

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(Blackwell Scientific Publications, Osney Mead, Oxford OX2 OEL, England)

British Journal of Industrial Medicine BJIMAG
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British Journal of Pharmacology and Chemotherapy BJPCAL
(McMillan Journals, Brunel Rd., Basingstoke, Hants., England)

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British Institute of Radiology, 32 Welbeck St., London W1M 7PG England

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Laboratory of Tokyo
Tansuiku Suisan Kenkyusho Kenkyu Hokoku, Suisan-cho Tansui-ku Suisan Kenkyusho, Hino-machi Minamatoma-gun, Tokyo, Japan

Bulletin of the Japanese Society of Scientific Fisheries — BJSSF*
Nippon Suisan Gakkai, c/o Tokyo Suisan Daigaku, 4-5-7, Konan Minato-ku, Tokyo, Japan

Bulletin Mount Desert Island Biological Laboratory — BMDBL*
Salsbury Cove, Maine 04672, USA

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(The Organization, 1211 Geneva 27, Switzerland)

Bundesgesetzblatt — BGBL**
Umweltbundesamt, Bismarckplatz 1, D-1000 Berlin 23

Bunseki Kagaku — BNSKAK
Nippon Bunseki Kagakkai, c/o Tokyo Kogyo Shikensho, 1-1-15, Hon-machi, Shibuya-ku, Tokyo, Japan

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v/o "Mezhdunarodnaya Kniga," Kuznetskii Most 18, Moscow G-200, USSR

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Springer-Verlag, Neuenheimer Landst 28-30, D 6900 Heidelberg 1, Germany

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California Fish and Game — CAFGAX
Office of Procurement, Document Section, P.O. Box 20191, Sacramento, California 95820

Canadian Journal of Botany — CJBOAW
National Research Council of Canada, Ottawa, K1A OR6, Ont. Canada

Canadian Journal of Comparative Medicine. CJCMAV
(360 Bronson Ave., Ottawa, K1R 6J3, Ontario, Canada)

Canadian Journal of Genetics Cytology CNJGA8
Tr. Dr. H. Baenziger, Forage Section, Ottawa Research Station, Central Experimental Farm, Ottawa K1A OC6, Can.

Canadian Journal of Microbiology CJMIAZ
National Research Council of Canada, Ottawa, K1A OR6, Ont. Canada

Canadian Journal of Plant Science CPLSAY
Agricultural Institute of Canada, 151 Slater St., Suite 907, Ottawa, Ont., K1P 5H4

Canadian Journal of Zoology CJZOAG
(Formerly Can. J. Res., Sect. D)
National Research Council of Canada, Ottawa, K1A OR6, Ontario, Canada

Canadian Medical Association Journal. CMAJAX
(CMA House, Box 8650 Ottawa, K1G 0G8, Ontario, Canada)

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Commission of the European Communities, Joint Research Centre, Italy

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Chemical and Engineering News (American Chemical Society, 1155 16th st., N.W., Washington, DC 20036) — CENEAR

Chemical Reviews (American Chemical Society, 1155 16th St., N.W., Washington D.C. 20036) — CHREAY

Chemical Week (Formerly Chem. Ind. Week) McGraw-Hill Publications, 330 W. 42nd St., New York, N.Y. USA 10036 — CHWKA9

Chemistry & Industry (Society of Chemical Industry, 14 Belgrave Sq., London SW1X 8PS, England) — CHINAG

Chesapeake Science Natural Resources Institute, University of Maryland, Chesapeake Biological Laboratory, Solomons, Md 10742	CPSCAL
Circular of the Fisheries and Wildlife Service Washington	CFWSW*
Circulation Supplement American Heart Association, Publishing Director, 44 E 23rd St., New York, N.Y. 10010	CISUAQ
Clendenning K.A. (1960) Laboratory Investigations, North W.J., The Effects of Discharge on Kelp, quarterly progress report 1, October 1 - December 31, 1959, University of California, Institute of Marine Resources, IMR Ref. 60-10	UCIMR*
Clinical Pediatrics (Lippincott J.B., E. Washington Sq., Philadelphia, PA 19105)	CPEDAM
Clinical Toxicology. (Dekkar, Marcel, 305 E. 45th St., New York, NY 10017)	CTOXAO
Coello W.F. et al. (1974) Ecological Effects of Lead in Auto-Exhaust. In Survival in Toxic Environments, M.A.Q. Kahn and J.P. Bederka eds., Academic Press, New York, p.499	STEAE*
Commercial Fisheries Review (changed to Mar. Fish. Rev.), US Government Printing Office, Supt. of Doc., Washington D.C., USA 20402	CFREAK
Commonwealth Bureau of Soil Science and Technology, Technical Communciation England	CBSST*
Comparative Biochemistry and Physiology, Part B Pergamon Press Ltd., Headington Hill Hall, Oxford, OX3 OEW, England	CBPBB8
Comptes Rendues Hebdomadaires des Seances Academie des Sciences (Paris, France)	COREAF
Contact Dermatitis Copenhagen, Denmark	CONDE*
Contributions in Marine Science University of Texas Marine Science Institute, Port Aransas, Texas 78373	CMSCAY

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Critical Reviews in Environmental Control CCECAU
Chemical Rubber Company, 18901 Cranwood Pky., Cleveland, Ohio, USA 44128

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(Current Science Association, Mgr. Raman Research Institute, Bangalore 6, India)

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Deep Sea Research DESRAY
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Dermatologica DERAAC
S. Karger AG, Arnold-Boecklin St. 25, CH-4000 Basel 11, Switzerland

Dermatosen in Beruf und Umwelt DBEUM*
Aulendorf, Germany

Deutsche Forschungsgemeinschaft, Farbstoff-Kommission, Mitteilung. DFFKAN
Franz Steiner Verlag GmbH, Bahnhofstr. 39, 6200 Wiesbaden, Federal Republic of Germany

Deutsche Forschungsgemeinschaft, Senats-Kommission zur Prufung Gesundheitsschadlicher Arbeitsstoffe Mitteilung XV, "Maximale Arbeitsplatzkonzentrationen 1979", Bonn, Fed. Republic of Germany — DFSK**

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American Microscopical Society, P.O. Box 368, Lawrence, Kans. 66044

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Trudy Kazanskogo Instituta Kraevoi Patologii TTMKBR
Akademiya Meditsinskikh Nauk SSSR
Gosudarstvennyi Nauchno-Issledovatel'skii i Proektnyi Institut po Obogashcheniyu Rud Tsvetnykh Metallov "Razmekhanob", Alma-Ata USSR

Trudy Instituta Ekologii Rasternii i Zhivotmykh TERZAP
Akademiya Nauk SSR, Nauchnyi Tsentr., Institut Ekologii Rastenii i Zhivotnykh, Sverdlovsk, USSR

Trudy Stavropol'skogo sel'skokhozyaistvennogo Instituta TSTSAA
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(VEB Gustav Fischer Verlag, Postfach 176, Villengang 2,
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4. COMPREHENSIVE LIST OF ABBREVIATIONS ORDERED ALPHABETICALLY BY FULL TERM

acceptable daily intake	=	ADI
acceptable or tolerable limit	=	AL
acceptable or tolerable residue limt	=	ARL
acceptable or tolerable weekly intake	=	AWI
accidental exposure	=	ACC
activation analysis	=	AA
acclimated or activated, acclimated microorganisms i.e. microorganisms that have been adapted to the compound	=	acc
activity change	=	act
additives	=	ADD
adipose tissue	=	fat
adsorbed on solid surface	=	ads
adsorption	=	ADS
aerobic conditions	=	o
Afghanistan	=	AFG
Africa	=	AFRI
agricultural	=	agr
air, atmosphere	=	air
Alaska, Gulf of	=	ASKg
Albania	=	ALB
Algeria	=	DZA
allergic effect	=	all
American Samoa	=	ASM
amphibians	=	amp
anaerobic conditons	=	a
Andorra	=	AND
Angola	=	AGO
animal	=	ani
anodic stripping voltametry	=	ASV
Antarctica	=	ATA
Antigua	=	ATG
application, deliberate	=	appli
April	=	Apr
aquatic, water	=	aq
Arabian Sea	=	ARBs
Arctic Ocean	=	ARCo
Argentina	=	ARG
Asia	=	ASIA
Atlantic Ocean	=	ATLo
atomic absorption spectroscopy	=	AAS
August	=	Aug
Australia	=	AUS
Austria	=	AUT
autonomic nervous sytem	=	ANS
average value	=	av
background, ambient	=	bkg
Bahamas	=	BHS
Bahrain	=	BHR
Balkan countries	=	BLK
Baltic Sea	=	BALs

Bangladesh	=	BGD
Barbados	=	BRB
Barents Sea	=	BARs
batch or slurry method	=	BAT
Beaufort Sea	=	BFTs
behavioural effect	=	bhv
Belgium	=	BEL
Belize	=	BLZ
Benelux countries	=	BNX
Bengal, Bay of	=	BNGb
Benin	=	BEN
Bering Sea	=	BERs
Bermuda	=	BMU
Bhutan	=	BTN
biomass determination (increas in total bacterial numbers)	=	BIM
biochemical change	=	bcm
biological oxygen demand	=	BOD
biota	=	biota
bird	=	brd
bird, wild	=	bwd
Biscay, Bay of	=	BISb
Black Sea	=	BLAs
blood	=	bld
body weight	=	bw
boiling point	=	BP
Bolivia	=	BOL
Botswana	=	BWA
Bouvet Island	=	BVT
Brazil	=	BRA
British Antarctic Territory	=	ATB
British Indian Ocean Territory	=	IOT
British Virgin Islands	=	VGB
Brunel	=	BRN
Bulgaria	=	BGR
Burma	=	BUR
Burundi	=	BDI
Byelorussian SSR	=	BYS
calculated value	=	cal
California, Gulf of	=	CALg
Cameroon, United Republic of	=	CMR
Canada	=	CAN
Canton and Enderbury Islands	=	CTE
Cape Verde	=	CPV
carbon dioxide evolution	=	CO2
carcinogenic effect	=	car
cardiovascular system	=	CVS
Carribean Sea	=	CARs
Caspian Sea	=	CSPs
cat	=	cat
cattle, horse	=	ctl
Cayman Islands	=	CYM
ceiling value	=	C
cell culture	=	cc

cellular change = cel
Celsius degrees = °C
Central African Empire = CAF
central nervous sytem = CNS
Chad = TCD
changes, miscellaneous = cng
Chemical Abstracts Service Name = CAS
Chemical Abstracts Service Number = CAS NU
Chemical Hazard Response Information System (US Coast Guard) Reference Number = CHRIS
chemical oxygen demand = COD
chemically reactive = chem-react
chicken = ckn
child (1-13Y) = chd
Chile = CHL
China = CHN
Christmas Island = CXR
chromosome test = CHR
circulation change = crc
city = cty
closed cup = c-cup
coast line = coast
Cocos (Keeling) Islands = CCK
colorimetry = COLM
Columbia = COL
column method = CLM
Commission of the European Communities = CEC
community = comm
Comoros = COM
Congo = COG
consumer goods = cgd
Cook Islands = COK
corrosive effect = cor
Costa Rica = CRI
crustacea = crs
Cuba = CUB
Cyprus = CYP
Czechoslovakia = CSK
day = D
x days during pregnancy = xDP
xth day of pregnancy = xtDP
death = dth
December = Dec
decomposes = dec
definition = DEF
Denmark = DNK
density = DEN
Department of Transportation (US) = DOT
depth = depth
dermal penetration = dpn
detection limit, lower = Det
dialysis method = DIA
disappearance of the substrate, specific chemical analysis (percent disappearance of original amount) = DIS

dissolved organic carbon	=	DOC
distribution adsorption coefficient	=	Kd
Djibouti	=	DJI
DNA test	=	DNA
dog	=	dog
domestic	=	dom
Dominica	=	DMA
Dominican Republic	=	DOM
drinking	=	drk
Dronning Maud Land	=	ATN
dry weight	=	dwt
duck	=	dck
early mortality	=	emr
East	=	E
East China Sea (Tung Hai)	=	CHNsE
East Indian Archipelago (Indonesia)	=	INDaE
East Siberia Sea	=	SIBsE
East Timor	=	TMP
Ecuador	=	ECU
effectivity date	=	Eff
eggs	=	egg
Egypt	=	EGY
electrophoresis	=	EP
El Salvador	=	SLV
Equatorial Guinea	=	GNQ
embryo, embryonic stage	=	emb
emission	=	emi
energy production, due to	=	erg
endocrine, hormonal effect	=	end
endocrine system	=	END
Environmental Chemicals Data and Information Network of the Commission of the European Communities	=	ECDIN
estuarine	=	est
Ethiopia	=	ETH
Europe	=	EUR
European Economic Communities	=	EEC
European Free Trade Association	=	EFTA
evaluation	=	eval
excluding	=	ex
exocrine effect	=	exo
experimental measured value	=	exp
eye	=	EYE
Faeroe Islands	=	FRO
Falkland Islands (Malvinas)	=	FLK
fat (adipose) tissue	=	fat
February	=	Feb
fetus, including embryo and neonate	=	FET
field study	=	field
Fiji	=	FJI
Finland	=	FIN
fire hazard	=	fire
fish	=	fsh
flammable limits	=	FL

flash point	=	FP
flow through method	=	flow
fluorescence spectrophotometry	=	FS
Food and Agriculture Organisation of the United Nations	=	FAO
food products/food and beverages	=	food
France	=	FRA
French Guiana	=	GUF
French Polynesia	=	PYF
French Southern and Antarctic Territories	=	ATF
fresh (water)	=	frs
Freundlich Adsorption Coefficient	=	K
fuel	=	fuel
functional change	=	fnc
Gabon	=	GAB
Gambia	=	GMB
gas chromatography	=	GC
gas chromatography coupled with mass spectrometry	=	GC-MS
gas chromatography with electron capture detection	=	EC-GC
gastrointestinal tract	=	GIT
generations	=	GN
genetic change	=	gen
geophysical modifications	=	geoph
gerbil	=	grb
German Democratic Republic	=	DDR
Germany, Federal Republic of	=	DEU
Ghana	=	GHA
Gibraltar	=	GIB
Gilbert Islands	=	GEL
gorilla	=	gor
gram	=	g
Great Australian Bight	=	AUSb
Greece	=	GRC
Greenland	=	GRL
Grenada	=	GRD
ground	=	grnd
Guadeloupe	=	GLP
Guam	=	GUM
Guatemala	=	GTM
Guinea	=	GIN
Guinea-Bissau	=	GNB
guinea pig	=	gpg
Guyana	=	GUY
haematological system	=	HEM
Haiti	=	HTI
hamster	=	ham
harmful quantity	=	HQ
hazard classification	=	HAZ
Heard and McDonald Islands	=	HMD
heart	=	HRT
high pressure liquid chromatography	=	HPLC
Honduras	=	HND
HongKong	=	HKG
hour	=	H
Hudson Bay	=	HUDb

human	=	hmn
human cell culture	=	hcc
Hungary	=	HUN
hydrogen ion concentration	=	pH
Iceland	=	ISL
immission	=	imi
immunological effect	=	imm
immunological system	=	IMM
implant	=	imp
impurities	=	IMPUR
inconclusive	=	inc
India	=	IND
Indian Ocean	=	INDo
Indonesia	=	IDN
industrial, industrial area	=	ind
infant (0-1Y)	=	inf
inflammation	=	ifl
infra red spectrophotometry	=	IR
inhalation	=	ihl
insect	=	ins
Inter-Governmental Maritime Consultative Organisation		
Pollution Categories for Operational Discharge:		
Category A	=	IMCO A
Category B	=	IMCO B
Category C	=	IMCO C
Category D	=	IMCO D
intermittent	=	I
International Standards Organisation Name	=	ISO
intraarterial	=	iat
intraaural	=	ial
intracerebral	=	ice
intracervical	=	icv
intradermal	=	idr
intraduodenal	=	idu
intramuscular	=	ims
intraperitoneal	=	ipr
intraplacental	=	ipc
intrapleural	=	ipl
intrarenal	=	irn
intraspinal	=	isp
intratracheal	=	itr
intravaginal	=	ivg
intravenous	=	ivn
invertebrates other than those specifically listed	=	inv
ion specific electrode	=	pX
Iran	=	IRN
Iraq	=	IRQ
Ireland	=	IRL
Irish Sea, St. George's Channel and North Channel	=	IRLs
IRPTC number	=	IRPTC NU
irritant effects	=	irr
Israel	=	ISR
Italy	=	ITA
Ivory Coast	=	CIV

Jamaica	=	JAM
January	=	Jan
Japan	=	JPN
Japan, Sea of	=	JPNs
Johnston Island	=	JTN
Jordan	=	JOR
July	=	Jul
June	=	Jun
juvenile, newly hatched, immature	=	juv
Kampuchea, Democratic	=	KHM
Kara Sea	=	KARs
Kenya	=	KEN
kilogram	=	kg
kilograms consumed/produced	=	kg-c/kg-p
kilopascal	=	kPa
Korea, Democratic People's Republic	=	PRK
Korea, Republic of	=	KOR
Kuwait	=	KWT
lake	=	lak
Lao People's Democratic Republic	=	LAO
Laptev (or Nordenskjold) Sea	=	LAPs
larvae	=	lar
Lebanon	=	LBN
Lesotho	=	LSO
lethal concentration n% kill, i.e. the percentage kill is added, e.g. LC100	=	LCn
lethal concentration, 50% kill	=	LC50
lethal dose, 50% kill	=	LD50
Liberia	=	LBR
Libyan Arab Jamahiriya	=	LBY
Liechtenstein	=	LIE
lifetime	=	LT
lipid weight	=	lwt
lithosphere	=	lith
litre	=	l
liver and gall bladder	=	LVR
load, total environmental	=	load
loss of the compound from one subcompartment	=	loss
lowest lethal concentration found	=	LCLo
lowest lethal dose found	=	LDLo
Luxembourg	=	LUX
Macau	=	MACAU
Madagascar	=	MDG
Malawi	=	MWI
Malaysia	=	MYS
Maldives	=	MDV
Mali	=	MLI
Malta	=	MALTA
mammals	=	mam
mammalian cell culture	=	mcc
man (human male)	=	man
March	=	Mar
marine	=	mar
Martinique	=	MTQ

mass spectrometry = MS
Mauritania = MRT
Mauritius = MUS
maximum allowable concentration = MAC
maximum limit = ML
maximum permissible concentrations = MPC
maximum residue level = MRL
maximum tolerable or acceptable concentration = MTC
maximum worksite concentration = MAK
May = May
Mediterranean Sea = MEDs
melting point = MP
metabolites (total) produced, specific analysis of
percent produced of original amount of substrate = MET
metre, cubic = m^3
Mexico = MEX
Mexico, Gulf of = MEXg
micrograms = µg
microorganisms, including bacteria, fungi, algae or plankton = mcr
Midway Islands = MID
milligrams = mg
milligrams per gram = mg/g
milligrams per kiligram body weight per day = mg/kg
milligrams per kilogram body weight
(used in legal file when dose is reported as such) = mg/kg bw
milligrams per litre = mg/l
milligrams per millilitre = mg/ml
millilitres = ml
millimetres mercury = mmHg
mink = mnk
minute = M
molecular formula = MOLFM
molecular weight = MOLWT
molluscs = mol
Monaco = MCO
Mongolia = MNG
monkey = mky
month = Mo
Montserrat = MSR
Morocco = MAR
mouse = mus
Mozambique = MOZ
multiple effects = mlt
multiple organs/systems = MLT
muscular effect = msc
mutagenic effect = mut
Namibia = NAM
nanogram = ng
National Cancer Institute, Carcinogenesis Bioassay
Programme Number = NCI
natural production or occurrence = natur
Nauru = NRU
neoplastic effect = neo
Nepal = NPL

Netherlands	=	NLD
Netherlands Antilles	=	ANT
neural effect	=	neu
Neutral Zone	=	NTZ
New Caledonia	=	NCL
New Hebrides	=	NHB
New Zealand	=	NZL
Nicaragua	=	NIC
Niger	=	NER
Nigeria	=	NGA
Niue	=	NIU
no effect level	=	NEL
no effects reported	=	nef
no water should be used to fight fire	=	NO H2O
non-agricultural use	=	nagr
non-inclusive	=	ni
Norfolk Island	=	NFK
North	=	N
North America	=	NAm
North east	=	NE
North west	=	NW
North Sea	=	Ns
North West Passage	=	NWp
Norway	=	NOR
Norwegian Sea	=	NORs
not detectable	=	ND
November	=	Nov
nuclear magnetic resonance spectroscopy	=	NMR
occupational environment	=	occ
occupational exposure	=	OCC
Oceania, including Australia	=	OCEA
October	=	Oct
ocular	=	ocu
Okhotsk, Sea of	=	OKHs
Oman	=	OMN
open cup	=	o-cup
oral	=	orl
organic solvent	=	ors
Organization for Economic Cooperation and Development	=	OECD
organoleptic effect	=	olp
osmotic change	=	osm
oxygen consumption, increased or decreased	=	oxy
Pacific Islands	=	PCI
Pacific Ocean	=	PACo
Pakistan	=	PAK
Panama	=	PAN
Panama Canal Zone	=	PCZ
pancreas	=	PNC
Papua New Guinea	=	PNG
Paraguay	=	PRY
parenteral	=	par
particulates	=	part
partition coefficient (n-octanol/water)	=	PC
parts per billion	=	ppb

parts per hundred = pph
parts per million = ppm
parts per thousand = ppt
pascal = Pa
percent = %
percent organic matter content = % org
percent salinity = % sal
peripheral nervous system = PNS
permissible or allowable limit = PL
Peru = PER
phenotypic test = PHN
Philippines = PHL
Philippine Sea = PHLs
picogram = pg
pig, young swine = pig
pigeon = pgn
Pitcairn Islands = PCN
plant or plant cells = plt
polarography = POLG
Poland = POL
polluted area = pol
population, population change = pop
Portugal = PRT
pre-adult = pad
pregnancy, during = P
pressure change = prs
previously listed organs or systems = PLT
prohibition = PRO
psychotropic effect = psy
Puerto Rico = PRI
pulmonary system = PUL
pure culture = p
Qatar = QAT
quail = qal
rabbit = rbt
radiochemical method = RAD
rat = rat
received from all other subcompartments, amount = recv
recommendation = REC
rectal = rec
Red Sea = REDs
Register entry date = RED
Registry of Toxic Effects of Chemical Substances Registry Number (NIOSH) = RTECS
regulation = REG
relative vapour density = RVDEN
removal = rmv
reproductive effect = rep
reproductive system = REP
reptile = rept
respiration rate change = res
restriction = RSTR
retardation = ret
Reunion = REU

Rf value, distance travelled by the test compound/distance travelled by water	=	Rf
river	=	rvr
Romania	=	ROM
rural	=	rur
Rwanda	=	RWA
St. Helena	=	SHN
St. Kitts-Nevis-Anguilla	=	KNA
St. Lawrence, Gulf of	=	SLWg
St. Lucia	=	LCA
St. Pierre and Miquelon	=	SPM
St. Vincent	=	VCT
salinity	=	% sal
Samoa	=	WSM
sample size	=	samp
San Marino	=	SMR
Sao Tome and Principe	=	STP
Saudi Arabia	=	SAU
Scandinavian countries	=	SCND
sediment	=	sed
selected	=	sel
Senegal	=	SEN
sensation, change in	=	sns
sense organs	=	SNS
September	=	Sep
sewage water and sludge	=	sew
Seychelles	=	SYC
sheep, goat	=	shp
short term exposure limit	=	STEL
Sierra Leone	=	SLE
Singapore	=	SGP
size or weight change	=	siz
skeletal system	=	SKL
skin application	=	skn
skin and mucous membranes	=	SKN
soil	=	soil
Solomon Islands	=	SLB
Somalia	=	SOM
somatic nervous system	=	SON
South	=	S
South Africa	=	ZAF
South America	=	SAm
South China Sea (Nan Hai)	=	CHNsS
South East	=	SE
South west	=	SW
Southern Rhodesia	=	RHO
Spain	=	ESP
spills, accidents and uncontrolled dumping	=	spill
squirrel	=	sql
Sri Lanka	=	LKA
static method	=	stat
steady state	=	ss
stratosphere	=	strat
structural change	=	str

structural formula	=	STRFM
subcutaneous	=	scu
subdivision or region within a larger geographic area	=	sbd
Sudan	=	SDN
sunlight (simulated or natural)	=	sun
surface	=	srf
Suriname	=	SUR
susceptible strain	=	s
Svalbard and Jan Meyen Islands	=	SJM
Swaziland	=	SWZ
Sweden	=	SWE
swine	=	swn
Switzerland	=	CHE
synonyms	=	SYN
Syrian Arab Republic	=	SYR
Taiwan, Province of	=	TWN
Tanzania, United Republic of	=	TZA
technical reference concentration	=	TRK
teratogenic effect	=	ter
terrestrial	=	trr
Thailand	=	THA
thin layer chromatography	=	TLC
thousand tonnes	=	tt
thousand tonnes consumed/produced	=	tt-c/tt-p
threshold limit value	=	TLV
time weighted average	=	TWA
times	=	x
tissues	=	tiss
titration	=	TIT
Togo	=	TGO
Tokelau	=	TKL
Tonga	=	TON
tonnes, metric	=	t
tonnes consumed	=	t-c
tonnes produced	=	t-p
total	=	tot
toxic concentration, lowest found	=	TCLo
toxic dose, lowest found	=	TDLo
toxic fumes	=	tox-fumes
transformation (environmental) of non-natural products	=	trans
transplacental	=	tpl
transport	=	trnsp
treatment of poisoning cases, clinical	=	trt
Trinidad and Tobago	=	TTO
troposphere	=	trop
Tunisia	=	TUN
Turkey	=	TUR
turkey	=	trk
Turks and Caicos Islands	=	TCA
Tuvalu	=	TUV
Uganda	=	UGA
Ukranian SSR	=	UKR
ultra violet spectrophotometry	=	UV
United Arab Emirates	=	ARE

United Kingdom	=	GBR
UN Transport of Dangerous Goods Classification Number	=	UN CLASS
UN Transport of Dangerous Goods Packaging Groups:		
very dangerous substances	=	UN PACK I
substances presenting medium danger	=	UN PACK II
substances presenting minor danger	=	UN PACK III
UN Transport of Dangerous Goods Reference Number	=	UN
United States	=	USA
United States Misc. Pacific Islands	=	PUS
US EPA, Office of Hazardous Materials- Technical Assistance Data System Reference Number	=	OHM-TADS
United States Virgin Islands	=	VIR
unspecified effect	=	uns
unspecified organ/system	=	UNS
unspecified species	=	usp
Upper Volta	=	HVO
Uraguay	=	URY
urinary system	=	URS
urine	=	urn
use and handling	=	use
USSR	=	SUN
vapour pressure	=	VP
Vatican City State (Holy See)	=	VAT
Venezuela	=	VEN
vertebrates, other than those listed specifically	=	ver
Viet Nam	=	VNM
visible spectrophotometry	=	VIS
Wake Island	=	WAK
Wallis and Futuna Islands	=	WLF
warning	=	WARN
waste	=	wst
water	=	aq
water solubility	=	AQSOL
week	=	Wk
West	=	W
Western Sahara	=	ESH
wet weight	=	wwt
Wiswesser Line Notation	=	WLN
woman	=	wmn
world	=	WLD
World Health Organisation of the United Nations	=	WHO
worms	=	wor
X-ray diffraction	=	XRD
X-ray emission spectroscopy	=	XE
X-ray fluorescence spectroscopy	=	XF
year	=	Y
Yemen	=	YEM
Yemen, Democratic	=	YMD
Yugoslavia	=	YUG
Zaire	=	ZAR
Zambia	=	ZMB
1979 (other years are expressed similarly)	=	(79)

5. COMPREHENSIVE LIST OF ABBREVIATIONS ORDERED ALPHABETICALLY BY ABBREVIATION

a	=	anaerobic conditions
AA	=	activation analysis
AAS	=	atomic absorption specytroscopy
ACC	=	accidental exposure
acc	=	acclimated or activated microorganisms i.e. microorganisms that have been adapted to the compound
act	=	activity change
ADD	=	additives
ADI	=	acceptable daily intake
ADS	=	adsorption
ads	=	adsorbed on solid surface
AFG	=	Afghanistan
AFRI	=	Africa
AGO	=	Angola
agr	=	agricultural
air	=	air, atmosphere
ALB	=	Albania
AL	=	acceptable or tolerable limit
all	=	allergic effect
amp	=	amphibians
AND	=	Andorra
ani	=	amimal
ANS	=	autonomic nervous system
ANT	=	Netherlands Antilles
appli	=	deliberate application
Apr	=	April
aq	=	aquatic, water
AQSOL	=	water solubility
ARBs	=	Arabian Sea
ARCo	=	Arctic Ocean
ARE	=	United Arab Emirates
ARG	=	Argentina
ARL	=	acceptable or tolerable residue limit
ASIA	=	Asia
ASKg	=	Alaska, Gulf of
ASM	=	American Samoa
ASV	=	anodic stripping voltametry
ATA	=	Antarctica
ATB	=	British Antarctic Territory
ATF	=	French Southern and Antartic Territory
ATG	=	Antigua
ATLo	=	Atlantic Ocean
ATN	=	Dronning Maud Land
Aug	=	August
AUS	=	Australia
AUSb	=	Great Australian Bight
AUT	=	Austria
av	=	average value
AWI	=	acceptable or tolerable weekly intake
BALs	=	Baltic Sea
BARs	=	Barents Sea

BAT	=	batch or slurry method
bcm	=	biochemical change
BDI	=	Burundi
BEL	=	Belgium
BEN	=	Benin
BERs	=	Bering Sea
BFTs	=	Beaufort Sea
BGD	=	Bangladesh
BGR	=	Bulgaria
BHR	=	Bahrain
BHS	=	Bahamas
bhv	=	behavioural effect
BIM	=	determination of biomass (increase in total bacterial numbers)
biota	=	biota
BISb	=	Biscay, Bay of
bkg	=	background, ambient
BLAs	=	Black Sea
bld	=	blood
BLK	=	Balkan countries
BLZ	=	Belize
BMU	=	Bermuda
BNGb	=	Bengal, Bay of
BNX	=	Benelux countries
BOD	=	biological oxygen demand
BOL	=	Bolivia
BP	=	boiling point
BRA	=	Brazil
BRB	=	Barbados
brd	=	bird
BRN	=	Brunei
BTN	=	Bhutan
BUR	=	Burma
BVT	=	Bouvet Island
BWA	=	Botswana
bw	=	body weight
BYS	=	Byelorussian SSR
C	=	ceiling value
°C	=	degrees Celsius
CAF	=	Central African Empire
cal	=	calculated value
CALg	=	California, Gulf of
CAN	=	Canada
CARs	=	Carribean Sea
car	=	carcinogenic effect
CAS	=	Chemical Abstracts Service Name
CAS NU	=	Chemical Abstracts Service Number
cat	=	cat
cc	=	cell culture
CCK	=	Cocos (Keeling) Islands
c-cup	=	closed cup
cel	=	cellular change
CEC	=	Commission of the European Communities
cgd	=	consumer goods

chd = child (1-13Y)
CHE = Switzerland
chem-react = chemically reactive
CHL = Chile
CHN = China
CHNsE = East China Sea (Tung Hai)
CHNsS = South China Sea (Nan Hai)
CHRIS = The Chemical Hazard Response Information System (US Coast Guard) Reference Number
CHR = chromosome test
CIV = Ivory Coast
ckn = chicken
CLM = column method
CMR = Cameroon, United Republic of
cng = miscellaneous changes
CNS = central nervous system
CO2 = carbon dioxide evolution
COD = chemical oxygen demand
COG = Congo
COK = Cook Islands
COL = Columbia
COLM = colorimetry
COM = Comoros
com = community
cor = corrosive effect
CPV = Cape Verde
crc = change in circulation
CRI = Costa Rica
crs = crustacea
CSK = Czechoslovakia
CSPs = Caspian Sea
cst = coastline
CTE = Canton and Enderbury Isalands
ctl = cattle, horse
cty = city
CVS = cardiovascular system
CUB = Cuba
CXR = Christmas Island
CYM = Cayman Islands
CYP = Cyprus
D = day
dck = duck
DDR = German Democratic Republic
Dec = December
dec = decomposes
DEF = definition
DEN = density
depth = depth
Det = lower detection limit
DEU = Germany, Federeal Republic of
DIA = dialysis method
DIS = specific chemical analysis of the disappearance of the substrate (percent disappearance of the original amount)
DJI = Djibouti

DMA = Dominica
DNA = DNA test
DNK = Denmark
DOC = dissolved organic carbon
dog = dog
DOM = Dominica Republic
dom = domestic
DOT = Department of Transportation, US
xDP = x days during pregnancy
xtDP = xth day of pregnancy
dpn = dermal penetration
drk = drinking
dth = death
dwt = dry weight
DZA = Algeria
E = east
egg = eggs
ECDIN = Environmental Chemicals Data and Information Network of the Commission of the European Communities
EC-GC = gas chromatography with electron capture detection
ECU = Ecuador
EEC = European Economic Communities
Eff = effectivity date
EFTA = European Free Trade Association
EGY = Egypt
emb = embryonic stage, embryo
emi = emission
emr = early mortality
END = endocrine system
end = endocrine, hormonal effect
EP = electrophoresis
erg = through energy production
ESH = Western Sahara
ESP = Spain
est = estuarine
ETH = Ethiopia
EUR = Europe
eval = evaluation
ex = excluding
exo = exocrine effect
exp = experimental measured value
EYE = eye
FAO = Food and Agriculture Organisation of the United Nations
fat = fat (adipose) tissue
Feb = February
FET = fetus, including embryo
field = field study
FIN = Finland
fire = fire hazard
FJI = Fiji
FL = flammable limits
FLK = Falkland Islands (Malvinas)
flow = flow through method
fnc = functional change

food = food products/food and beverages
FP = flash point
FRA = France
FRO = Faeroe Islands
frs = fresh (water)
FS = fluorescence spectrophotometry
fsh = fish
fuel = fuel
g = gram
GAB = Gabon
GBR = United Kingdom
GC = gas chromatography
GC-MS = gas chromatography coupled with mass spectrometry
GEL = Gilbert Islands
gen = genetic change
geoph = geophysical modifications
GHA = Ghana
GIB = Gibraltar
GIN = Guinea
GIT = gastrointestinal tract
GLP = Guadeloupe
GMB = Gambia
GNB = Guinea-Bissau
GNQ = Equatorial Guinea
GN = generation
gor = gorilla
gpg = guinea pig
grb = gerbil
GRC = Greece
GRD = Grenada
GRL = Greenland
grnd = ground
GTM = Guatemala
GUF = French Guiana
GUM = Guam
GUY = Guyana
H = hour
ham = hamster
HAZ = hazard classification
hcc = human cell culture
HEM = haematological system
HKG = Hong Kong
HMD = Heard and MacDonald Islands
hmn = human
HND = Honduras
HPLC = high pressure liquid chromatography
HQ = harmfule quantity
HRT = heart
HTI = Haiti
HUDb = Hudson Bay
HUN = Hungary
HVO = Upper Volta
I = intermittent
ial = intraaural

iat	=	intraarterial
ice	=	intracerebral
icv	=	intracervical
IDN	=	Indonesia
idr	=	intradermal
idu	=	intraduodenal
ifl	=	inflammation
ihl	=	inhalation
IMCO A	=	Inter-Governmental Maritime Consultative Organization Pollution Category A for Operational Discharge
IMCO B	=	Inter-Governmental Maritime Consultative Organization Pollution Category B for Operational Discharge
IMCO C	=	Inter-Governmental Maritime Consultative Organization Pollution Category C for Operational Discharge
IMCO D	=	Inter-Governmental Maritime Consultative Organization Pollution Category D for Operational Discharge
imi	=	immission
IMM	=	immunological system
imm	=	immunological effect
imp	=	implant
IMPUR	=	impurities
ims	=	intramuscular
inc	=	inconclusive
ind	=	industrial, industrial area
IND	=	India
INDaE	=	East Indian Archipelago (Indonesia)
INDo	=	Indian Ocean
inf	=	infant (0-1Y)
ins	=	insect
inv	=	invertebrates other than those specifically listed
IOT	=	British Indian Ocean Territory
ipc	=	intraplacental
ipl	=	intrapleural
ipr	=	intraperitoneal
IR	=	infra red spectrophotometry
IRL	=	Ireland
IRLs	=	Irish Sea
IRN	=	Iran
irn	=	intrarenal
IRPTC NU	=	IRPTC number
IRQ	=	Iraq
irr	=	irritant effects
ISL	=	Iceland
ISO	=	International Standards Organisation Name
isp	=	intraspinal
ISR	=	Israel
ITA	=	Italy
itr	=	intratracheal
ivg	=	intravaginal
ivn	=	intravenous
JAM	=	Jamaica
Jan	=	January
JOR	=	Jordan
JPN	=	Japan

JPNs	=	Japan, Sea of
JTN	=	Johnston Island
Jul	=	July
Jun	=	June
juv	=	juvenile, newly hatched, immature
K	=	Freundlich adsorption coefficient
KARs	=	Kara Sea
Kd	=	distribution adsorption coefficient
KEN	=	Kenya
kg	=	kilogram
kg-c	=	kilograms consumed
kg-p	=	kilograms produced
KHM	=	Kampuchea, Democratic
KNA	=	St. Kitts-Nevis-Anguilla
KOR	=	Korea, Republic of
kPa	=	kilopascal
KWT	=	Kuwait
l	=	litre
LAO	=	Lao People's Democratic Republic
LAPs	=	Laptev (or Nordenskjold) Sea
lar	=	larvae
lak	=	lake
LBN	=	Lebanon
LBR	=	Liberia
LBY	=	Libyan Arab Jamahiriya
LC50	=	lethal concentration, 50% kill
LCA	=	St Lucia
LCLo	=	lowest lethal concentration found
LCn	=	lowest concentration n% kill, i.e. the percentage kill is added, e.g. LC100
LD50	=	lethal dose, 50% kill
LDLo	=	lowest lethal dose found
LIE	=	Liechtenstein
lith	=	lithosphere
LKA	=	Sri Lanka
load	=	total environmental load
loss	=	loss of the compound from one subcompartment
LSO	=	Lesotho
LT	=	lifetime
LUX	=	Luxembourg
LVR	=	liver and gall bladder
lwt	=	lipid weight
M	=	minute
m^3	=	cubic metre
MAC	=	naximum allowable concentration
MACAU	=	Macau (ISO abbreviation is MAC)
MAK	=	maximum worksite concentration
mam	=	mammals
man	=	man (human male)
MAR	=	Morocco
Mar	=	March
mar	=	marine
May	=	May
mcc	=	mammalian cell culture

MCO	=	Monaco
mcr	=	microorganisms, including bacteria, fungi, algae and plankton
MDG	=	Madagascar
MDV	=	Maldives
MEDs	=	Mediterranean Sea
MET	=	specific chemical analysis of the total metabolites produced (percent produced of original amount of the substrate)
MEX	=	Mexico
MEXg	=	Mexico, Gulf of
mg	=	milligram
mg/g	=	milligrams per gram
mg/kg	=	milligrams per kilogram (toxicology data: milligrams per kilogram body weight per day)
mg/kg bw	=	milligrams per kilogram body weight (used in legal file when dose is reported as such)
mg/l	=	milligrams per litre
mg/ml	=	milligrams per millilitre
MID	=	Midway Islands
mky	=	monkey
ML	=	maximum limit
ml	=	millilitre
MLI	=	Mali
MALTA	=	Malta (ISO abbreviation is MLT)
MAR	=	Morocco
MLT	=	multiple organs/systems
mlt	=	multiple effects
mmHg	=	millimetres mercury
MNG	=	Mongolia
mnk	=	mink
Mo	=	month
mol	=	molluscs
MOLFM	=	molecular formula
MOLWT	=	molecular weight
MOZ	=	Mozambique
MP	=	melting point
MPC	=	maximum permissible concentrations
MRL	=	maximum residue limit
MRT	=	Mauritania
MS	=	mass spectrometry
msc	=	muscular effect
MSR	=	Montserrat
MTC	=	maximum tolerable or acceptable concentration
MTQ	=	Martinique
MUS	=	Mauritius
mus	=	mouse
mut	=	mutagenic effect
MWI	=	Malawi
MYS	=	Malaysia
N	=	north
nagr	=	non-agricultrual use
NAM	=	Namibia
NAm	=	North America
natur	=	natural production or occurrence

NCI	=	National Cancer Institute, Carcinogenesis Bioassay Program Number
NCL	=	New Caledonia
ND	=	not detectable
NE	=	north east
nef	=	no effects reported
NEL	=	no effect level
neo	=	neoplastic effect
NER	=	Niger
neu	=	neural effect
NO H2O	=	no water should be used to fight fire
NFK	=	Norfolk Island
ng	=	nanogram
NGA	=	Nigeria
NHB	=	New Hebrides
ni	=	non inclusive
NIC	=	Nicaragua
NIU	=	Niue
NLD	=	Netherlands
NMR	=	nuclear magnetic resonance spectroscopy
NOR	=	Norway
NORs	=	Norwegian Sea
Nov	=	November
NPL	=	Nepal
NRU	=	Nauru
Ns	=	North Sea
NTZ	=	Neutral Zone
NW	=	North West
NWp	=	North West Passage
NZL	=	New Zealand
o	=	aerobic conditions
occ	=	occupational environment
OCC	=	occupational exposure
OCEA	=	Oceania, including Australia
Oct	=	October
ocu	=	ocular
o-cup	=	open cup
OECD	=	Organisation for Economic Cooperation and Development
OHM-TADS	=	US EPA, Office of Hazardous Materials - Technical Assistance Data System Reference Number
OKHs	=	Okhotsk, Sea of
olp	=	organoleptic effect
OMN	=	Oman
% org	=	percent organic matter content
orl	=	oral
ors	=	organic solvent
osm	=	osmotic changes
oxy	=	oxygen consumption increased or decreased
P	=	during pregnancy
p	=	pure culture
PACo	=	Pacific Ocean
pad	=	pre-adult
PAK	=	Pakistan
PAN	=	Panama

par = parenteral
part = particulates
PC = partition coefficient (n-octanol/water)
PCI = Pacific Islands
PCN = Pitcairn Islands
PCZ = Panama Canal Zone
PER = Peru
pg = picogram
pgn = pigeon
pH = hydrogen ion concentrations
PHN = phenotypic test
PHL = Philippines
PHLs = Philippine Sea
pig = pig, young swine
PL = permissible or allowable limit
plt = plant or plant cells
PLT = previously listed organs or systems
PNC = pancreas
PNG = Papua New Guinea
PNS = peripheral nervous system
POL = Poland
POLG = polarography
pol = polluted area
pop = population, population change
ppb = parts per billion
pph = parts per hundred
ppm = parts per million
ppt = parts per thousand
PRI = Puerto Rico
PRK = Korea, People's Democratic Republic of
PRO = prohibition
prs = pressure change
PRT = Portugal
PRY = Paraguay
psy = psychotropic effect
PUL = pulmonary system
PUS = United States Misc. Pacific Islands
pX = ion specific electrode
PYF = French Polynesia
qal = quail
QAT = Qatar
RAD = radiochemical method
rat = rat
rbt = rabbit
rec = rectal
REC = recommendation
recv = amount received from all other subcompartments
RED = Register entry date
REDs = Red Sea
REG = regulation
REP = reproductive system
rep = reproductive effect
rept = reptile
res = change in respiration rate

ret	=	retardation
REU	=	Reunion
Rf	=	Rf value, distance travelled by the test compound/distance travelled by water
RHO	=	Southern Rhodesia
rmv	=	removal
ROM	=	Romania
RSTR	=	restriction
RTECS	=	NIOSH Registry of Toxic Effects of Chemical Substances Registry Number
rur	=	rural
RVDEN	=	relative vapour density
rvr	=	river
RWA	=	Rwanda
S	=	south
s	=	susceptible strain
% sal	=	salinity
SAm	=	South America
samp	=	sample size
SAU	=	Saudi Arabia
sbd	=	subdivision or region within a larger geographic area
SCND	=	Scandinavian Countries
scu	=	subcutaneous
SDN	=	Sudan
SE	=	south east
sed	=	sediment
sel	=	selected
SEN	=	Senegal
Sep	=	September
sew	=	sewage water and sludge
SGP	=	Singapore
SHN	=	St Helena
shp	=	sheep, goat
SIBsE	=	East Siberia Sea
siz	=	size or weight change
SJM	=	Svalbard and Jan Mayen Islands
SKL	=	skeletal system
SKN	=	skin and mucous membranes
skn	=	skin application
SLB	=	Solomon Islands
SLE	=	Sierra Leone
SLV	=	El Salvador
SLWg	=	St Lawrence, Gulf of
SMR	=	San Marino
SNS	=	sense organs
sns	=	changes in sensation
soil	=	soil
SOM	=	Somalia
SON	=	somatic nervous system
spill	=	spills, accidents and uncontrolled dumping
SPM	=	St Pierre and Miquelon
sql	=	squirrel
srf	=	surface
ss	=	steady state

stat	=	static method
STEL	=	short term exposure limit
STP	=	Sao Tome and Principe
str	=	structural change
strat	=	stratosphere
STRFM	=	structural formula
SUN	=	USSR
sun	=	sunlight (simulated or natural)
SUR	=	Suriname
SW	=	south west
swn	=	swine
SWE	=	Sweden
SWZ	=	Swaziland
SYC	=	Seychelles
SYN	=	synonyms
SYR	=	Syrian Arab Republic
t	=	metric tonnes
t-c	=	tonnes consumed
TCA	=	Turks and Caicos Islands
TCD	=	Chad
TCLo	=	lowest toxic concentration found
TDLo	=	lowest toxic dose found
ter	=	teratogenic effect
TGO	=	Togo
THA	=	Thailand
tiss	=	tissues
TIT	=	titration
TKL	=	Tokelau
TLC	=	thin layer chromatography
TLV	=	threshold limit value
TMP	=	East Timor
TON	=	Tonga
tot	=	total
tox-fumes	=	toxic fumes
t-p	=	tonnes produced
tpl	=	transplacental
trans	=	environmental transformation of non-natural products
trk	=	turkey
TRK	=	technical reference concentration
trop	=	troposphere
trnsp	=	transport
trr	=	terrestrial
trt	=	clinical treatment of poisoning cases
tt	=	thousand tonnes
tt-c	=	thousand tonnes consumed
TTO	=	Trinidad and Tobago
tt-p	=	thousand tonnes produced
TUN	=	Tunisia
TUR	=	Turkey
TUV	=	Tuvala
TWA	=	time weighted average
TWN	=	Taiwan, Province of
TZA	=	Tanzania, United Republic of
UGA	=	Uganda

UKR	=	Ukranian SSR
UN	=	UN Transport of Dangerous Goods Reference Number
UN CLASS	=	UN Transport of Dangerous Goods Classification Number
UN PACK I	=	UN Transport of Dangerous Goods Packaging Group I, very dangerous substances
UN PACK II	=	UN Transport of Dangerous Goods Packaging Group II, substances presenting medium danger
UN PACK III	=	UN Transport of Dangerous Goods Packaging Group III, substances presenting minor danger
UNS	=	unspecified organ/system
uns	=	unspecified effect
urn	=	urine
URS	=	urinary system
URY	=	Uraguay
USA	=	United States
use	=	use and handling
usp	=	unspecified species
UV	=	ultra violet spectrophotometry
VAT	=	Vatican City State (Holy See)
VCT	=	St. Vincent
VEN	=	Venezuela
ver	=	vertebrates other than those listed specifically
VGB	=	British Virgin Islands
VIR	=	United States Virgin Islands
VIS	=	visible spectrophotometry
VNM	=	Viet-Nam
VP	=	vapour pressure
W	=	west
Wk	=	week
WAK	=	Wake Island
WARN	=	warning
WHO	=	United Nations, World Health Organisation
WLD	=	world
WLF	=	Wallis and Futuna Islands
WLN	=	Wiswesser Line Notation
wmn	=	woman
wor	=	worms
WSM	=	Samoa
wst	=	waste
wwt	=	wet weight
x	=	times
XE	=	X-ray emission spectroscopy
XF	=	X-ray fluorescence spectroscopy
XRD	=	X-ray diffraction
Y	=	year
YEM	=	Yemen
YMD	=	Yemen, Democratic
YUG	=	Yugoslavia
ZAF	=	South Africa
ZAR	=	Zaire
ZMB	=	Zambia
µg	=	micrograms
%	=	percent
(79)	=	1979, other years are expressed similarly

6. ABBREVIATIONS FOR GEOGRAPHIC AND POLITICAL AREAS

Specifications:

When convenient, the following specifications are added to the abbreviations for geographic areas in order to better describe the area:

background, ambient	=	bkg
city	=	cty
coastline	=	cst
east	=	E
industrial area	=	ind
lake	=	lak
north	=	N
north east	=	NE
north west	=	NW
polluted area, e.g. sewage or fall out	=	pol
river	=	rvr
rural	=	rur
south	=	S
south east	=	SE
south west	=	SW
subdivision or region within a larger geographic area	=	sbd
west	=	W

Option:
The World Meteorological Organisation's Worldwide Grid Location Chart could be used for identifying small specified areas.

GEOGRAPHIC AREAS

World

world	=	WLD

Continents

Africa	=	AFRI
Antarctica	=	ATA
Asia	=	ASIA
Europe	=	EUR
North America	=	NAm
Oceania, including Australia	=	OCEA
South America	=	SAm

Other Major Geographic Areas and Organizations

Balkan countires	=	BLK
Benelux countries	=	BNX
European Economic Community	=	EEC
European Free Trade Association	=	EFTA
Organization for Economic Cooperation and Development	=	OECD
Scandinavian countires	=	SCND

Oceans and Seas

Alaska, Gulf of	=	ASKg
Arabian Sea including Gulf of Iran, Gulf of Agabah, Gulf of Oman, Gulf of Aden	=	ARBs
Arctic Ocean including Lincoln Sea	=	ARCo
Atlantic Ocean	=	ATLo
Atlantic Ocean, North	=	ATLoN
Atlantic Ocean, South	=	ATLoS
Baltic Sea including Gulf of Bothnia, Gulf of Finland, Gulf of Riga	=	BALs
Barents Sea including White Sea	=	BARs
Bengal, Bay of including Anadaman or Burma Sea and Malacca and Singapore Straits	=	BNGb
Bering Sea	=	BERs
Beaufort Sea	=	BFTs
Biscay, Bay of	=	BISb
Black Sea including Sea of Agor	=	BLAs
California, Gulf of	=	CALg
Carribean Sea	=	CARs
Caspian Sea	=	CSPs
East China Sea (Tung Hai) including Yellow Sea	=	CHNsE
East Indian Archipelago (Indonesia) including Sulu Sea, Celebes Sea, Molucca Sea, Gulf of Tomini, Halmahera Sea, Ceram Sea, Banda Sea, Arafura Sea, Timor Sea, Flores Sea, Boni Sea, Bali Sea, Makassar Strait, Java Sea, Savu Sea	=	INDaE
East Siberia Sea including Chukchi Sea	=	SIBsE
Great Australian Bight	=	AUSb
Hudson Bay including Hudson Strait	=	HUDb
Indian Ocean including Mozambique Channel	=	INDo
Irish Sea, St. George's Channel and North Channel	=	IRLs
Japan, Sea of	=	JPNs
Kara Sea	=	KARs

Laptev (or Nordenskjold) Sea	=	LAPs
Mediterranean Sea including Western Basin, Eastern Basin, Straits of Gibraltar, Alboran Sea, Balearic Sea, Ligurian Sea, Tyrrhenian Sea, Ionian Sea, Adriatic Sea, Aegean Sea and Marmara, Sea of	=	MEDs
Mexico, Gulf of	=	MEXg
North Sea including Kattegat, Skagerak, English Channel	=	Ns
North West Passage including Baffin Bay, Davis Strait, Labrador Sea	=	NWp
Norwegian Sea including Greenland Sea	=	NORs
Okhotsk, Sea of	=	OKHs
Pacific Ocean	=	PACo
Pacific Ocean, North	=	PACoN
Pacific Ocean, South	=	PACoS
Philippine Sea	=	PHLs
Red Sea including Gulf of Suez	=	REDs
St. Lawrence, Gulf of	=	SLWg
South China Sea (Nan Hai) including Gulf of Thailand	=	CHNsS

COUNTRIES

Afghanistan	=	AFG
Albania	=	ALB
Algeria	=	DZA
American Samoa	=	ASM
Andorra	=	AND
Angola	=	AGO
Antarctica	=	ATA
Antigua	=	ATG
Argentina	=	ARG
Australia	=	AUS
Austria	=	AUT
Bahamas	=	BHS
Bahrain	=	BHR
Bangladesh	=	BGD
Barbados	=	BRB
Belgium	=	BEL
Belize	=	BLZ
Benin	=	BEN
Bermuda	=	BMU
Bhutan	=	BTN
Bolivia	=	BOL
Botswana	=	BWA
Bouvet Island	=	BVT
Brazil	=	BRA
British Antarctic Territory	=	ATB
British Indian Ocean Territory	=	IOT

British Virgin Islands	=	VGB
Brunel	=	BRN
Bulgaria	=	BGR
Burma	=	BUR
Burundi	=	BDI
Byelorussian SSR	=	BYS
Cameroon, United Republic of	=	CMR
Canada	=	CAN
Canton and Enderbury Islands	=	CTE
Cape Verde	=	CPV
Cayman Islands	=	CYM
Central African Empire	=	CAF
Chad	=	TCD
Chile	=	CHL
China	=	CHN
Christmas Island	=	CXR
Cocos (Keeling) Islands	=	CCK
Columbia	=	COL
Comoros	=	COM
Congo	=	COG
Cook Islands	=	COK
Costa Rica	=	CRI
Cuba	=	CUB
Cyprus	=	CYP
Czechoslovakia	=	CSK
Denmark	=	DNK
Djibouti	=	DJI
Dominica	=	DMA
Dominican Republic	=	DOM
Dronning Maud Land	=	ATN
East Timor	=	TMP
Ecuador	=	ECU
Egypt	=	EGY
El Salvador	=	SLV
Equatorial Guinea	=	GNQ
Ethiopia	=	ETH
Faeroe Islands	=	FRO
Falkland Islands (Malvinas)	=	FLK
Fiji	=	FJI
Finland	=	FIN
France	=	FRA
French Guiana	=	GUF
French Polynesia	=	PYF
French Southern and Antarctic Territories	=	ATF
Gabon	=	GAB
Gambia	=	GMB
German Democratic Republic	=	DDR
Germany, Federal Republic of	=	DEU
Ghana	=	GHA
Gibraltar	=	GIB
Gilbert Islands	=	GEL
Greece	=	GRC
Greenland	=	GRL
Grenada	=	GRD

Guadeloupe	=	GLP
Guam	=	GUM
Guatemala	=	GTM
Guinea	=	GIN
Guinea-Bissau	=	GNB
Guyana	=	GUY
Haiti	=	HTI
Heard and McDonald Islands	=	HMD
Honduras	=	HND
HongKong	=	HKG
Hungary	=	HUN
Iceland	=	ISL
India	=	IND
Indonesia	=	IDN
Iran	=	IRN
Iraq	=	IRQ
Ireland	=	IRL
Israel	=	ISR
Italy	=	ITA
Ivory Coast	=	CIV
Jamaica	=	JAM
Japan	=	JPN
Johnston Island	=	JTN
Jordan	=	JOR
Kampuchea, Democratic	=	KHM
Kenya	=	KEN
Korea, Democratic People's Republic	=	PRK
Korea, Republic of	=	KOR
Kuwait	=	KWT
Lao People's Democratic Republic	=	LAO
Lebanon	=	LBN
Lesotho	=	LSO
Liberia	=	LBR
Libyan Arab Jamahiriya	=	LBY
Liechtenstein	=	LIE
Luxembourg	=	LUX
Macau (ISO abbreviation is MAC)	=	MACAU
Madagascar	=	MDG
Malawi	=	MWI
Malaysia	=	MYS
Maldives	=	MDV
Mali	=	MLI
Malta (ISO abbreviation is MLT)	=	MALTA
Martinique	=	MTQ
Mauritania	=	MRT
Mauritius	=	MUS
Mexico	=	MEX
Midway Islands	=	MID
Monaco	=	MCO
Mongolia	=	MNG
Montserrat	=	MSR
Morocco	=	MAR
Mozambique	=	MOZ
Nambia	=	NAM

Nauru	=	NRU
Nepal	=	NPL
Netherlands	=	NLD
Netherlands Antilles	=	ANT
Neutral Zone	=	NTZ
New Caledonia	=	NCL
New Hebrides	=	NHB
New Zealand	=	NZL
Nicaragua	=	NIC
Niger	=	NER
Nigeria	=	NGA
Niue	=	NIU
Norfolk Island	=	NFK
Norway	=	NOR
Oman	=	OMN
Pacific Islands	=	PCI
Pakistan	=	PAK
Panama	=	PAN
Panama Canal Zone	=	PCZ
Papua New Guinea	=	PNG
Paraguay	=	PRY
Peru	=	PER
Philippines	=	PHL
Pitcairn Island	=	PCN
Poland	=	POL
Portugal	=	PRT
Puerto Rico	=	PRI
Qatar	=	QAT
Reunion	=	REU
Romania	=	ROM
Rwanda	=	RWA
St. Helena	=	SHN
St. Kitts-Nevis-Anguilla	=	KNA
St. Lucia	=	LCA
St. Pierre and Miquelon	=	SPM
St. Vincent	=	VCT
Samoa	=	WSM
San Marino	=	SMR
Sao Tome and Principe	=	STP
Saudi Arabia	=	SAU
Senegal	=	SEN
Seychelles	=	SYC
Sierra Leone	=	SLE
Singapore	=	SGP
Solomon Islands	=	SLB
Somalia	=	SOM
South Africa	=	ZAF
Southern Rhodesia	=	RHO
Spain	=	ESP
Sri Lanka	=	LKA
Sudan	=	SDN
Suriname	=	SUR
Svalbard and Jan Meyen Islands	=	SJM
Swaziland	=	SWZ

Sweden	=	SWE
Switzerland	=	CHE
Syrian Arab Republic	=	SYR
Taiwan, Province of	=	TWN
Tanzania, United Republic of	=	TZA
Thailand	=	THA
Togo	=	TGO
Tokelau	=	TKL
Tonga	=	TON
Trinidad and Tobago	=	TTO
Tunisia	=	TUN
Turkey	=	TUR
Turks and Caicos Islands	=	TCA
Tuvalu	=	TUV
Uganda	=	UGA
Ukranian SSR	=	UKR
United Arab Emirates	=	ARE
United Kingdom	=	GBR
United States	=	USA
United States Misc. Pacific Islands	=	PUS
United States Virgin Islands	=	VIR
Upper Volta	=	HVO
Uraguay	=	URY
USSR	=	SUN
Vatican City State (Holy See)	=	VAT
Venezuela	=	VEN
Viet Nam	=	VNM
Wake Island	=	WAK
Wallis and Futuna Islands	=	WLF
Western Sahara	=	ESH
Yemen	=	YEM
Yemen, Democratic	=	YMD
Yugoslavia	=	YUG
Zaire	=	ZAR
Zambia	=	ZMB

International Organisation for Standardization, International Standard ISO 3166 - 1974/Ammendment 2, Codes for the Representation of Names and Countries 1978, Geneva, Switzerland.

7. CONVERSION INSTRUCTIONS

DOSE CONVERSIONS

Conversions to mg/kg bw

The conversion factors are found on the following page.

a) from Ymg

$$X \text{ mg/kg bw} = \frac{Y \text{ mg}}{\text{body weight (kg)}}$$

b) from Y mg/kg diet (Y ppm)

$$\text{Conversion factor (food)} = \frac{\text{body weight (kg)}}{\text{daily food consumption (kg)}}$$

$$X \text{ mg/kg bw} = \frac{Y \text{ mg/kg diet}}{\text{Conversion factor (food)}}$$

c) from Y mg/l drinking water (Y ppm)

$$\text{Conversion factor (water)} = \frac{\text{body weight (kg)}}{\text{daily water consumption (l)}}$$

$$X \text{ mg/kg bw} = \frac{Y \text{ mg/l water}}{\text{Conversion factor (water)}}$$

d) from Y % solution (drinking water)

$$X \text{ mg/kg bw} = \frac{Y \; 10^4 (\text{mg/l})}{\text{Conversion factor (water)(kg/l)}}$$

e) from Y mole/litre (M) (drinking water)

$$X \text{ mg/kg bw} = \frac{Y(M) \times \text{molecular weight}}{\text{Conversion factor(water)(kg/l)}}$$

CONVERSION FACTORS FOR TOXIC DOSE CALCULATION FROM NON-SPECIFIC DATA*

Species (adult unless otherwise specified)	Weight	Consumption Food g/day	Water ml/day (Approx.)	Conversion Factor (Food)	Conversion Factor (Water-kg/l)
Bird (any domestic or laboratory bird reported but not otherwise identified)	1 kg				
Bird (wild bird species)	40 g				
Cat	5 kg	250	400	20	12.5
Cattle, Horse	500 kg	10,000	-	50	-
Chicken (male or female)	500 g	100	200	5	2.5
Child (1-13Y)	20 kg	-	-	-	-
Dog	10 kg	500	1,000	20	10
Dog (beagle)	17 kg	1,500	2,000	12	8.5
Duck (domestic)	2.5 kg	250	500	10	5
Frog	33 g				
Gerbil	100 g	5	5	20	20
Gorilla	400 kg	-	-	-	-
Guinea pig	600 g	30	100	20	6
Hamster	125 g	15	85	8	1.5
Human	70 kg	-	1,200	-	58
Infant (0-1Y)	5 kg	-	-	-	-
Mammal (species unspecified in reference)	200 g	-	-	-	-
Man	70 kg	-	-	-	-
Mink	1000 g	100	-	10	-
Monkey	5 kg	400	500	12.5	10
Monkey (Rhesus)	12.5 kg	500	500	25	25
Monkey (Tupaia glis)	200 g	25	25	8	8
Mouse	25 g	5	5	5	5
Pig (young swine)	50 kg	2000	-	25	-
Pigeon	500 g	50	50	10	10
Quail (laboratory)	100 g	-	-	-	-
Rabbit	3 kg	100	330	30	9
Rat	200 g	10	25	20	8
Rat (weanling)	50 g	10	25	5	2
Sheep, goat	60 kg	2000	-	30	-
Squirrel	500 g	-	-	-	-
Swine	150 kg	3000	-	50	-
Toad	100 g	-	-	-	-
Turkey	5 kg	-	-	-	-
Woman	50 kg	-	-	-	-

* NOTE: Values given here are within reasonable limits usually found in the published literature and are selected to facilitate calculations for data from publications in which toxic dose information has not been presented for an individual animal of the study. Data for lifetime exposure are calculated from the assumptions for adult animals for the entire period of exposure. For definitive data, the reader must review the referenced publication. Much of this data was taken from NIOSH (1977) Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, Ohio.

CONCENTRATION CONVERSIONS

"Ppm in air" means volumes of contaminant per million volumes of air. The conversion from parts per million in air and milligrams per cubic metre involves assumptions about a standard atmosphere. The assumptions, in the case of studies of the effects of contamination on plant life, are different from those in the case of studies of health effects on experimental animals or industrial workers.

In reporting air concentrations affecting vegetation, the following assumptions of the standard atmosphere are made: pressure, 760 torr; temperature 15°C; volume of a gas 23.654 litres. In reporting air concentrations affecting experimental animals and for industrial hygiene surveys, the standard atmosphere is considered to have the same pressure, but a temperature of 25°C, and thus a volume of a mole of gas 24,45 litres.

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Conversions to mg/m^3 air at 25°C and 101.3kPa (760mmHg): for experimental animals and industrial hygiene surveys.

a) from Ypph (%) (parts per hundred) — Xmg/m^3 = molecular weight x Ypph x 409

b) from Yppt (dm^3/m^3) (parts per thousand) — Xmg/m^3 = molecular weight x Yppt x 40.9

c) from Yppm (cm^3/m^3) (parts per million) — Xmg/m^3 = molecular weight x Yppm x 0.0409

d) from Yppb (mm^3/m^3) (parts per US billion) — Xmg/m^3 = molecular weight x Yppb x 0.0409 x 10^{-3}

e) from Yppt (μ^3/m^3) (parts per US trillion) — Xmg/m^3 = molecular weight x Yppt x 0.0409 x 10^{-6}

Conversions to mg/m^3 air at 15°C and 101.3kPa(760mmHg) for plants, vegetation

a) from Ypph (%) (parts per hundred) — Xmg/m^3 = molecular weight x Ypph x 423

b) from Yppt(dm^3/m^3) (when t = thousand) — Xmg/m^3 = molecular weight x Yppt x 42.3

c) from Yppm(cm^3/m^3) (parts per million) — Xmg/m^3 = molecular weight x Yppm x 0.0423

d) from Yppb(mm^3/m^3) (parts per US billion) — Xmg/m^3 = molecular weight x Yppb x 0.0423 x 10^{-3}

e) from Yppt(μ^3/m^3) (when t = trillion) — Xmg/m^3 = molecular weight x Yppt x 0.0423 x 10^{-6}

Conversions to mg or other weight unit per kg solid and per l water
(the density of water assumed to be 1)

a) from Ypph(%)	Xg/kg	= Ypph x 10
	Xg/l	= Ypph x 10
b) from Yppt (when t = thousand)	Xg/kg	= Yppt
	Xg/l	= Yppt
c) from Yppm	Xmg/kg	= Yppm
	Xmg/l	= Yppm
d) from Yppb	Xμg/kg	= Yppb
	Xμg/l	= Yppb
e) from Yppt (when t = trillion)	Xng/kg	= Yppt
	Xng/l	= Yppt
f) from mg/ml	Xmg/l	= Ymg/ml x 1000
g) from mg/m^3	Xmg/l	= $\frac{Y mg/m^3}{1000}$
h) from M(mole per litre)	Xg/l	= YM x molecular weight

WEIGHT AND VOLUME TO WEIGHT CONVERSIONS

Xkg = Ylbs x 0.4536

X tonnes = $\frac{Ykg}{1000}$

X tonnes = Ylbs x 0.0004536

For the purpose of the Register 1 litre will be considered to weigh 1kg for all liquids. The following conversions are used.

X tonnes = $\frac{Y \text{ litres}}{1000}$

X tonnes = $\frac{Y \text{ barrels(petroleum)} \times 159}{1000}$, as 1 barrel(petroleum) = 159 litres*

X tonnes = $\frac{Y \text{ barrels(other material)} \times 116}{1000}$, as 1 barrel(other material) = 116 litres*

* Geigy (1970) Scientific Tables, 7th edition, Diem, K and Lentner C. ed., published by J.R. Geigy S.A., Basel, Switzerland, p.204

TEMPERATURE CONVERSIONS

Conversions to degrees Celsius (centigrade)

a) from Y degrees Fahrenheit: $X^{o}C = 5/9 \times (Y^{o}F - 32)$

b) from Y degrees Kelvin: $X^{o}C = YK - 273.15$

Initial conversions are made with the most exact figures available, then the resulting figure is rounded off to the nearest whole number in such a manner that .5 raises the odd numbers, while even numbers are not altered, e.g. 13.51 is rounded off to 14; 13.5 is rounded off to 14, but 14.5 is rounded off to 14.

PRESSURE CONVERSIONS

Conversions to kilopascal, kPa

a) from YmmHg (Torr): XkPa = YmmHg x 0.1333

b) from Y bar: XkPa = Ybar x 100

c) from Yatm (physical atmosphere) XkPa = Yatm x 101.3

d) from Yat (technical atmosphere) XkPa = Yat x 98.07

Initial conversions are made with the most exact figures available, then the resulting figure is rounded off to the same amount of significant figures given originally.

DENSITY CONVERSIONS

Conversions to grams per millilitre

a) from Yg/cm^3: $Xg/ml = Yg/cm^3$

b) from Ykg/l: Xg/ml = Ykg/l

8. FORMAT FOR DATA PROFILES

IRPTC NU:
CAS NU: MOLFM: MOLWT:
STRFM: WLN:

DEF:

SYN:

MP: FP: DEN:
BP: FL: RVDEN:
HAZ:
VP: ADS/DES:
PC: AQSOL:

ADD:
IMPUR:

PRODUCTION/CONSUMPTION

PRODUCTION PROCESS(ES)

USES

PATHWAYS INTO THE ENVIRONMENT

CONCENTRATIONS

BIODEGRADATION

PHOTODEGRADATION

HYDROLYSIS

ADSORPTION

EVAPORATION

LOSS

MODEL ECOSYSTEM STUDIES

ENVIRONMENTAL FATE

BIOCONCENTRATION FACTOR

CLEARANCE TIME

MAMMALIAN METABOLITES

MAMMALIAN TOXICITY ARRAY

CARCINOGENICITY

MUTAGENICITY

NEUROTOXICITY/BEHAVIOUR

POTENTIATION

PRIMARY IRRITATION

REPRODUCTION

SENSITIZATION

TERATOGENICITY

AQUATIC TOXICITY

TERRESTRIAL TOXICITY

SAMPLING/PREPARATION/ANALYSIS

SAMPLING/PREPARATION

SPILLS

TREATMENT OF POISONING

REMOVAL

RECOMMENDATIONS/LEGAL MECHANISMS