

Health and Safety Guide No. 39

# MIREX

## HEALTH AND SAFETY GUIDE



UNITED NATIONS  
ENVIRONMENT PROGRAMME



INTERNATIONAL  
LABOUR ORGANISATION



WORLD HEALTH  
ORGANIZATION

## IPCS

Other HEALTH AND SAFETY GUIDES available:

1. Acrylonitrile
2. Kelevan
3. 1-Butanol
4. 2-Butanol
5. 2,4-Dichlorophenoxyacetic Acid (2,4-D)
6. Methylene Chloride
7. *tert*-Butanol
8. Epichlorohydrin
9. Isobutanol
10. Tetrachloroethylene
11. Tetradifon
12. Tecnazene
13. Chlordane
14. Heptachlor
15. Propylene Oxide
16. Ethylene Oxide
17. Endosulfan
18. Dichlorvos
19. Pentachlorophenol
20. Dimethoate
21. Aldrin and Dieldrin
22. Cypermethrin
23. Quintozene
24. Allethrins
25. Resmethrins
26. Pyrrolizidine Alkaloids
27. Magnetic Fields
28. Phosphine
29. Dimethyl Sulfate
30. Deltamethrin
31. Tetramethrin
32. *d*-Phenothrin
33. Permethrin
34. Fenvalerate
35. Phosphorus Trichloride and Phosphorus Oxychloride
36. Vinylidene Chloride
37. Ammonia
38. Cyhalothrin and Lambda-Cyhalothrin

**IPCS**

Health and Safety Guide No. 39

**MIREX  
HEALTH AND  
SAFETY GUIDE**

This is a companion volume to  
Environmental Health Criteria 44: Mirex

Published by the World Health Organization for the International  
Programme on Chemical Safety  
(a collaborative programme of the United Nations Environment  
Programme, the International Labour Organisation, and the World  
Health Organization)

**WORLD HEALTH ORGANIZATION, GENEVA 1990**

This report contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of the United Nations Environment Programme, the International Labour Organisation, or the World Health Organization

WHO Library Cataloguing in Publication Data

Mirex : health and safety guide.

(Health and safety guide ; no. 39)

1. Mirex - standards I.Series

ISBN 92 4 151039 0 (NLM Classification: WA 240)

ISSN 0259-7268

© World Health Organization 1990

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. For rights of reproduction or translation of WHO publications, in part or *in toto*, application should be made to the Office of Publications, World Health Organization, Geneva, Switzerland. The World Health Organization welcomes such applications.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

Computer typesetting by HEADS, Oxford OX7 2NY, England  
Printed by Wissenschaftliche Verlagsgesellschaft mbH · D-7000 Stuttgart 10

# CONTENTS

	Page
INTRODUCTION .....	5
1. PRODUCT IDENTITY AND USES .....	7
1.1 Identity .....	7
1.2 Physical and chemical properties .....	7
1.3 Analytical methods .....	8
1.4 Uses .....	8
2. SUMMARY AND EVALUATION .....	9
2.1 Human exposure to mirex .....	9
2.2 Kinetics and metabolism .....	9
2.3 Effects on experimental animals .....	9
2.4 Effects on human health .....	10
2.5 Effects on the environment .....	10
3. CONCLUSIONS AND RECOMMENDATIONS .....	11
3.1 Conclusions .....	11
3.2 Recommendations .....	11
4. HUMAN HEALTH HAZARDS, PREVENTION AND PROTECTION, EMERGENCY ACTION .....	12
4.1 Main human health hazards, prevention and protection, first aid .....	12
4.1.1 Advice to physicians .....	12
4.1.2 Health surveillance advice .....	13
4.2 Safety in use .....	13
4.3 Explosion and fire hazards .....	14
4.3.1 Explosion hazards .....	14
4.3.2 Fire hazards .....	14
4.4 Storage .....	14
4.4.1 Leaking containers in store .....	14

# CONTENTS

	Page
4.5 Transport . . . . .	15
4.6 Spillage and disposal . . . . .	15
4.6.1 Spillage . . . . .	15
4.6.2 Disposal . . . . .	15
5. HAZARDS FOR THE ENVIRONMENT AND THEIR PREVENTION . . . . .	 17
5.1 Hazards . . . . .	17
5.2 Prevention . . . . .	17
6. SUMMARY OF CHEMICAL SAFETY INFORMATION . . . . .	19
7. CURRENT REGULATIONS, GUIDELINES, AND STANDARDS . . . . .	 24
7.1 Previous evaluations by international bodies . . . . .	24
7.2 Exposure limit values . . . . .	24
7.3 Specific restrictions . . . . .	24
7.4 Labelling, packaging, and transport . . . . .	26
BIBLIOGRAPHY . . . . .	27

## INTRODUCTION

The Environmental Health Criteria (EHC) documents produced by the International Programme on Chemical Safety include an assessment of the effects on the environment and on human health of exposure to a chemical or combination of chemicals, or physical or biological agents. They also provide guidelines for setting exposure limits.

The purpose of a Health and Safety Guide is to facilitate the application of these guidelines in national chemical safety programmes. The first three sections of a Health and Safety Guide highlight the relevant technical information in the corresponding EHC. Section 4 includes advice on preventive and protective measures and emergency action; health workers should be thoroughly familiar with the medical information to ensure that they can act efficiently in an emergency. Within the Guide is a Summary of Chemical Safety Information which should be readily available, and should be clearly explained, to all who could come into contact with the chemical. The section on regulatory information has been extracted from the legal file of the International Register of Potentially Toxic Chemicals (IRPTC) and from other United Nations sources.

The target readership includes occupational health services, those in ministries, governmental agencies, industry, and trade unions who are involved in the safe use of chemicals and the avoidance of environmental health hazards, and those wanting more information on this topic. An attempt has been made to use only terms that will be familiar to the intended user. However, sections 1 and 2 inevitably contain some technical terms. A bibliography has been included for readers who require further background information.

Revision of the information in this Guide will take place in due course, and the eventual aim is to use standardized terminology. Comments on any difficulties encountered in using the Guide would be very helpful and should be addressed to:

The Manager  
International Programme on Chemical Safety  
Division of Environmental Health  
World Health Organization  
1211 Geneva 27  
Switzerland

**THE INFORMATION IN THIS GUIDE  
SHOULD BE CONSIDERED AS A  
STARTING POINT TO A COMPREHENSIVE  
HEALTH AND SAFETY PROGRAMME**

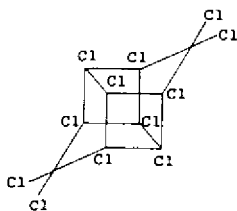


# 1. PRODUCT IDENTITY AND USES

## 1.1 Identity

Common name: mirex

Chemical structure:



Molecular formula:  $C_{10}Cl_{12}$

Common trade names: Dechlorane, Ferriamicide, GC 1283

Common synonyms: dodecachloropentacyclo[5.2.1.0<sup>26</sup>0<sup>39</sup>0<sup>58</sup>]-decanedodecachloro-octahydro-1,3,4-metheno-2H-cyclo-buta[cd]pentalene

CAS chemical name: 1,1a,2,2,3,3a,4,5,5,5a,5b,6-dodecachlorooctahydro-1,3,4-metheno-1H-cyclobuta-[cd]pentalene

CAS registry number: 2385-85-5

Relative molecular mass: 545.5

## 1.2 Physical and Chemical Properties

Mirex is a white crystalline, odourless solid with a melting point of 485 °C. It is soluble in several organic solvents including tetrahydrofuran (30%), carbon disulfide (18%), chloroform (17%), and benzene (12%), but is practically insoluble in water. It has a vapour pressure of  $3 \times 10^{-7}$  mmHg at 25 °C.

## PRODUCT IDENTITY AND USES

Mirex is considered to be extremely stable. It does not react with sulfuric, nitric, hydrochloric, or other common acids and is unreactive with bases, chlorine, or ozone. Despite its stability, reductive dechlorination of mirex can be brought about by reaction with reduced iron porphyrin or more effectively by vitamin B<sub>12</sub>. Slow partial decomposition will also result from exposure to ultraviolet radiation (UVR) in hydrocarbon solvents or to gamma rays. Photomirex (8-monohydro-mirex) is the major product of dechlorination by UVR, and may represent the fate of most of the mirex in the environment.

Mirex is quite resistant to pyrolysis; decomposition begins at 525 °C, and 98–99% combustion is accomplished at 700 °C within 1 second. Hexachlorobenzene is a major pyrolytic product with lesser amounts of carbon monoxide, carbon dioxide, hydrogen chloride, chlorine, carbon tetrachloride, and phosgene given off in the form of a vapour.

Technical grade preparations of mirex contain 95.19% mirex and 2.58% chlordecone, the rest being unspecified. The term "mirex" is also used to refer to bait comprising corncob grits, soya bean oil, and mirex. Insect bait formulations for aerial application containing 0.3–0.5% mirex and fire ant formulations containing 0.075–0.3% mirex have also been used in the USA.

### 1.3 Analytical Methods

Gas chromatography with electron-capture detection is the analytical method most commonly used for its determination.

### 1.4 Uses

Mirex is mainly used as a flame-retardant and as a stomach insecticide, usually formulated into baits, for the control of ants, especially fire ants and harvester ants. The USA appears to be the main country in which mirex was used for pest control, but this use was discontinued in 1978.

The same chemical substance is used, under the name Dechlorane, as a fire retardant in plastics, rubbers, paints, etc. This application is not restricted to the USA.

Recently, the use of mirex has become increasingly restricted or prohibited in many countries (see, e.g., section 7.3).

## 2. SUMMARY AND EVALUATION

### 2.1 Human Exposure to Mirex

Food probably represents the major source of intake of mirex for the general population, fish, wild game, and meat being the main sources. Normally, such intake is below established residue tolerances. Mirex may occur in breast milk, but levels are very low or below detection limits.

No data are available regarding occupational exposure.

### 2.2 Kinetics and Metabolism

Following oral ingestion, mirex is only partly absorbed into the body and the remainder, depending on the dose administered, is eliminated unchanged in the faeces. Mirex can also be absorbed following inhalation and via the skin.

It is a lipophilic compound and, as such, is stored in adipose tissue to a greater extent than in any other tissue. Mirex is transferred across the placenta to the fetus and is excreted with the milk.

Mirex does not appear to have been metabolized to any extent in any animal species investigated. Its elimination from the body is slow and, depending on the species, it has a half-life in the body of several months.

It is one of the most stable pesticides in use today.

### 2.3 Effects on Experimental Animals

Mirex was moderately toxic in single-dose animal studies (oral LD<sub>50</sub> values ranged from 365 to 3000 mg/kg body weight). Toxic effects included neurological symptoms, especially tremors and convulsions.

The most sensitive effects of repeated exposure in experimental animals are principally associated with the liver (liver hypertrophy with morphological changes in the liver cells, and induction of mixed-function

## SUMMARY AND EVALUATION

oxidases). These effects have been observed with doses as low as 1 mg/kg diet (0.05 mg/kg body weight per day), the lowest dose tested.

In studies to investigate the toxicity of mirex in pregnant animals, teratogenic effects were seen in rats given 6 mg/kg body weight per day by gavage, and fetotoxic effects were seen in animals given 25 mg/kg diet. In addition, exposure of male mice to dietary levels of about 2 mg/kg for 3 months resulted in impaired reproductive performance.

Mirex was not generally active in short-term tests for genetic activity. However, mirex is carcinogenic for both mice and rats.

### **2.4 Effects on Human Health**

No data on effects on human beings were available to the Task Group.

### **2.5 Effects on the Environment**

Mirex is one of the most stable and environmentally persistent pesticides in use today. It is not biodegraded by microorganisms, except occasionally under aerobic conditions, and hydrolysis is very slow. Although general environmental levels are low, it is widespread in the biotic and abiotic environment. Mirex is both accumulated and biomagnified. It is strongly adsorbed on sediments and has a low water solubility.

The delayed onset of toxic effects and mortality is typical of mirex poisoning. The long-term toxicity of mirex is uniformly high. It is toxic for a range of aquatic organisms, crustacea being particularly sensitive. Mirex induces pervasive long-term physiological and biological disorders in vertebrates.

Although no field data are available, the adverse effects of long-term exposure to low levels of mirex, combined with its persistence, suggest that the use of mirex presents a long-term environmental risk.

## **3. CONCLUSIONS AND RECOMMENDATIONS**

### **3.1 Conclusions**

1. No data on human health effects are available in connection with occupational exposure to mirex. On the basis of findings in mice and rats, this chemical should be considered, for practical purposes, as being potentially carcinogenic for human beings.
2. For the same reason, reservations must remain about the safety of this chemical in food, despite the relatively low residues so far reported.
3. Effects on the organisms studied, as well as the persistence of mirex, suggest that mirex presents a long-term hazard for the environment.
4. Taking into account these considerations, it is felt that the use of this chemical for both agricultural and non-agricultural applications should be discouraged, except where there is no adequate alternative.

### **3.2 Recommendations**

1. Surveillance should be maintained over any future production, transport, and disposal of mirex and the nature and extent of both its agricultural and non-agricultural use.
2. Comprehensive monitoring of levels of mirex in the environment should be continued.

## 4. HUMAN HEALTH HAZARDS, PREVENTION AND PROTECTION, EMERGENCY ACTION

### 4.1 Main Human Health Hazards, Prevention and Protection, First Aid

Mirex is an organochlorine insecticide. It is toxic and may be hazardous for human beings if incorrectly or carelessly handled. It is therefore essential that the correct precautions should be observed during handling and use.

For details, see the Summary of Chemical Safety Information (section 6).

#### 4.1.1 *Advice to physicians*

##### 4.1.1.1 *Symptoms of poisoning*

Mirex is toxic by mouth, by skin contact (especially liquid formulations), and by inhalation of dust from powder concentrates. It acts as a stimulant of the central nervous system.

Following accidental ingestion or over-exposure, symptoms may include headache, dizziness, nausea, vomiting, weakness in the legs, and convulsions.

Organochlorines can cause respiratory depression. They also sensitize the heart to endogenous catecholamines, leading to ventricular fibrillation and cardiac arrest in severe cases.

Respiratory depression may lead to metabolic acidosis and, if necessary, blood gases should be checked. The use of an ECG monitor is recommended, if the symptoms are severe.

No cases of poisoning in man have been reported so far.

#### 4.1.1.2 *Medical advice*

Medical treatment is largely symptomatic and supportive and directed against convulsions and hypoxia. Because many liquid formulations contain hydrocarbon solvent, vomiting should *not* be induced and emetics

## HUMAN HEALTH HAZARDS, PREVENTION AND PROTECTION, EMERGENCY ACTION

are contraindicated. If mirex is swallowed, the stomach should be emptied as soon as possible by careful gastric lavage (with a cuffed endotracheal tube), avoiding aspiration into the lungs. This should be followed by intragastric administration of 3–4 tablespoons of activated charcoal and 30 g magnesium sulfate or sodium sulfate in a 30% aqueous solution. Oily purgatives are contraindicated. No fats, oils, or milk should be given.

If convulsions occur, anti-convulsants should be given, e.g., diazepam, 10 mg slowly intravenously (children 1–5 mg), repeated as necessary; or thiopental sodium, or hexobarbital sodium slowly intravenously in a dose of 10 mg/kg body weight with a maximum total dose of up to 750 mg for an adult. On account of their short action, these barbiturates should always be followed by phenobarbital given orally at 3 mg/kg body weight (up to 200 mg for an adult), or phenobarbital sodium given intramuscularly at 3 mg/kg (also up to 200 mg for an adult).

**Morphine and its derivatives, epinephrine and norepinephrine, should never be given.**

An unobstructed airway must be maintained. Oxygen and/or artificial respiration may be needed.

### 4.1.2 *Health surveillance advice*

A pre-employment and an annual general medical examination are advised for regularly exposed workers. Special attention should be paid to liver and kidney function.

## 4.2 Safety in Use

Handling liquid formulations:

Wear protective neoprene or PVC gloves, cotton overalls, rubber boots, and face-shield.

Handling powder formulations:

Avoid raising a dust cloud. Wear protective gloves and dust mask. Follow the advice relating to personal hygiene.

## HUMAN HEALTH HAZARDS, PREVENTION AND PROTECTION, EMERGENCY ACTION

### 4.3 Explosion and Fire Hazards

#### 4.3.1 *Explosion hazards*

The explosion hazard will depend on the solvent used in the formulation, or on the characteristics of the dust.

#### 4.3.2 *Fire hazards*

Liquid products containing organic solvents may be flammable. Extinguish fires with alcohol-resistant foam, carbon dioxide, or powder. With sufficient burning or external heat, mirex will decompose, emitting toxic fumes. Fire-fighters should wear a self-contained breathing apparatus, eye protection, and full protective clothing.

Confine the use of water spray to the cooling of unaffected stock, thus avoiding the accumulation of polluted run-off from the site.

### 4.4 Storage

Products should be stored in locked buildings, preferably dedicated to insecticides.

Keep products out of reach of children and unauthorized personnel. Do not store near foodstuffs or animal feed.

#### 4.4.1 *Leaking containers in store*

Take precautions and use appropriate personal protection. Empty any product remaining in damaged/leaking containers into a clean empty drum, which should then be tightly closed and suitably labelled.

Sweep up spillage with sawdust, sand, or earth (moisten for powders), and dispose of safely.

Emptied leaking liquid containers should be rinsed with at least 1 litre water per 20-litre drum. Swirl round to rinse the walls, empty, and add the



## HUMAN HEALTH HAZARDS, PREVENTION AND PROTECTION, EMERGENCY ACTION

residues to the sawdust or earth. Do not re-use containers for any other purpose. Puncture the container to prevent re-use.

### 4.5 Transport

Comply with any local requirements regarding movement of hazardous goods. Do not transport with foodstuffs or animal feed. Make sure that containers are in good condition and labels undamaged before dispatch.

### 4.6 Spillage and Disposal

#### 4.6.1 Spillage

Before dealing with any spillage, precautions should be taken as required and appropriate personal protection should be used.

Prevent liquid from spreading or contaminating other cargo and vegetation, and avoid pollution of surface waters and ground water by using the most suitable available material, e.g., earth or sand.

Absorb spilled liquid with sawdust, sand, or earth, sweep up and place it in a closeable container for later transfer to a safe place for disposal.

As soon as possible after the spillage and before re-use, cover all contaminated areas with damp sawdust, sand, or earth. Sweep up and place in a closeable container for later transfer to a safe place for disposal. Care should be taken to avoid run-off into surface waters or drains.

#### 4.6.2 Disposal

Surplus product, contaminated absorbents, and containers should be disposed of in an appropriate way. Mirex is not readily decomposed chemically or biologically and is relatively persistent. Waste material should be burned only in a proper incinerator designed for organochlorine waste disposal (1000 °C and 30-min residence time with effluent gas scrubbing). If this is not possible, bury in an approved dump or landfill.

## **HUMAN HEALTH HAZARDS, PREVENTION AND PROTECTION, EMERGENCY ACTION**

where there is no risk of contamination of surface or ground water.  
Comply with any local legislation regarding disposal of toxic wastes.

## **5. HAZARDS FOR THE ENVIRONMENT AND THEIR PREVENTION**

### **5.1 Hazards**

Mirex is one of the most stable of the organochlorine insecticides. Although general environmental levels are low, it is widespread in the biotic and abiotic environment. Mirex is both accumulated and biomagnified. It is strongly adsorbed on sediments and has a low water solubility.

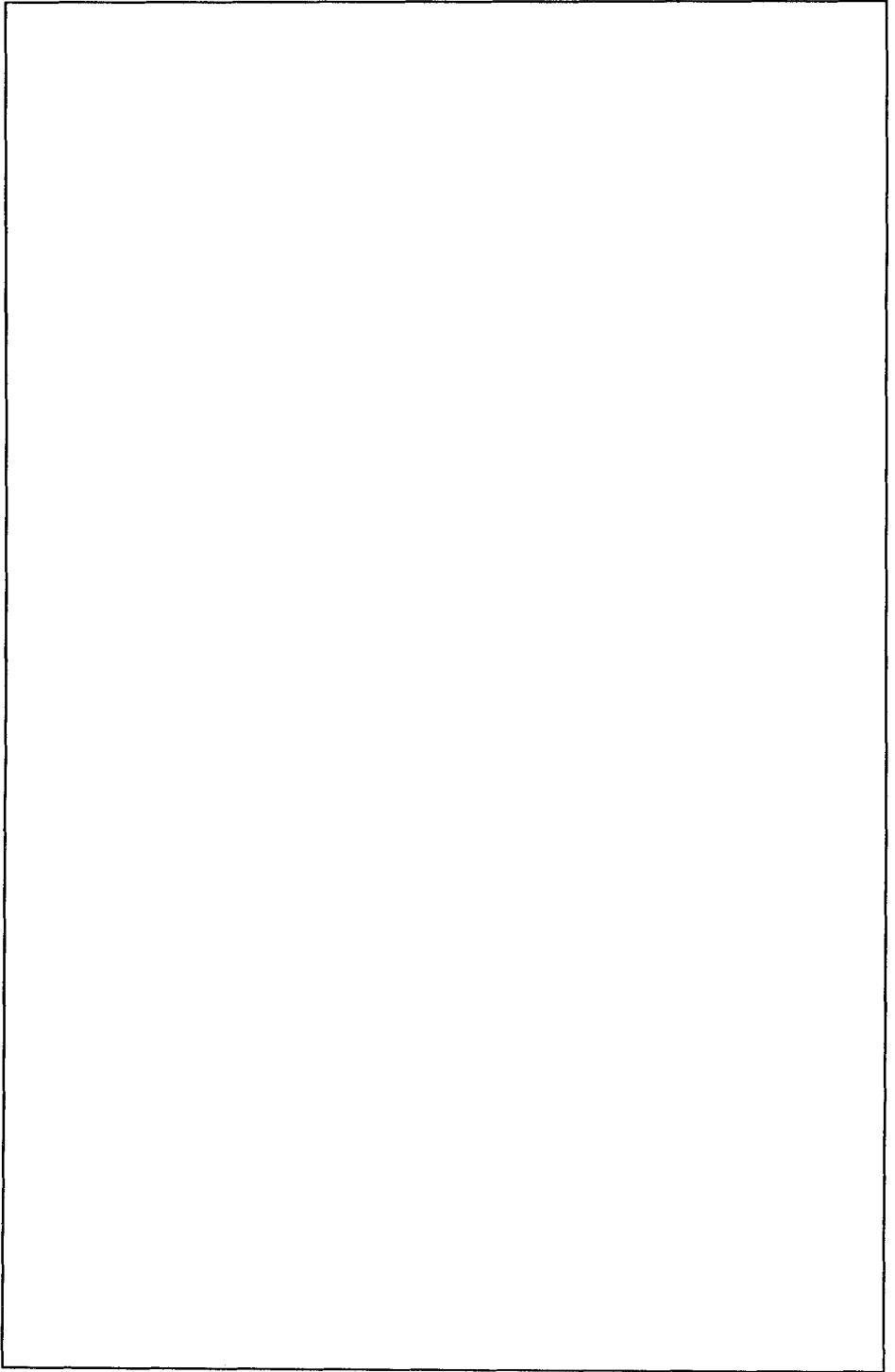
Delayed onset of toxic effects and mortality is typical of mirex poisoning. The long-term toxicity of mirex is uniformly high. Mirex is toxic for a range of aquatic organisms, crustacea being particularly sensitive.

Although no field data are available, the adverse effects of long-term exposure to low levels of mirex, combined with its persistence, suggest that the use of mirex presents a long-term environmental risk.

### **5.2 Prevention**

Industrial discharges from manufacturing, formulation, and technical applications should not be allowed to pollute the environment and should be treated properly.

Any spillage or unused product should be prevented from spreading to vegetation or waterways and should be treated and disposed of properly.



## 6. SUMMARY OF CHEMICAL SAFETY INFORMATION

*This summary should be easily available to all health workers concerned with, and users of, mirex. It should be displayed at, or near, entrances to areas where there is potential exposure to mirex, and on processing equipment and containers. The summary should be translated into the appropriate language(s). All persons potentially exposed to the chemical should also have the instructions in the summary clearly explained.*

*Space is available for insertion of the National Occupational Exposure Limit, the address and telephone number of the National Poison Control Centre, and for local trade names.*

## SUMMARY OF CHEMICAL SAFETY INFORMATION

### MIREX

CAS chemical name: 1,1a,2,2,3,3a,4,5,5a,5b,6-dodecachloroocta-hydro-1,3,4-metheno-1H-cyclobuta[cd]pentalene

CAS registry number: 2385-85-5

RTECS registry number: PC8225000

Molecular formula: C<sub>10</sub>Cl<sub>12</sub>

### PHYSICAL PROPERTIES

Melting point (°C) 485  
Vapour pressure (mmHg at 25 °C)  $3 \times 10^{-7}$   
Relative molecular mass 545.5  
Solubility: practically insoluble  
in water 30%  
in tetrahydrofuran 18%  
in carbon disulfide 17%  
in chloroform 12%  
in benzene

### OTHER CHARACTERISTICS

Mirex is a white crystalline, odourless solid; it is considered to be extremely stable and does not react with common acids, bases, chlorine, or ozone; slow, partial dechlorination by UV radiation yields photomirex; it is quite resistant to pyrolysis, hexachlorobenzene being a major pyrolysis product; it is a stomach insecticide with little contact activity; a major use is for ant control; it is also used as a flame retardant under the name Dechlorane

HAZARDS/SYMPTOMS	PREVENTION AND PROTECTION	FIRST AID
<p>GENERAL: Potential human carcinogen; on repeated exposure mirex may accumulate in the body</p>		
<p>SKIN: Over-exposure may cause poisoning</p>	<p>Avoid skin contact; wear protective clothing, PVC or neoprene gloves, rubber boots</p>	<p>Remove contaminated clothing immediately; wash skin with water and soap</p>
<p>EYES: Irritation, redness</p>	<p>Wear face-shield or goggles</p>	<p>Flush with clean water for 15 minutes; if irritation persists, seek medical attention</p>
<p>INHALATION: Dust may irritate</p>	<p>Wear appropriate dust mask or respirator</p>	
<p>INGESTION: Unlikely occupational hazard</p>	<p>Do not eat, drink, or smoke during work; wash hands before eating, drinking, or smoking</p>	
<p>Accidental or intentional ingestion may cause poisoning</p>		<p>Obtain medical attention immediately; do not induce vomiting; keep at rest lying face downwards; ensure clear airway; fat, milk, or oil should not be given</p>

## SUMMARY OF CHEMICAL SAFETY INFORMATION (continued)

### FIRST AID

### PREVENTION AND PROTECTION

### HAZARDS/SYMPTOMS

**ENVIRONMENT:** Toxic for aquatic and terrestrial life; persistent

Do not spill on animal feed or in waterways

### SPILLAGE

Take appropriate personal precautions; prevent liquid from spreading or contaminating other cargo, vegetation, or waterways with a barrier of the most suitable available material, e.g., earth or sand

Absorb spilled liquid with sawdust, sand, or earth; sweep up and place it in a closeable container for later safe disposal

### STORAGE

Products should be stored in locked buildings, preferably dedicated to insecticides

Keep products out of reach of children and unauthorized personnel; do not store near foodstuffs or animal feed

### FIRE AND EXPLOSION

Liquid products will burn and emulsifiable concentrates are miscible with water; extinguish fires with alcohol-resistant foam, carbon dioxide, or powder; with sufficient burning or external heat, mirex will decompose, emitting toxic fumes; the smoke and fumes could be injurious through inhalation, or absorption through the skin; therefore, fire-fighters should wear protective clothing and self-contained breathing apparatus; confine the use of water spray to the cooling of unaffected stock, thus avoiding polluted run-off from the site



**WASTE DISPOSAL**

**NATIONAL INFORMATION**

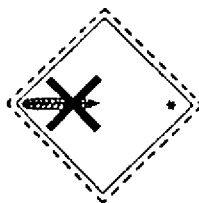
Mirex is not readily decomposed chemically or biologically and is relatively persistent; waste material should be burned in a proper incinerator designed for organochlorine waste disposal; if this is not possible, bury in an approved dump or landfill where there is no risk of contamination of surface or ground water; comply with any local legislation regarding disposal of toxic wastes

National Occupational Exposure Limit:

National Poison Control Centre:

Local trade names:

UN No. 2762, 2995, 2996



## **7. CURRENT REGULATIONS, GUIDELINES, AND STANDARDS**

The information given in this section has been extracted from the International Register of Potentially Toxic Chemicals (IRPTC) legal file and other United Nations sources. Its intention is to give the reader a representative but non-exhaustive overview of current regulations, guidelines, and standards.

The reader should be aware that regulatory decisions about chemicals taken in a certain country can only be fully understood in the framework of the legislation of that country. Furthermore, the regulations and guidelines of all countries are subject to change and should always be verified with the appropriate regulatory authorities before application.

### **7.1 Previous Evaluations by International Bodies**

IARC (1979) evaluated the carcinogenic hazard resulting from exposure to mirex and concluded that "there is sufficient evidence for its carcinogenicity to mice and rats. In the absence of adequate data in humans, it is reasonable, for practical purposes, to regard mirex as if it presented a carcinogenic risk to humans".

An acceptable daily intake (ADI) for mirex has not been established by FAO/WHO.

### **7.2 Exposure Limit Values**

Some exposure limit values are given in the table on the opposite page.

### **7.3 Specific Restrictions**

Recently, the use of mirex has been increasingly restricted or prohibited in many countries.

In the USA, all registered products containing mirex have been cancelled. It has been banned in Ecuador and in various other countries. In the German Democratic Republic, mirex is not permitted in agricultural formulations.

## CURRENT REGULATIONS, GUIDELINES, AND STANDARDS

### EXPOSURE LIMIT VALUES

Medium	Specification	Country/ organization	Exposure limit description	Value	Effective date
FOOD, ANIMAL FEED		USA	Acceptable residue limit (ARL)	0.1 mg/kg	1981
			- Specified animal products - General	0.01 mg/kg	
FOOD		Germany, Federal Republic of	Maximum residue limit (MRL) - Plant (all)	0.01 mg/kg	1984
FOOD	Animal	Germany, Federal Republic of	Maximum residue limit (MRL)	0.1 mg/kg	1984
			- of animal origin (specified)	wet weight	
			- of animal origin (general)	0.1 mg/kg lipid weight	
				0.01 mg/kg wet weight	

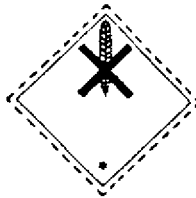
## CURRENT REGULATIONS, GUIDELINES, AND STANDARDS

### 7.4 Labelling, Packaging, and Transport

The United Nations Committee of Experts on the Transportation of Dangerous Goods classified mirex in:

- Hazard Class 6.1:           poisonous substance
- Packing Group III:       a substance presenting a relatively low risk of poisoning in transport (mirex liquid formulations > 60%)

The label should be as follows:



St Andrew's Cross over an ear of wheat (black);  
Background: white.

The bottom half of the label should bear the inscriptions:

*Harmful, stow away from foodstuffs.*

## BIBLIOGRAPHY

FAO (1985a) *Guidelines for the packaging and storage of pesticides*. Rome, Food and Agriculture Organization of the United Nations.

FAO (1985b) *Guidelines for the disposal of waste pesticides and pesticide containers on the farm*. Rome, Food and Agriculture Organization of the United Nations.

FAO (1985c) *Guidelines on good labelling practice for pesticides*. Rome, Food and Agriculture Organization of the United Nations.

FAO (1986a) *International code of conduct on the distribution and use of pesticides*. Rome, Food and Agriculture Organization of the United Nations.

FAO/WHO (1986b) *Guide to Codex recommendations concerning pesticide residues*. Part 8. *Recommendations for methods of analysis of pesticide residues*. 3rd ed. Rome, Codex Committee on Pesticide Residues.

GIFAP (1982) *Guidelines for the safe handling of pesticides during their formulation, packing, storage and transport*. Brussels, Groupement International des Associations Nationales des Fabricants de Produits Agrochimiques.

GIFAP (1983) *Guidelines for the safe and effective use of pesticides*. Brussels, Groupement International des Associations Nationales des Fabricants de Produits Agrochimiques.

GIFAP (1984) *Guidelines for emergency measures in cases of pesticide poisoning*. Brussels, Groupement International des Associations Nationales des Fabricants de Produits Agrochimiques.

GIFAP (1987) *Guidelines for the safe transport of pesticides*. Brussels, Groupement International des Associations Nationales des Fabricants de Produits Agrochimiques.

IARC (1972-present) *IARC monographs on the evaluation of carcinogenic risk of chemicals to man*. Lyons, International Agency for Research on Cancer.

## BIBLIOGRAPHY

IRPTC (1985) *IRPTC file on treatment and disposal methods for waste chemicals*. Geneva, International Register of Potentially Toxic Chemicals, United Nations Environment Programme.

IRPTC (1987) *IRPTC legal file 1986*. Geneva, International Register of Potentially Toxic Chemicals, United Nations Environment Programme.

PLESTINA, R. (1984) *Prevention, diagnosis, and treatment of insecticide poisoning*. Geneva, World Health Organization (unpublished document WHO/VBC/84.889).

SAX, N.I. (1984) *Dangerous properties of industrial materials*. New York, Van Nostrand Reinhold Company, Inc.

UNITED NATIONS (1986) *Recommendations on the transport of dangerous goods*. 4th ed. New York, United Nations.

US NIOSH/OSHA (1981) *Occupational health guidelines for chemical hazards*. 3 Vol. Washington DC, US Department of Health and Human Services, US Department of Labor (Publication No. DHSS(NIOSH) 01-123).

WHO (1984) *Environmental Health Criteria 44: Mirex*. Geneva, World Health Organization.

WHO (1988) *The WHO recommended classification of pesticides by hazard and guidelines to classification 1988-89*. Geneva, World Health Organization (unpublished document WHO/VBC/88.953).

WHO/FAO (1975-90) *Data sheets on pesticides*. Geneva, World Health Organization (unpublished documents).

WORTHING, C.R. & WALKER, S.B. (1983) *The pesticide manual*. 7th ed. Lavenham, Lavenham Press Limited, British Crop Protection Council.

Price: Sw. fr. 5.-  
Price in developing countries: Sw. fr. 3.50

ISBN 92 4 151039 0