CS INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY

Health and Safety Guide No. 97

METHOMYL HEALTH AND SAFETY GUIDE

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WORLD HEALTH ORGANIZATION, GENEVA 1995

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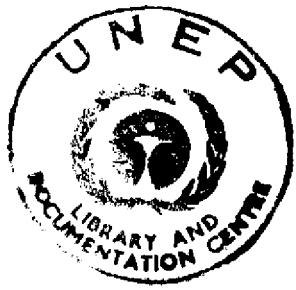
Health and Safety Guide No. 97

METHOMYL HEALTH AND SAFETY GUIDE

This is a companion volume to
Environmental Health Criteria 178: Methomyl



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INTRODUCTION

The Environmental Health Criteria (EHC) monographs 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:

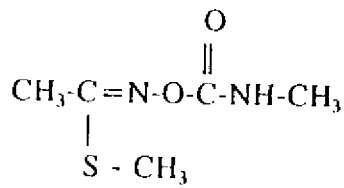
The Director
International Programme on Chemical Safety
World Health Organization
1211 Geneva 27
Switzerland

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

1.1.1 *Primary constituent*

Common name (ISO):	methomyl
Chemical structure:	
Molecular formula:	$C_5H_{10}N_2O_2S$
Relative molecular mass:	162.2
IUPAC chemical name:	*S*-methyl-*N*-(methylcarbamoyloxy)thioacetimidate
CAS chemical name:	methyl *N*-[[(methylamino) carbonyl]oxy]ethanimido-thioate
CAS registry number:	16752-77-5
RTECS number:	AK2975000
Synonyms:	metomil, mesomil, OMS 1196

1.1.2 *Technical product*

Major trade names:	Flytek, Golden Fly Bait, Lannate, Methomex, Nudrin, Pillarmate
Purity:	>98% w/w

Impurities: *S*-methyl-*N*-hydroxy-thioacetimidate (0.2%)
1,3-dimethylurea (0.4%)

1.2 Physical and Chemical Properties

Methomyl is a white crystalline solid with a melting point of 77 °C. It is soluble in water and in many organic solvents. It is stable at temperatures up to 140 °C; the autoignition temperature is 265 °C. Methomyl is stable in sterile distilled water at pH values of 5-7 but decomposes increasingly with higher pH and temperature levels. Its half-life in water at pH 9 is 30 days.

Some physical properties of methomyl are listed in Table 1.

Table 1. Physical properties of methomyl

Physical state	crystalline solid
Colour	white
Odour	slight sulfurous
Melting point	77 °C
Vapour pressure (at 25 °C)	6.65 mPa
Henry's Law constant	2.1×10^{-11} atm-m^3/mole
Octanol-water partition coefficient (K_{ow})	1.24
Solubility:	
water	54.7 g/litre
toluene	30 g/litre
isopropanol	220 g/litre
ethanol	420 g/litre
acetone	720 g/litre
methanol	1000 g/litre

1.3 Analytical Methods

The principal analytical procedure for the determination of methomyl residues in foods, crops, and environmental solid media consists of extraction with an organic solvent followed by solvent partition and then, usually, a column cleanup. Water samples are mainly submitted directly to solid phase extraction. The cleaned up samples are analysed using HPLC or GLC methods, in some cases, after conversion to the oxime derivative.

Methomyl as technical material and in formulations can be determined by reverse phase HPLC followed by UV analysis.

1.4 Production and Uses

Methomyl is a monomethyl carbamate insecticide that has been in use since 1966. It is used in many countries to control insects on fruit, vines, hops, vegetables, grain, soyabeans, cotton, and ornamentals. Methomyl is mainly formulated as water-soluble powders and water-miscible liquids. These products are diluted with water and applied using ground or aerial spraying equipment. Typical application rates are 0.15-1.0 kg active ingredient per hectare.

2. SUMMARY AND EVALUATION

2.1 Exposure

Methomyl is photolysed rapidly in water with a half-life of 2-3 days. It is broken down rapidly in the aquatic environment; analysis of various water sources in the vicinity of methomyl applications has shown non-detectable (< 0.02 mg/kg) or very low concentrations of the compound.

When applied in the field, methomyl is not very mobile in the soil and remains mostly in the top 15-cm layer. Under these conditions, it is broken down rapidly with a half-life of 11-30 days. Carbon dioxide is an end product of the degradation. Very low levels of methomyl may be found in the soil after aerial or ground application to crops at recommended rates.

Methomyl has a low octanol:water partition coefficient and has shown no evidence for bioaccumulation in fish. It is not likely to accumulate in the environment.

After its application to crops, methomyl is broken down on plant foliage to give carbon dioxide and acetonitrile. The remaining residue is incorporated into natural plant components, such as Krebs cycle acids and sugars. Methomyl's half-life on growing foliage is 1-7 days. Any remaining residue is composed mainly of methomyl itself, which may be present in low concentrations in food crops at harvesting. These residues may be reduced further during transport, storage, and processing. Total diet and individual food analyses show undetectable or very low methomyl residues. Thus, exposure of the general population to methomyl is expected to be very low.

After re-entry into treated vineyards, the areas of workers' bodies that received the highest exposure to dislodgeable foliar residues of methomyl were the upper body and head, during grape girdling and the upper body and hands, during raisin harvesting. Inhalation exposure was minimal. One day after methomyl application to cucumbers and tomatoes in greenhouses, the ambient air concentration was 4.7 $\mu g/m^3$. Hand wash sampling was considered to be the most reliable indicator of operator exposure in these circumstances.

2.2 Uptake, Metabolism, and Excretion

Methomyl is absorbed very rapidly after oral administration to rats. Distribution to tissues and the excretion of breakdown products also occur very rapidly. The main excretory routes are expired air (as carbon dioxide and acetonitrile in the ratio 2:1), 34% in 5 days, and urine, 54% in 7 days. The main urinary metabolite is the mercapturic acid derivative of methomyl. It is probable that the *S*-methyl group on methomyl is displaced by glutathione followed by enzymatic transformation to give the mercapturic acid derivative. The expired air products are probably derived from the hydrolysis of methomyl to its oxime followed by breakdown to carbon dioxide, and, by conversion of methomyl to its anti-isomeric form, which undergoes hydrolysis, rearrangement, and elimination reactions to give acetonitrile.

In mice, the penetration of ^{14}C-methomyl through the skin was estimated to be 85%, one hour after its dermal application in acetone. Despite this, the dermal toxicity of methomyl is low (section 2.4), probably because of its rapid metabolism and excretion. Total radioactivity excreted was 54% within 8 h of application.

Methomyl is also rapidly broken down and eliminated from ruminants after oral administration. Lactating cows, given 80 mg/kg feed for 28 days, showed no detectable residues of methomyl (<0.02 mg/kg) in milk or tissues.

Overall, the absorption, metabolism, and excretion of methomyl is very rapid in mammals. Much of an oral dose is eliminated within 24 h and its half-life is a few hours. Tissue levels of methomyl are low and less than that in blood. There is no evidence for accumulation of methomyl in the body.

2.3 Effects on Non-target Organisms in the Environment

There is no apparent effect on soil microorganisms when methomyl is applied at recommended rates.

Methomyl is moderately to highly toxic for fish with 96-h LC_{50}s mostly in the range of 0.5-2 mg/litre. In an early life stage, 28-day, toxicity study on fathead minnows, the maximum acceptable toxicant concentrations (MATC) were >57 and <117 μg/litre, respectively. *Daphnia magna*

appears to be the most susceptible of other aquatic organisms with a 48-h LC_{50} of 31.7 μg/litre. The Fidler crab was one of the least susceptible with a 96-h LC_{50} of 2380 μg/litre. In a 21-day study on survival, growth, and reproductive capacity in *Daphnia magna*, the MATC was >1.6 and <3.5 μg/litre.

The contact and oral toxicity of methomyl is high for honey bees. Field observations indicate that early morning or evening application of methomyl to flowering crops is advisable, because bees are less active and the spray has time to dry before exposure occurs.

Methomyl is toxic for birds with acute oral LD_{50}s of 10 mg/kg body weight for the pigeon and 34 mg/kg body weight for the Japanese quail. It is relatively less toxic by the dietary route with 8-h LC_{50}s of 1100 mg/kg and 2880 mg/kg for the bobwhite quail and mallard duck, respectively. No effects were seen on birds in field studies, when methomyl was sprayed at recommended rates from the air or using ground equipment.

Although methomyl is likely to have high acute oral toxicity for wildlife mammals, it is unlikely to have any significant effect on them in normal usage, apart from a small depression of blood cholinesterase activity.

2.4 Effects on Experimental Animals and *in vitro* Test Systems

Methomyl is a carbamate cholinesterase inhibitor, depressing cholinesterase activity in the blood and brain. It causes signs typical of anticholinesterase action, depending upon the dose, including pupil constriction, profuse salivation, lacrimation, and tremor. Recovery from the toxic effects is rapid in surviving animals after acute doses, because of the rapid reversibility of cholinesterase inhibition.

The acute oral toxicity of methomyl in the rat is high with an LD_{50} of 17-45 mg/kg body weight. It is also toxic for the rat via inhalation with a 4-h LC_{50} of 0.26 mg/litre, in aerosol form. The dermal toxicity of methomyl in the rabbit is low with an LD_{50} of >2000 mg/kg body weight. Methomyl is not a skin irritant or sensitizer and is only mildly irritant to the eye.

The repeated administration of methomyl does not show any accumulated or increased toxic action. Rats showed mild to moderate toxic effects when given methomyl at 250 mg/kg diet for 13 weeks. Rabbits given repeated

dermal applications of 500 mg/kg body weight per day for 21 days showed hyperactivity and depressed plasma and brain cholinesterase activity. No effects were observed at 5 mg/kg body weight per day. In long-term studies, no-observed-effect levels (NOELs) were established at 100 mg/kg diet for the rat and the dog, and, at 50 mg/kg for the mouse.

There was no evidence for a carcinogenic effect in 2-year rat and mouse studies.

Methomyl was not mutagenic in several types of *in vitro* assay with various end-points, or in an *in vivo* rat bone-marrow chromosome study.

Neither embryotoxic nor teratogenic effects were produced in rats or rabbits at doses of up to 400 mg/kg diet or 16 mg/kg body weight per day (by gavage), respectively. Rat reproduction studies over 2 or 3 generations did not show any morphological effects. In a 3-generation study, reproductive indices were not affected at a dietary level of 100 mg/kg.

Delayed neurotoxicity was not shown in any of the above studies or in studies on the hen. Measurements of plasma, erythrocyte, and brain cholinesterase activity during the toxicity studies showed that cholinesterase inhibition was not increased with repeated dosing. Atropine was the most effective antidote on the evidence of studies on several species.

2.5 Effects on Human Beings

Reports of accidental or suicidal poisoning have shown that victims exhibited cholinergic symptoms following acute overexposure. Survivors recovered rapidly from the effects. In some cases, effective treatment was provided by the administration of atropine. Analysis of tissues and excreta and estimates of the amount ingested indicated that doses as low as 12-15 mg/kg body weight could be lethal. Reports of occupational effects usually indicate non-observance of recommended safety precautions as a causal factor.

3. CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

Methomyl is a monomethyl carbamate insecticide that is highly toxic by the oral and inhalation routes. Misuse or disregard of label safety instructions may therefore lead to severe poisoning.

Its low dermal toxicity and the application of correct handling and use procedures ensure a low potential for occupational hazard.

Exposure of the general population is expected to be very low and should not constitute a health hazard.

Methomyl is moderately to highly toxic for aquatic species, bees, birds, and mammals in laboratory studies. The results of field studies and observations indicate that methomyl does not give rise to long-lasting adverse effects, when used as recommended. Methomyl residue levels in the environment are very low or undetectable.

3.2 Recommendations

Continued emphasis should be given to the correct handling and use of methomyl so that workers and users apply good work practices, hygiene measures, and recommended safety precautions.

Observations on regularly exposed workers should be maintained.

Unnecessary contamination of the environment should be avoided by following appropriate disposal practices. The insecticide must be applied at recommended rates in field use

and, where necessary, any special precautions to avoid environmental overexposure should be observed.

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

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

Methomyl is a monomethyl carbamate insecticide. The acute toxicity of technical methomyl by the oral and inhalation routes is high. The oral toxicity of formulations for laboratory mammals is lower. Both technical and formulated methomyl products can be hazardous for humans, if incorrectly handled or misused. Poisoned individuals may show symptoms typical of anti-cholinesterase action and their onset may be rapid in cases of over-exposure. Although the dermal toxicity of methomyl is low and it is not a skin irritant or sensitizer, adequate precautions should be taken to prevent skin and eye contamination or to remove any such contamination quickly.

The human health hazards associated with methomyl exposure together with preventive and protective measures and first aid recommendations are shown in Table 2.

4.2 Advice to Physicians

4.2.1 *Symptoms of poisoning*

Methomyl directly inhibits cholinesterase activity, therefore signs of poisoning can arise very quickly, sometimes within minutes. Early symptoms include malaise, muscle weakness, dizziness, and sweating. Headache, salivation, nausea, vomiting, abdominal pain, and diarrhoea are often prominent. Constriction of pupils (miosis), blurred vision, and muscle twitching are other symptoms reported. Dyspnoea, bronchospasm, and chest tightness, leading to pulmonary oedema in the more severe cases, can also occur. Severe neurological indications including convulsions and coma are less commonly observed than with organophosphate poisoning.

The effects of poisoning are likely to be of shorter duration than those of organophosphorus toxicity. Because blood cholinesterase activity can return to normal within a few hours of exposure, its measurement may not be a helpful indicator of poisoning and recovery. However, it may be of some use if measured within an hour or so of a severe poisoning, provided

that a rapid assay method is used that takes into account the rapid enzyme reactivation, which can occur in blood samples as well as *in vivo*. A normal blood cholinesterase activity value does not disprove the diagnosis of symptoms and treatment of a suspected poisoning should proceed immediately.

4.2.2 *Medical treatment*

For each case, the appropriate emergency first aid (as shown in Table 2) should be applied. In the case of a swallowed dose, when the patient is conscious, induce vomiting or perform gastric lavage and administer activated charcoal. If the patient has difficulty in breathing or is unconscious, give oxygen and begin cardiopulmonary resuscitation (CPR) as needed.

Administer atropine sulfate intravenously or intramuscularly as soon as possible.

N.B. The use of oximes, e.g., pralidoxime (2-PAM), is not recommended for carbamate poisonings.

Initially, administer 1-2 mg atropine sulfate intravenously or intramuscularly to adults. Repeat dosage at 10 to 30-min intervals until symptoms are relieved and full atropinization is achieved. For severe intoxication, initially administer 2-4 mg atropine sulfate intravenously or intramuscularly and give repeated 2 mg doses every 3-10 min until signs of cholinesterase inhibition disappear. For mild intoxication of children (< 13 years), administer atropine sulfate at 0.05 mg/kg body weight and repeat every 15-30 min until atropinization is achieved. Maintain a mild degree of atropinization until the patient recovers by administering 0.02 mg/kg body weight as repeated doses.

Observe the patient for at least 24 h to ensure that cholinergic symptoms do not recur.

If the insecticide consists of methomyl in combination with an organophosphorus pesticide and the poisoning is due partly, or wholly, to the organophosphate, then the use of oximes, e.g., 2-PAM is recommended.

Table 2. Human health hazards, preventive and protective measures, and first aid

HAZARD/SYMPTOM	PREVENTION AND PROTECTION	FIRST AID
GENERAL: readily absorbed following ingestion or inhalation, or through the skin; if absorbed may cause cholinesterase inhibition poisoning: weakness, headache, vomiting, diarrheoa, excessive sweating, salivation, pinpoint pupils, muscular twitching; in severe cases, dyspnoea, bronco-spasm, and chest tightness	Avoid exposure	
SKIN: extensive contamination may cause poisoning	Wear clothing covering most of the body, protective gloves, and apron	Remove and wash contaminated clothing; wash contaminated skin with plenty of soap and water; obtain medical attention, if necessary
EYES: pupil constriction, mild irritation	Wear safety goggles or face shield	Flush eyes with clean water for at least 15 min; obtain medical attention if effects persist
INHALATION: overexposure may cause poisoning	Avoid breathing dust or aerosol, use adequate ventilation, use recommended respiratory equipment, if required	Move into fresh air immediately; use oxygen or artificial respiration, if needed; obtain medical attention
INGESTION: an unlikely occupational hazard	Wash hands before eating, drinking, using the toilet, and after work	
Accidental or intentional ingestion may rapidly lead to severe poisoning	Keep the insecticide out of reach of children and under lock and key	Obtain medical attention immediately; if breathing has stopped, apply artificial respiration; induce vomiting, if person is conscious

4.2.3 *Health surveillance advice*

Unlike most organophosphorus compounds, the use of blood cholinesterase activity monitoring is of limited value for the assessment of occupational exposure to methomyl and many other *N*-methylcarbamates. This is because of the fast reversal of enzyme inhibition *in vivo* and the difficulty of submitting blood samples quickly enough for instantaneous assay. It may be useful, however, to help in differential diagnosis in eliminating poisoning with an anticholinesterase compound.

4.3 Explosion and Fire Hazards

Technical methomyl is not sensitive to impact. Its lower explosion limit is 0.269 g/litre and its autoignition temperature is 265 °C. Dusts may form an explosive mixture in air. Hazardous gases and vapours may be produced under fire conditions including sulfur oxides, HCN, and methylisocyanate. Liquid formulations may be combustible and heating releases vapours that are ignitable.

In case of fire, evacuate personnel to a safe area. Use water squirts, dry powder, foam, or dry ice to control/extinguish fire. Warn fire-fighting personnel to wear full protective equipment, including self-contained breathing apparatus. Prevent contamination of local water sources.

4.4 Storage

Keep containers tightly closed in dry, cool, well-ventilated areas set aside for pesticide storage. Do not store them near foodstuffs or animal feed. Keep products out of reach of children and unauthorized personnel. Liquid formulations should be kept at a temperature above 0 °C.

4.5 Transport

Comply with any local regulations regarding the movement of hazardous goods. Do not load into transport units containing foodstuffs or animal feed. Ensure that containers are undamaged and sound and that labels are securely fixed and intact before transportation.

4.6 Spillage and Disposal

4.6.1 *Spillage*

Check any fire and explosion hazards and safety precautions before clean up. Wear appropriate personal protective equipment. Evacuate personnel and thoroughly ventilate the area. Keep upwind of the spillage and remove sources of heat, sparks, flame, impact, friction, and electricity. Use sawdust, sand, or other absorbent material to help clean up; transfer to a clean, dry, empty container and label it.

Contain any liquid spillage with a barrier of soil, sand, or other suitable, available material and prevent it from reaching drainage systems and waterways. If any product remains in crevices, treat with sodium hydroxide solution, allow to stand for 4 h, then flush out with water (**caution:** sodium hydroxide causes skin burns and eye damage).

4.6.2 *Disposal*

Disposal must comply with any local or government legislation. Methods recommended are those described by FAO and GIFAP. Ensure that disposal does not contaminate drinking-water and food or animal feed and that there is no danger of run-off or seepage into drainage systems or watercourses.

Contaminated absorbents, containers, and surplus product should be burnt in an efficient high temperature incinerator (950-1200 ^{o}C) equipped with an effluent gas scrubber. Alternatively, bury in an approved dump or landfill, or, burn, if allowed by the local authority.

After agricultural use, excess pesticide, spray mixture, or rinsate must be used up by further application according to label instructions. If it is not possible to dispose of the concentrate or spray mixture in this way, they may be decomposed by the addition of sodium hydroxide solution (after appropriate dilution of concentrate). Allow to stand for 4 h, above pH 10, and then incinerate, or, after neutralization to about pH 7, dispose of according to local regulations (**caution:** sodium hydroxide causes skin burns and eye damage).

5. HAZARDS FOR THE ENVIRONMENT AND THEIR PREVENTION

Methomyl is moderately to highly toxic for aquatic organisms. Its acute toxicity for birds is high, but dietary toxicity is comparatively low. Methomyl is broken down rapidly in the environment and does not bioaccumulate. Only very low levels have been found in soil, water, and plant foliage. It is unlikely that methomyl will pose a threat to aquatic or bird life at recommended rates of usage. However, direct, or unnecessary, contamination of streams, rivers, ponds, lakes, and other natural water-courses should be avoided. Follow disposal advice outlined in section 4.6.2.

Methomyl is acutely toxic for bees. Do not spray during periods when bees are foraging; apply methomyl in the early morning or evening when bees are less active and the spray has time to dry.

6. 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.

6.1 Previous Evaluations by International Bodies

The FAO/WHO Joint Meeting on Pesticide Residues (JMPR) evaluated methomyl at its meetings in 1975, 1976, 1977, 1978, 1986, 1987, 1988, 1989, 1990, and 1991. In 1989, an acceptable daily intake (ADI) of 0-0.03 mg/kg body weight was established. See the table on pp. 24-25 for Codex maximum residue limits (MRL).

Methomyl is listed in Class IB, "Highly Hazardous" category, in the WHO Recommended Classification of Pesticides by Hazard on the basis of its acute oral LD_{50}.

6.2 Exposure Limit Values

Some exposure limit values for methomyl are given in the table on pp. 24-25.

6.3 Specific Restrictions

Methomyl has been approved for use as a pesticide in many countries. In some countries, specific uses are defined as well as limitations and precautions, particularly for products with a high concentration of the active ingredient.

6.4 Labelling, Packaging, and Transport

The United Nations Committee of Experts on the Transportation of Dangerous Goods classifies methomyl in:

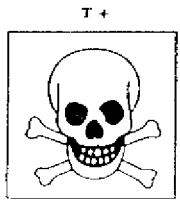
-Hazard Class 6.1: poisonous substance

-Packing Group II: a substance presenting a relatively medium risk of poisoning in transport

The label should be as follows:

Poison
Packaging Group II

The European Economic Community legislation requires labelling of methomyl as a dangerous substance using the symbol:



VERY TOXIC

ES: Muy tóxico
DA: Meget giftig
DE: Sehr giftig
EL: Αίαν τοξικό
EN: Very toxic
FR: Tres toxique
IT: Molto tossico
NL: Zeer vergiftig
PT: Muito tóxico

The label must read:

Very toxic by inhalation and if swallowed.

6.5 Waste Disposal

In the USA, methomyl waste is regarded as acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If the wastes cannot be disposed of according to the label instruction, contact the appropriate Pesticide or Environmental Control Agency or Hazardous Waste representative for guidance. Do not contaminate water, food, or animal feed during storage or disposal.

CURRENT REGULATIONS, GUIDELINES, AND STANDARDS

Exposure limit values

Medium	Specification	Country/ organization	Exposure limit description	Value	Effective date
AIR	Workplace	United Kingdom	Long-term exposure (8-h TWA)	2.5 mg/m^3	1993
		USA/ACGIH	Threshold limit value (TLV) - Time-weighted average (TWA)	2.5 mg/m^3	1977
		USA/OSHA	Permissible exposure limit (PEL) - Time-weighted average (TWA)	2.5 mg/m^3	
FOOD	Intake from residues	FAO/WHO	Acceptable daily intake (ADI)	0-0.03 mg/kg body weight	1989
		FAO/WHO	Maximum residue limit (MRL) (methomyl + oxime as methomyl) - meats, milks - cottonseed, peanuts, potatoes, soyabeans, beans (dry), sugar beet, sweet corn	 0.02 mg/kg 0.1 mg/kg	1991

			- cucumbers, egg plants, melons, onion bulbs, pineapples, sorghum, squashes	0.2 mg/kg	
			- barley, oats, onions (Welsh), peas (shelled), tomatoes, wheat	0.5 mg/kg	
			- citrus, peppers, sorghum, forage	1 mg/kg	
			- asparagus, cauliflowers, celery, common beans (pods and/or immature seed), mint hay, pome fruits	2 mg/kg	
			- barley straw and fodder (dry), cabbage (head), grapes, kale, lettuce (head), nectarines, oat straw & fodder (dry), peaches, peanut forage (green), peas, spinach, wheat straw and fodder (dry)	5 mg/kg	
			- alfalfa forage, green hops (dry), pea vines (green) soyabean forage (green)	10 mg/kg	
WATER	Drinking-	Australia	"Standard" maximum residue level	0.06 mg/litre	1987
		USA/EPA	Health advisory, longer term	0.2 mg/litre	1992

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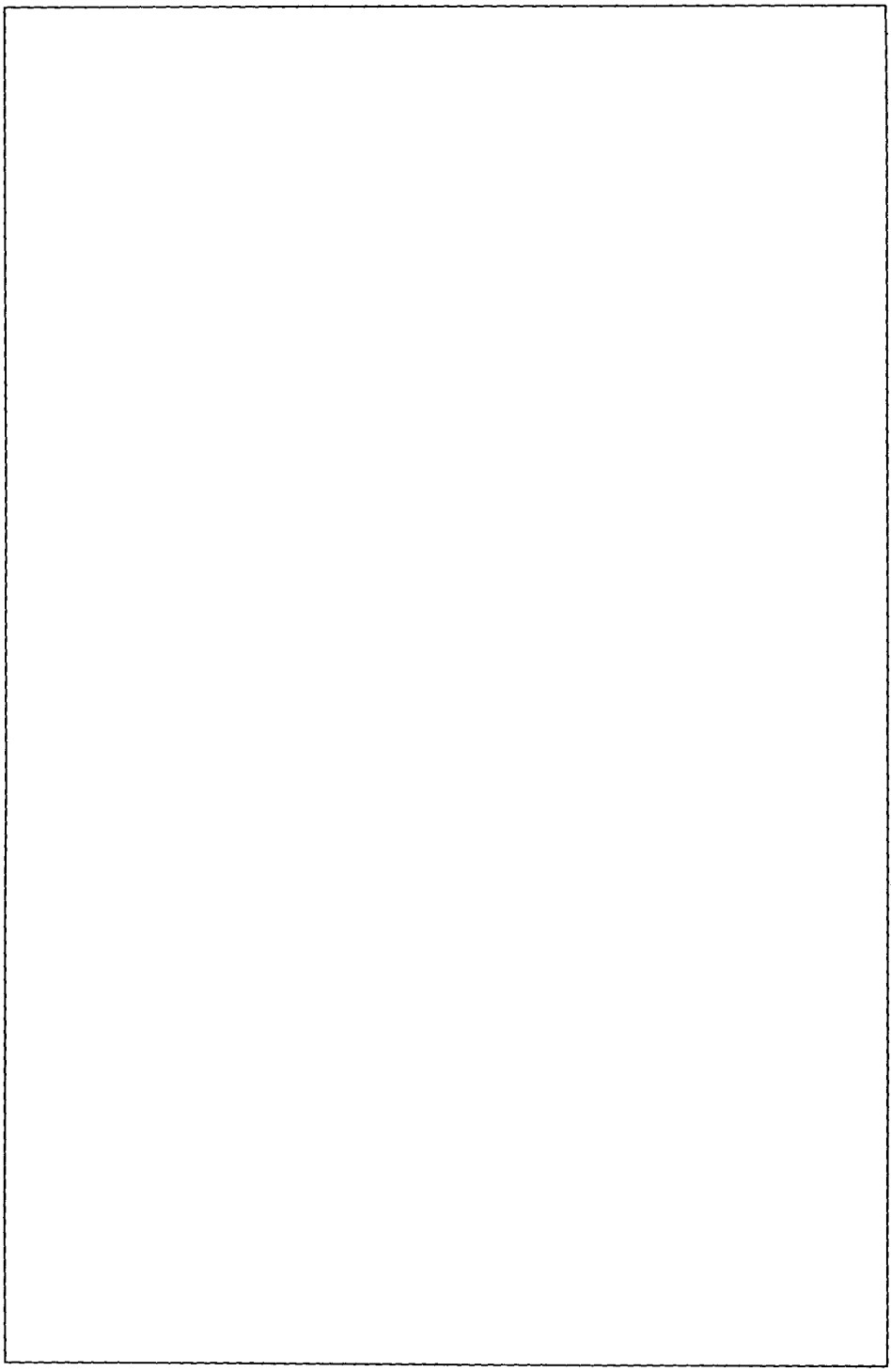

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