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Health and Safety Guide No. 23

**QUINTOZENE
HEALTH AND
SAFETY GUIDE**

This is a companion volume to
Environmental Health Criteria 41: Quintozene

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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 an International Chemical Safety Card 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
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**THE INFORMATION IN THIS GUIDE
SHOULD BE CONSIDERED AS A
STARTING POINT TO A COMPREHENSIVE
HEALTH AND SAFETY PROGRAMME**

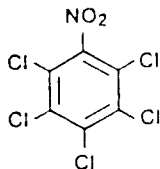
1. PRODUCT IDENTITY AND USES

1.1 Identity

Common name: Quintozene

Chemical formula: $C_6Cl_5NO_2$

Chemical structure:



Common trade names: Avicol, Botrilex, Brassicol, Earthcide, Fartox, Folosan, Fomac 2, Fungiclor, GC 3944-3-4, Kobu, Kobutol, KP 2, NCI-C00419, Olpisan, PCNB, Pentagen, Terraclor, Terrafum, Tilcarex, Tritisan (a complete list of trade names is available from IRPTC (1983))

CAS chemical name: pentachloronitrobenzene

CAS registry number: 82-68-8

Relative molecular mass: 295.36

Hexachlorobenzene is often found as a contaminant in quintozene and levels can range up to 3%. (in the past, levels as high as 30% were found, but regulations have been introduced in many countries to restrict these levels).

1.2 Physical and Chemical Properties

Quintozene is a pale yellow-to-white (depending on the purity) solid with a musty odour and a melting point of 142–146 °C. It is soluble in carbon disulfide, benzene, chloroform, ketones, and aromatic and chlorinated hydrocarbons, but is practically insoluble in water.

PRODUCT IDENTITY AND USES

It is quite stable in soil, but eventually degrades to pentachloroaniline (PCA).

1.3 Analytical Methods

Gas chromatography combined with electron capture detection is used for the analytical determination of quintozene.

1.4 Production and Uses

Quintozene has been used as a soil fungicide and as a seed dressing since the 1930s. It is available as a wettable powder, dust, emulsifiable concentrate, granules, or in combination products.

2. SUMMARY AND EVALUATION

2.1 Quintozene Toxicity

On the basis of the oral LD₅₀ in the rat of 12 000 mg/kg, WHO (1986) classified quintozene in the category of technical products unlikely to present an acute hazard in normal use.

No-observed-adverse-effect levels in long-term studies on the rat and the dog were 1.25 and 0.75 mg/kg body weight (25 and 30 mg/kg diet), respectively. In long-term studies on rats and at higher dosages (63 mg/kg diet), quintozene gave rise to liver hypertrophy with some histopathological changes; dogs administered 5000 mg quintozene/kg diet exhibited more severe liver damage with fibrosis. In short-term studies on female rats, quintozene caused induction of mixed-function oxidases.

Quintozene is partly metabolized and partly excreted unchanged and does not accumulate in tissues.

Purified quintozene is not considered to be teratogenic.

Quintozene is generally negative in short-term tests for genetic activity.

Equivocal or negative findings have been reported in carcinogenicity studies on rats and mice.^a Hexachlorobenzene, an impurity in technical quintozene, is carcinogenic for mice, rats, and hamsters.

Quintozene is a weak skin sensitizer, but not an irritant.

With the exception of a single case of conjunctivitis in an occupational setting, no other cases of poisoning or adverse effects have been reported in man.

2.2 Human Exposure to Quintozene

The general population can be exposed through residues in food, especially in oils and fats. Information on exposure from other sources is

^aIn a recent (1986) NTP study on purified PCNB in mice, no evidence of carcinogenicity was found at high dose levels.

SUMMARY AND EVALUATION

lacking. No cases of accidental or occupational overexposure have been reported.

2.3 Evaluation of Health Risks for Man

With the exception of some data on residues in food, no human exposure data are available for quintozone. It is therefore difficult to evaluate the hazard for man of present exposures to this substance. Nevertheless, the low toxicity of quintozone that has been demonstrated in short-term and long-term animal studies indicates a low degree of concern in relation to human health effects.

2.4 Evaluation of Effects on the Environment

Quintozone persists in soil with a half-life within the range of 4–10 months. Part of it is lost from the soil by volatilization. Biodegradation, mainly to pentachloroaniline, is an important route of conversion. Photodegradation is not important.

The only significant adverse effect reported for quintozone is on earthworms. In laboratory tests, quintozone applied as a soil fungicide, at recommended doses, appeared to have long-term toxic effects on the earthworm. Unfortunately, no observations of the effects on earthworms of quintozone alone, during field use, are available.

There is no evidence that quintozone represents a threat to non-target organisms. It has a very low acute toxicity for fish and *Daphnia*.

Its bioaccumulation by fish is low, and no effects have been reported on terrestrial plants, birds, or microorganisms.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

(a) The general population does not appear to be at risk from residues of quintozone in food.

(b) Exposure of the general population via air and drinking-water could not be evaluated because of lack of data.

(c) Occupational exposure has not been reported to cause any adverse effects.

(d) There is limited information on the effects of quintozone in the general environment. It has been shown to be toxic for earthworms in laboratory tests. Data on other organisms suggest that quintozone does not pose a problem in the general environment.

(e) Quintozone does not biomagnify.

(f) The major toxicological concern with quintozone is the presence of hexachlorobenzene as an impurity.

3.2 Recommendations

Levels of impurities in quintozone, especially hexachlorobenzene, should be kept to a minimum.

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

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

Quintozene is a practically non-toxic organochlorine fungicide. Nevertheless, the correct precautions should be observed in its handling and use.

For details see the International Chemical Safety Card on pages 18–21.

4.1.1 Advice to physicians

Poisoning is unlikely to occur unless a massive overdose is swallowed. In this case, it is not necessary to induce vomiting. If gastric lavage is undertaken, a cuffed endotracheal tube should be used. Otherwise, a clear airway should be maintained and respiration should be safeguarded.

4.1.2 Health surveillance advice

No routine medical supervision is required.

4.2 Explosion and Fire Hazards

4.2.1 Explosion hazards

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

4.2.2 Fire hazards

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

HUMAN HEALTH HAZARDS, PREVENTION AND PROTECTION, EMERGENCY ACTION

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

4.3 Storage

Products should be stored in locked buildings, preferably dedicated to pesticides, and kept out of reach of children and unauthorized personnel. They should not be stored near foodstuffs or animal feed.

4.3.1 *Leaking containers in store*

Take precautions and use appropriate personal protection (see the International Chemical Safety Card on pages 18–21). Empty any product remaining in the 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 (section 4.5.2).

After emptying, leaking containers should be rinsed with at least 1 litre of water per 20-litre drum. Swirl round to rinse the walls, empty, and add the rinsings to the sawdust or earth. Puncture the container to prevent re-use.

4.4 Transport

Local requirements regarding movements of hazardous goods should be complied with. The product should not be transported in the same compartment as foodstuffs. Containers should be checked before despatch to ensure that they are sound and that the labels are undamaged.

4.5 Spillage and Disposal

4.5.1 *Spillage*

Before dealing with any spillage, the necessary precautions should be taken and appropriate personal protection should be used (see the International Chemical Safety Card on pages 18–21).

HUMAN HEALTH HAZARDS, PREVENTION AND PROTECTION, EMERGENCY ACTION

4.5.1.1 *Solid products*

The remaining spilled product should be absorbed on moist sawdust, sand, or earth, swept up, and transferred in a suitable container to a safe place for disposal (section 4.5.2).

4.5.1.2 *Liquid products*

The liquid can be prevented from spreading or contaminating other cargo, vegetation, or waterways, by making a barrier of the most suitable material available, e.g., earth or sand.

Spilled liquid should be absorbed on sawdust, sand, or earth, swept up and placed in a closeable container for later transfer to a safe place for disposal (section 4.5.2).

4.5.1.3 *All products*

As soon as possible after the spillage and before re-use, all contaminated areas should be covered with damp sawdust, sand, or earth. This should be swept up and placed in a closeable container for later transfer to a safe place for disposal. Care should be taken to avoid run-off into water courses.

4.5.2 *Disposal*

Surplus product, contaminated absorbents, and containers should be disposed of in an appropriate way. Waste material should be burned 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, it should be buried in an approved dump or landfill where there is no risk of contamination of surface or ground water. Local legislation regarding disposal of toxic wastes should be complied with. Containers must be punctured to prevent re-use.

5. HAZARDS FOR THE ENVIRONMENT AND THEIR PREVENTION

Although there is limited information on the effects of quintozene in the general environment, it has been shown to be toxic for earthworms. Data on other organisms suggest that quintozene is not a problem in the general environment. Its bioaccumulation by fish is low. It does not biomagnify.

Discharges arising from the manufacture, formulation, and use of quintozene should not be allowed to pollute the environment and should be treated properly.

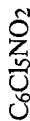
6. INTERNATIONAL CHEMICAL SAFETY CARD

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

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

INTERNATIONAL CHEMICAL SAFETY CARD

QUINTOZENE



CAS chemical name: pentachloronitrobenzene

CAS registry number: 82-68-8

PHYSICAL PROPERTIES

Melting point (°C)

Density (25 °C)

Vapour pressure (kPa at 20 °C)

Relative molecular mass

Solubility in:

water (20 °C)

ethanol (25 °C)

most other organic solvents

OTHER CHARACTERISTICS

142 - 146

1.718

10^{-8} x 667

295.36

0.44 mg/litre

(practically insoluble)

2%

soluble

Pale yellow-to-white solid with a musty odour; technical grade may contain hexachlorobenzene as a contaminant; it is rather stable in soil; it is used as a fungicide in agriculture, horticulture, and in soil and seed treatment

HAZARDS/SYMPTOMS	PREVENTION AND PROTECTION	FIRST AID
<p>SKIN: Repeated contamination may cause sensitization</p>	<p>Avoid skin contact, wear clean overalls and protective gloves; launder contaminated clothing before re-use</p>	<p>Remove contaminated clothing; wash skin with water and soap</p>
<p>EYES: May cause irritation, redness</p>	<p>Avoid working in a dusty atmosphere</p>	<p>Flush with clean water for 15 minutes; if irritation persists, seek medical attention</p>
<p>INHALATION: Dust may irritate</p>	<p>Avoid working in a dusty atmosphere</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>Massive accidental or intentional ingestion may cause poisoning</p>		<p>Obtain medical attention; do not induce vomiting</p>
<p>REPEATED EXPOSURE – SKIN, INHALATION, INGESTION: unlikely to cause adverse effects, unless massive exposure; may, however, cause skin sensitization</p>	<p>Same as above; take shower and put on clean clothing after work</p>	<p>In case of poisoning, same as above</p>

INTERNATIONAL CHEMICAL SAFETY CARD (continued)

HAZARDS/SYMPTOMS

ENVIRONMENT: Toxic for earthworms

PREVENTION AND PROTECTION

Do not pollute the environment with waste material or discharges

SPILLAGE

Take appropriate personal precautions; prevent liquid from spreading or contaminating other cargo, vegetation, or waterways, with a barrier of the most suitable material available, 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 formulations containing organic solvents may be flammable; emulsifiable concentrates are miscible with water; extinguish fires with alcohol-resistant foam, CO₂, or powder; with sufficient burning or external heat, quitozene will decompose, emitting toxic fumes; the smoke and fumes could be injurious through inhalation, or absorption through the skin; therefore, protective clothing and self-contained breathing apparatus should be worn; the use of water spray should be confined to the cooling of unaffected stock, thus avoiding the accumulation of polluted run-off from the site

WASTE DISPOSAL

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 INFORMATION

National Occupational Exposure Limit:

National Poison Control Centre:

Local Trade Names:

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 UN sources. The 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.^a

7.1 Previous Evaluations by International Bodies

The FAO/WHO Joint Meeting on Pesticide Residues (JMPR) reviewed residue and toxicity data on quintozone in 1969, 1973, 1974, 1975, and 1977. The conclusion in 1977 was that 25 mg/kg diet, equivalent to 1.25 mg/kg body weight was a no-observed-adverse-effect-level in the rat and 30 mg/kg diet, equivalent to 0.75 mg/kg body weight, in the dog. On the basis of these data, the estimate of an acceptable daily intake (ADI) for man was 0–0.007 mg/kg body weight.

IARC (1974) did not come to a conclusion on the carcinogenicity of quintozone, because of lack of data at the time. FAO/WHO (1978) concluded that there were no indications that administration of quintozone resulted in carcinogenic activity.

In the *WHO recommended classification of pesticides by hazard and guidelines to classification* (WHO, 1986), quintozone is classified in the category of technical products unlikely to present an acute hazard in normal use.

7.2 Exposure Limit Values

Some exposure limit values are given in the table on pages 23–25.

When no effective date appears in the IRPTC legal file, the year of the reference from which the data were taken is indicated by (r)

^a The regulations and guidelines of all countries are subject to change and should always be verified with the appropriate regulatory authorities before application.

CURRENT REGULATIONS, GUIDELINES, AND STANDARDS

EXPOSURE LIMIT VALUES

Medium	Specification	Country/ Organization	Exposure limit description	Value	Effective date
AIR	Work-place	Bulgaria	Maximum permissible concentration (MPC)	0.5 mg/m ³	1977
		USSR	Maximum allowable concentration (MAC) - Ceiling value for vapour, aerosol	0.5 mg/m ³	
AIR	Ambient	USSR	Maximum allowable concentration (MAC) - 1 × /day - Average per day	0.01 mg/m ³ 0.006 mg/m ³	
FOOD	Intake from	FAO/WHO	Acceptable daily intake (ADI)	0.007 mg/kg body weight	1977
		USSR	Acceptable daily intake (ADI)	0.007 mg/kg	1983

EXPOSURE LIMIT VALUES (continued)

Medium	Specification	Country/ Organization	Exposure limit description	Value	Effective date
FOOD	Plant	Brazil	Acceptable limit	0.01-5 mg/kg	
		Czechoslovakia	Maximum residue limit (MRL)	0.01-0.1 mg/kg	1978
		FAO/WHO	Maximum residue level	0.01-5 mg/kg	
		Finland	Maximum residue limit	0.2-0.3 mg/kg	1987
		Germany, Federal Republic of	Maximum residue limit (MRL)	0.01-0.3 mg/kg	1984
		Kenya	Maximum limit	0.02-10 mg/kg	
		Netherlands	Maximum residue limit (MRL) - Certain foodstuffs	0.02-3 mg/kg	1987
		Sweden	Maximum tolerable concentration	0.2-1 mg/kg	
		USA	Acceptable residue limit (interim tolerance limit)	0.1-1 mg/kg	

FOOD	Animal	Germany, Federal Republic of	Maximum residue limit (MRL)	0.01-0.2 mg/kg	1984
		Sweden	Maximum tolerable concentration	0.005-0.1 mg/kg	1983
FEED		Argentina	Maximum limit	0 mg/kg	1969
		USSR	Prohibition	0 mg/kg	1981
GOODS		Argentina	Maximum limit - Tobacco	0 mg/kg	1971
		Germany, Federal Republic of	Maximum residue limit (MRL)	0.2 mg/kg	1984

CURRENT REGULATIONS, GUIDELINES, AND STANDARDS

7.3 Specific Restrictions

The use of quintozone is permitted with certain restrictions in, among other countries, the Federal Republic of Germany, Finland, Japan, the Netherlands, the United Kingdom, the USA, and the USSR. In the USA, the hexachlorobenzene level must be reduced to less than 0.1% in technical products. In the Netherlands, the technical material used in the formulation may not contain more than 1 g hexachlorobenzene and 10 g pentachlorobenzene per kg. The use of quintozone was prohibited in Italy in 1973.

7.4 Labelling, Packaging, and Transport

No specific guidelines found.

7.5 Waste Disposal

In the USA, any non-domestic waste containing quintozone must be treated as hazardous waste. Specific instructions are given for incineration. Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, unless in compliance with a specified permit or procedure, owners/operators of vessels or onshore or offshore facilities must notify the USA government of any release of pentachloronitrobenzene (quintozone), in or on navigable waters, adjoining shorelines, the contiguous zone, or beyond the contiguous zone, or to any other environmental media (air, land, or ground water) in an amount equal to or greater than one pound (0.454 kilogram). The United States Environmental Protection Agency, on March 16 1987, proposed raising this reportable quantity to 100 pounds (45.4 kilograms), but has not yet done so.

In Finland, any waste containing quintozone is classified as hazardous waste and must be treated according to specific instructions.

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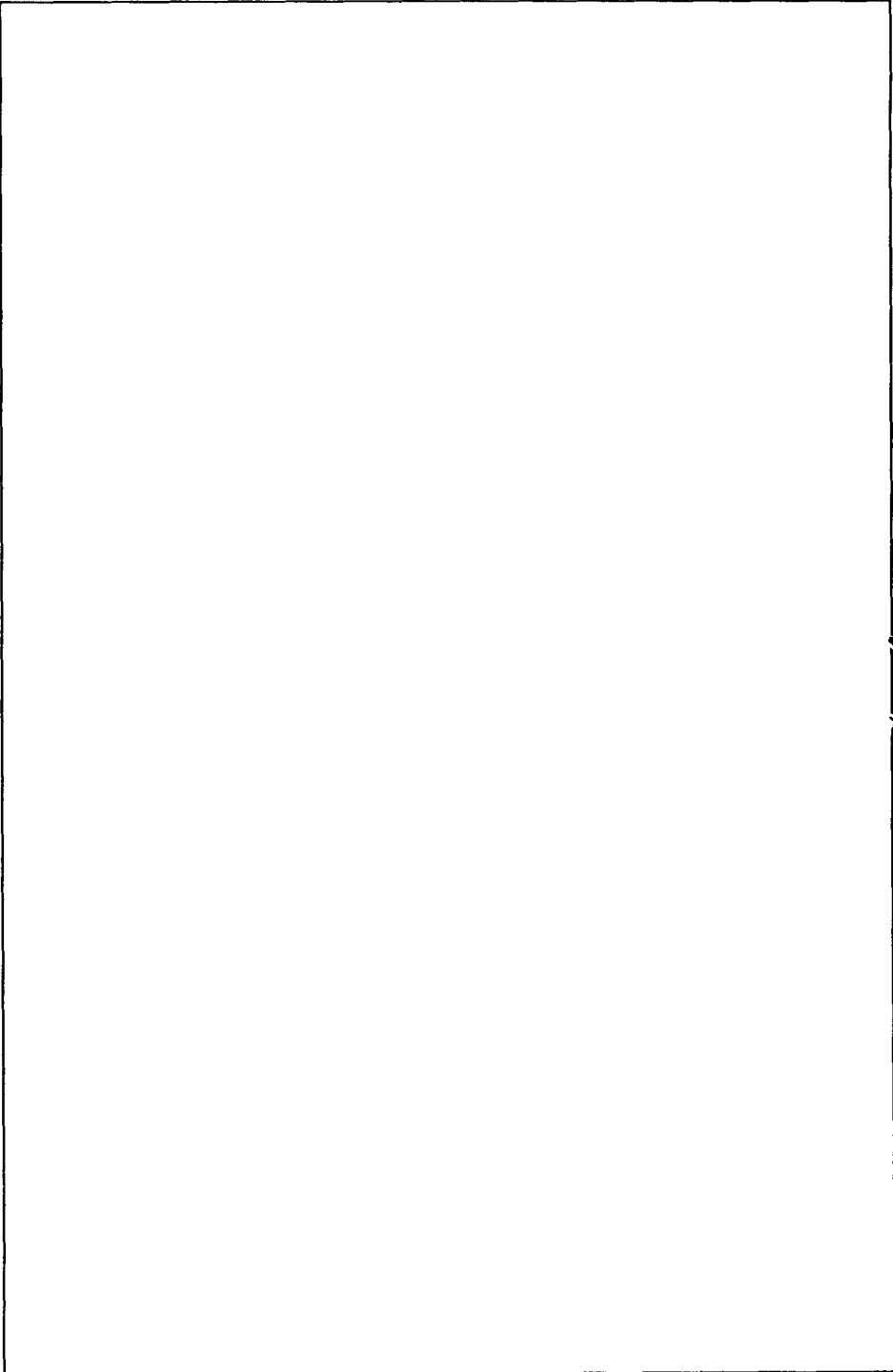
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