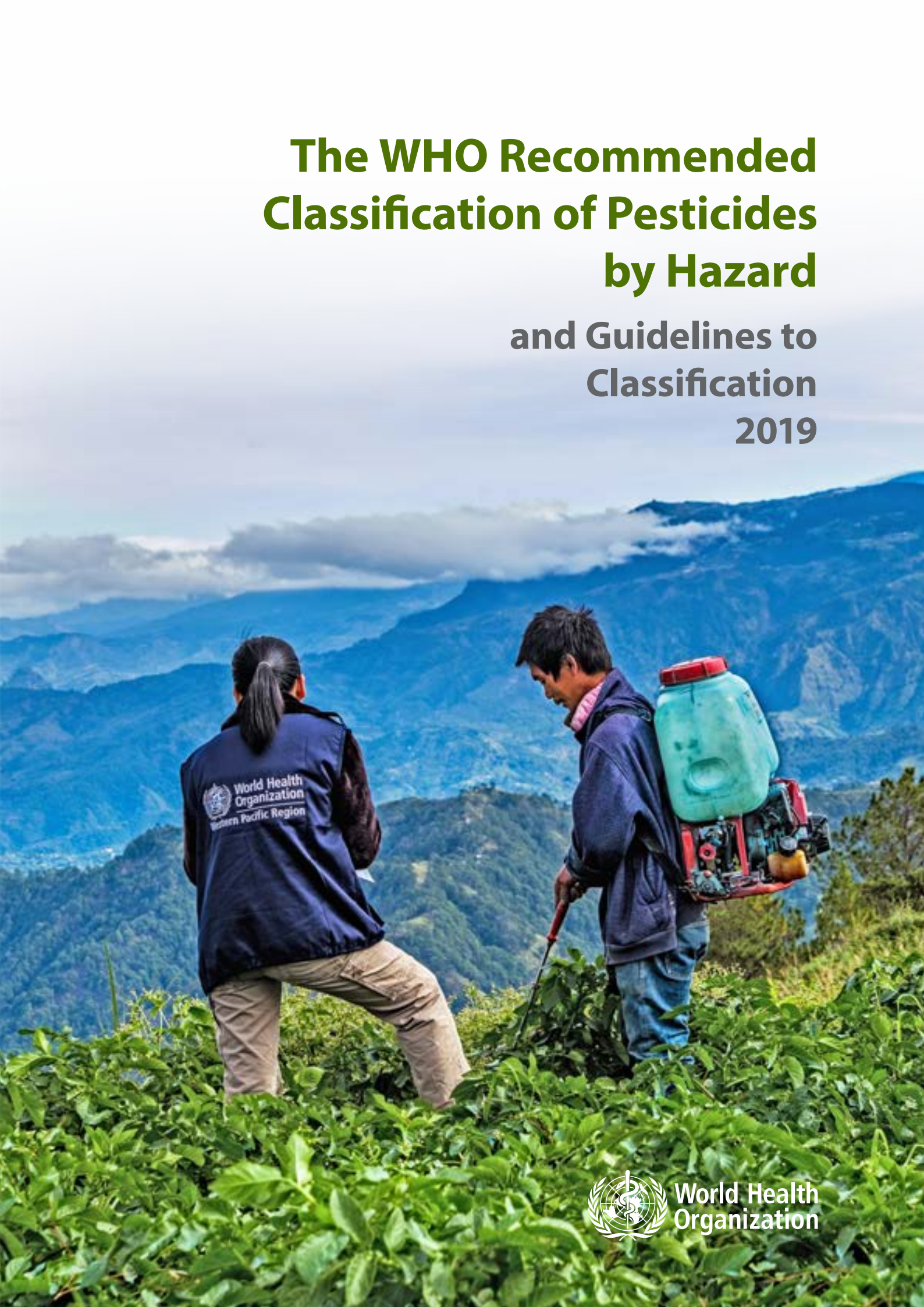
The WHO Recommended Classification of Pesticides by Hazard

and Guidelines to Classification 2019



World Health Organization

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2019

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The **International Programme on Chemical Safety (IPCS)** was established in 1980. The overall objectives of the IPCS are to establish the scientific basis for assessment of the risk to human health and the environment from exposure to chemicals, through international peer review processes, as a prerequisite for the promotion of chemical safety, and to provide technical assistance in strengthening national capacities for the sound management of chemicals.

This publication was developed in the IOMC context. The contents do not necessarily reflect the views or stated policies of individual IOMC Participating Organizations.

The **Inter-Organization Programme for the Sound Management of Chemicals (IOMC)** was established in 1995 following recommendations made by the 1992 UN Conference on Environment and Development to strengthen cooperation and increase international coordination in the field of chemical safety. The Participating Organizations are: FAO, ILO, UNDP, UNEP, UNIDO, UNITAR, WHO, World Bank and OECD. The purpose of the IOMC is to promote coordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

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The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification 2019

The WHO Recommended Classification of Pesticides by Hazard was approved by the 28th World Health Assembly in 1975 and has since gained wide acceptance. When it was published in the WHO Chronicle, 29, 397-401 (1975), an annex, which was not part of the Classification, illustrated its use by listing examples of classification of some pesticidal active ingredients and their formulations. Later suggestions were made by Member States and pesticide registration authorities that further guidance should be given on the classification of individual pesticides. Guidelines were first issued in 1978, and have since been revised and reissued every few years.

Up until 2009 the original guidelines approved by the World Health Assembly in 1975 were followed without amendment. The 2009 version of the guidelines introduced revised criteria for classification for the WHO Hazard Classes to take into account "*The Globally Harmonized System of Classification and Labelling of Chemicals*" (GHS)[1]. The GHS was published with the intent to provide a globally-harmonized system to address classification of chemicals, labels, and safety data sheets. The GHS (with subsequent revisions) is now being widely used for the classification and labelling of chemicals worldwide.

The information provided in this publication can be used to support efforts to manage pesticides appropriately, in line with the *WHO/FAO International Code of Conduct on Pesticide Management*[2]. In particular, this publication can be used to define "highly hazardous pesticides" using the criteria developed by the Joint FAO/WHO Meeting on Pesticide Management[3] (page 12).

The document is arranged as follows:

Part I: Overarching principles for the classification of pesticides as recommended by the World Health Assembly. These principles continue to apply, but the World Health Assembly Resolution envisaged that the classification criteria might need to be developed with time and increasing experience. The guide-points originally proposed in 1975 were aligned with corresponding Acute Toxicity Hazard Categories from the GHS.

Part II: Guidelines to Classification. Individual active ingredients are classified in a series of tables, according to the oral or dermal toxicity of the technical material. The tables are subject to review periodically. As has always been the case, the classification of some pesticides has been adjusted to take account of severe hazards to health other than acute toxicity.

The GHS Acute Toxicity Hazard Category for each pesticide is also presented. The GHS also contains provisions for classification according to carcinogenic, mutagenic or reproductive effects, or effects of long-term or repeated exposures. Many Member States have established and published GHS

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[1] See http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.

[2] See http://www.fao.org/3/I3604E/i3604e.pdf.

[3] See http://apps.who.int/iris/bitstream/10665/205561/1/9789241510417_eng.pdf?ua=1.

classifications for these other end-points for pesticides and other chemicals under their jurisdiction. These classifications may be identified from online resources such as the OECD eChemPortal (echemportal.org).

The toxicity values are intended to be a guide only. Formulations should be separately classified using the methods set out on pages 4 (single technical product) and 8 (mixtures) and the table in Part I. To assist in the classification of formulations, an annex is provided giving numerical tables from which the classification may also be derived.

Comments on Part II of the document are welcome, together with proposals for new entries. These should be addressed to the International Programme on Chemical Safety, World Health Organization, 20 avenue Appia, 1211 Geneva 27, Switzerland, and should include supporting data on the compound being commented on or proposed.

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PART I: RECOMMENDED CLASSIFICATION OF PESTICIDES BY HAZARD

Extract from WHO Chronicle, 29: 397-401 (1975)

In 1973, the WHO Executive Board asked the Director-General of WHO to take steps to develop a tentative classification of pesticides that would distinguish between the more and the less hazardous forms of each pesticide. A proposal for a WHO recommended classification of pesticides by hazard was accordingly prepared, taking into account the views of members of the WHO Expert Advisory Panel on Insecticides and other expert advisory panels with special competence and interest in pesticide technology, as well as the comments of WHO Member States and of two international agencies. This proposal was adopted by the Twenty-eighth World Health Assembly, which recommended the use of the classification by Member States, international agencies, and regional bodies.

The text below is reproduced from the Proposal[4] which was adopted by the World Health Assembly in 1975.

The hazard referred to in this Recommendation is the acute risk to health (that is, the risk of single or multiple exposures over a relatively short period of time) that might be encountered accidentally by any person handling the product in accordance with the directions for handling by the manufacturer or in accordance with the rules laid down for storage and transportation by competent international bodies.

Any classification based on biological data can never be treated as final. In the assessment of biological data, honest differences of opinion are inevitable and most borderline cases can be reclassified in an adjacent class. Variability or inconsistency in toxicity data due to differences in susceptibility of test animals, or to experimental techniques and materials used can also result in differing assessments. The classification criteria are guide-points intended to supplement but never to substitute for special knowledge, sound clinical judgement or experience with a compound. Reappraisal might be necessary from time to time.

Basis of classification

The classification distinguishes between the more and the less hazardous forms of each pesticide in that it is based on the toxicity of the technical compound and on its formulations. [In particular, allowance is made for the lesser hazards from solids as compared with liquids.][5]

[4] Official Record of the World Health Organization 1975, No.223, Part 1, p.12

[5] Note: this distinction is not made in the GHS and no longer applies to the WHO Classification

The classification is based primarily on the acute oral and dermal toxicity to the rat since these determinations are standard procedures in toxicology. Where the dermal LD_{50}[6] value of a compound is such that it would place it in a more restrictive class than the oral LD_{50} value would indicate, the compound will always be classified in the more restrictive class. Provision is made for the classification of a particular compound to be adjusted if, for any reason, the acute hazard to man differs from that indicated by LD_{50} assessments alone.

Application of the criteria for classification

(a) Where it is shown that for a particular compound the rat is not the most suitable test animal (for example, if another species is conspicuously more sensitive or more closely resembles man in its reaction) then the classification of that compound should take this into account.

(b) In practice, the majority of classifications will be made on the acute oral LD_{50} value. However, dermal toxicity must always be considered since it has been found that, under most conditions of handling pesticides, a high proportion of the total exposure is dermal. Classification based on dermal data in a class indicating a great risk is necessary when the dermal LD_{50} values indicate greater hazard than oral LD_{50} values.

(c) If the active ingredient produces irreversible damage to vital organs, is highly volatile, is markedly cumulative in its effect, or is found after direct observations to be particularly hazardous or significantly allergenic to man, then adjustments to the classification can be made by classifying the compound in a class indicating a higher hazard. Alternatively, if it can be shown that the preparation is less toxic or hazardous than expected from consideration of the LD_{50} values of the ingredient or ingredients, or for any other reason, adjustments should be made by classifying the compound in a class indicating a lower hazard.

(d) In certain special cases the acute oral or dermal LD_{50} values of the compound or formulation should not be used as the main basis for classification. In such cases (for example, aerosol preparations, other special formulations and fumigants), more appropriate criteria should be used.

(e) It is highly desirable that, whenever practicable, toxicological data for each formulation to be classified should be available from the manufacturer. However, if such data are not obtainable, then the classification may be based on proportionate calculations from the LD_{50} values of the technical ingredient or ingredients, according to the following formula:

$$\frac{LD_{50}\ active\ ingredient \times 100}{Percentage\ of\ active\ ingredient\ in\ formulation}$$

If the formulation contains more than one ingredient (including solvents, wetting agents, etc.) of significant toxicity-enhancing properties, then the classification should correspond to the toxicity of the mixed ingredients.

[6] The LD_{50} value is a statistical estimate of the number of mg of toxicant per kg of bodyweight required to kill 50% of a large population of test animals.

(f) With a few exceptions, pesticides have low volatility and therefore no criteria are at present set out for volatility in this Recommendation. The inclusion of such criteria is unlikely to affect the classification of pesticides by hazard except in the case of volatile fumigants used in agriculture and food storage. On the other hand, when the criteria are applied to pesticide formulations based on solvents or to other chemicals, account must be taken of volatility and consequent inhalation toxicity. [Further information on the inhalation toxicity of pesticides used as fumigants is now presented in Table 8.]

Effects of classification on labeling[7]

While no specific symbols to identify classes are included in the Recommendation, the following are the general implications of the classification as regards labelling.

The aim should be uniformity in the statement on the nature of the risk (by phrase and/or symbol) on the label of the product, irrespective of the country of origin or use. Labels of products classified in classes Ia and Ib should bear a symbol indicating a high degree of hazard (usually a type of skull and crossbones) and a signal word or phrase, e.g. POISON or TOXIC. The presentation of the symbol and word or phrase, in terms of colour, size and shape should ensure that they are given sufficient prominence on the label.

The text should be in the local language and for all formulations should include the approved name of the active ingredient or ingredients, the method of use, and precautions to be taken in use. For classes Ia and Ib, symptoms and immediate treatment of poisoning should also be included.

The detailed precautions necessary for the use of a pesticide depend on the nature of the formulation and the pattern of use and are best decided by a pesticide registration authority when accepting a commercial label.

There are international agreements on symbols to denote hazards from materials which are inflammable, corrosive, explosive, etc., and these should be consulted and used where appropriate.

[7] See WHO/FAO *International Code of Conduct on Pesticide Management*, WHO/FAO (2014), available at http://www.fao.org/3/I3604E/i3604e.pdf; also *Guidelines on Good Labelling Practice for Pesticides*, WHO/FAO (2015), available at http://apps.who.int/iris/bitstream/10665/195650/1/9789241509688_eng.pdf?ua=1.

Revised criteria for classification (in use since 2009 update)

The table showing the Recommended Criteria for Classification from the original World Health Assembly Proposal is not shown because it is no longer used. WHO now uses the Acute Toxicity Hazard Categories from the GHS[8] as the starting point for classification. This change is consistent with the 1975 World Health Assembly Resolution which envisaged that the WHO Classification would be further developed with time in consultation with countries, international agencies and regional bodies. The GHS meets this requirement as a classification system with global acceptance following extensive international consultation.

		LD_{50} for the rat (mg/kg body weight)	
Class		**Oral**	**Dermal**
Ia	Extremely hazardous	< 5	< 50
Ib	Highly hazardous	5–50	50–200
II	Moderately hazardous	50–2000	200–2000
III	Slightly hazardous	Over 2000	Over 2000
U	Unlikely to present acute hazard	5000 or higher	

Details of how the WHO Classification has been aligned with the GHS Acute Toxicity Hazard Categories are presented in Part II.

[8] See http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html. The categories for oral and dermal routes are used.

PART II: GUIDELINES TO CLASSIFICATION OF PESTICIDES BY HAZARD

The main section of the guidelines consists of five tables preceded by notes on their use. In the tables, active ingredients (technical grade) have been classified as follows:

The tables are arranged in alphabetical order.

In addition, the following tables show the details stated:

NOTES ON THE USE OF THE TABLES IN CLASSIFICATION

The final classification of any product is intended to be by formulation

The classification given in the tables below is of active ingredients, and only forms the starting point for the final classification of an actual formulation. It is by far preferable that the final classification of a formulation should be based on toxicity data obtained on that formulation by the manufacturer: the criteria set out in the table of the Classification in Part I are then applied to this first-hand data. Only if this is not available should the formula be used, as shown in Part I on page 4 to extrapolate the LD_{50} of the formulation from that of the technical product. In this event, the single oral or dermal value of the LD_{50} given in the tables below should be used in the formula.. See also the Annex on page 69.

The following important points should be noted.

1. While the classification deals only with the acute risk to health, evaluations of other effects, including cancer, have been completed for many compounds for registration purposes. Where other effects have been shown to occur in man, these are noted in the 'Remarks' column and may have in some cases resulted in an adjusted classification.

2. Wherever possible, the data are listed under internationally approved common names, or if such names are not at present available, under nationally approved names. Some other common names appear in the alphabetic index on pages 81–92. Trade names are not given since there are many of these.

3. A list of references that may be used for the identification of pesticides is given at the end of these introductory notes, and the manufacturer should always assist by specifying any existing approved or common names for his product.

4. It is not possible to include classification of mixtures of pesticides in the guidelines: very many of these are marketed with varying concentrations of active constituents. There are three possible approaches to the classification of mixtures – in order of preference:

   (a) require the formulator to obtain reliable acute oral and dermal toxicity data for rats on the actual mixture as marketed: or

   (b) classify the formulation according to the most hazardous constituent of the mixture as if that constituent was present in the same concentration as the total concentration of all active constituents: or

   (c) apply the formula:

$$\frac{C_a}{T_a} + \frac{C_b}{T_b} + \frac{C_z}{T_z} \equiv \frac{100}{T_m}$$

   Where C = the % concentrations of constituent A, B ... Z in the mixture

   T = the oral LD_{50} values of constituents A, B ... Z

   T_m = the oral LD_{50} value of the mixture.

The formula can also be used for dermal toxicities provided that this information is available on the same species for all constituents. The use of this formula does not take into account any potentiation or protective phenomena.

5. In the tables below, single figures have been given as LD_{50} values for classification purposes, using the route as described in the table. Where several LD_{50} values have been published, the lowest deemed reliable is used. Where a sex difference occurs in LD_{50} values, the value for the more sensitive sex is used. A number of adjustments to Classification have been made in respect of some pesticides and these are explained. A borderline case has been classified in the more or less hazardous class after consideration of its toxicology and use experience.

6. In the former WHO Classification scheme pesticides were classified on the basis of the physical state of the technical product. A distinction between liquids and solids is no longer made.

7. In Table 5, a number of pesticides are listed as unlikely to present any acute hazard in normal use. The WHO classification is open-ended but it is clear that there must be a point at which the acute hazard posed by the use of these compounds is so low as to be negligible provided that the precautions are taken that should be used in dealing with any chemical. In compiling this table, it has been assumed that this point is an LD_{50} of 5000 mg/kg bw or greater (in line with the upper limit for classification in the GHS). However, it should not be overlooked that in formulations of these technical products, solvents or vehicles may present a greater hazard than the actual pesticide and therefore classification of a formulation in one of the higher hazard classes may be necessary.

8. The WHO Classification is not limited to chemical pesticides. Biological pesticides can also be included if a suitable evaluation is available (*Bacillus thuringiensis* is included based on Environmental Health Criteria Document 217).

9. The toxicity data for pyrethroids is highly variable according to isomer ratios, the vehicle used for oral administration, and the husbandry of the test animals e.g. fasting prior to dosing. The variability is reflected in the prefix 'c' before LD_{50} values. The single LD_{50} value chosen for classification purposes is generally based on administration in corn oil and can be much lower than that in aqueous solutions. This underlines the need for classification by formulation if the classification is to reflect true hazard.

ENTRIES AND ABBREVIATIONS USED IN THE TABLES

New information since the previous edition is indicated by *italics*.

Column 1: Common name. [ISO] denotes common name of the active ingredient approved by the International Organization for Standardization. Such names are, when available, preferred by WHO to all other common names. However, attention is drawn to the fact that some of these names may not be acceptable for national use in some countries. If the letters ISO appear within parentheses (ISO), this indicates that ISO has standardized (or is in the process of standardizing) the name of the base, but not the name of the derivative listed in column 1. For example, fentin acetate (ISO) indicates that fentin is an ISO name, but fentin acetate is not. ISO* denotes pending ISO approval of the name. C denotes chemical, trivial, or other common name.

Column 2: CAS Registry number: The number for the chemical, not those for e.g. different esters or salts are given.

Column 3: UN number refers to the UN Recommendations on the transport of dangerous goods, Eleventh revision (1999), and subsequent revisions. Few active ingredients in Table 5 have UN numbers. The UN number refers only to the active ingredient; formulations are likely to have different numbers, since the ingredient may, for example, be dissolved in a solvent – and liquid products have different UN numbers, which depends on their flammability.

Column 4: Chemical type. Only a limited number of chemical types are shown. Most have some significance in the sense that they may have a common antidote, or may be confused in the nomenclature with other chemical types e.g. thiocarbamates are not cholinesterase inhibitors and do not have the same effects as carbamates. Chemical type is also a determinant of the UN numbering system. These chemical classifications are included only for convenience, and do not represent a recommendation on the part of the World Health Organization as to the way in which the pesticides should be classified. It should, furthermore, be understood that some pesticides may fall into more than one type.

AS	Arsenic compound
BP	Bipyridylium derivative
C	Carbamate
CO	Coumarin derivative
CU	Copper compound
HG	Mercury compound
NP	Nitrophenol derivative
OC	Organochlorine compound
OP	Organophosphorus compound
OT	Organotin compound
PAA	Phenoxyacetic acid derivative
PZ	Pyrazole
PY	Pyrethroid
T	Triazine derivative
TC	Thiocarbamate

Column 5: Physical state. Refers only to the active ingredient. L denotes liquid, including solids with a melting point below 50°C; oil denotes oily liquids and S solids, including waxes. The physical state may affect the exposure potential, and thus the absorbed amount of the chemical, and was taken into account when determining classification under the previous scheme.

Column 6: Main use. In most cases only a single use is given. This is only for identification purposes and does not exclude other uses.

AC	acaricide
AP	aphicide
B	bacteriostat (soil)
FM	fumigant
F	fungicide, other than for seed treatment
FST	fungicide, for seed treatment
H	herbicide
I	insecticide
IGR	insect growth regulator
Ix	ixodicide (for tick control)
L	larvicide
M	molluscicide
MT	miticide
N	nematocide
O	other use for plant pathogens
PGR	plant growth regulator
R	rodenticide
RP	repellant
-S	applied to soil: not used with herbicides or plant growth regulators
SY	synergist

Column 7: GHS: This column indicates the classification of the pesticide according to "*The Globally Harmonized System of Classification and Labelling of Chemicals*" (GHS)[9]. The value shown in the column is the Acute Toxic Hazard Category according to the GHS criteria, which in turn is derived from the acute toxicity estimate value for the substance. In the majority of cases the acute toxicity estimate will be the experimentally-derived LD_{50} value for oral exposure. For full details of classification according to GHS the official publication of the GHS should be consulted.

The former WHO Classification scheme used prior to 2009 applied different criteria to liquids and solids, but the GHS does not make a similar distinction and applies the same criteria. The GHS cut-off values for Category 2 and Category 3 are lower than the values which applied to liquids under the pre-2009 WHO scheme, such that some liquids allocated to Class Ib would be placed in the lower GHS Category 3 (specifically pesticides with oral LD_{50} values in the range 50–200 mg/kg bw). In aligning the WHO scheme with the GHS criteria there was no intention to "lower" the classification of pesticides previously considered to be "Highly hazardous". Therefore, the classification of this limited number of liquid pesticides has been adjusted such that they remain in Class Ib. The criteria for the WHO classification scheme now being used are shown in Part I (page 6).

Column 8: LD_{50}. The LD_{50} value is a statistical estimate of the number of mg of toxicant per kg of body weight required to kill 50% of a large population of test animals: the rat is used unless otherwise stated. Usually a single value, but sometimes a range is given. "c" preceding the value indicates that it is a value within a wider than usual range, adopted for classification purposes. When several different values are reported in the literature, the lowest is reported and used as the basis of classification, unless there are clear indications that a higher value is more reliable. Oral route values are used unless the dermal route values place the compound in a more hazardous class, or unless the dermal

[9] See http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html. The categories for oral and dermal routes are used

values are significantly lower than the oral values, although in the same class. Dermal LD_{50} values are indicated with the letter D.

Column 9: Remarks. This column is used to indicate cases in which the classification of a technical product has been adjusted (i.e., the oral LD_{50} value is not directly used as the basis of classification); Major irritant properties may also be noted although they do not affect the classification. Sources of further information may also be given here: EHC denotes an Environmental Health Criteria monograph, HSG a Health and Safety Guide, IARC refers to IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, ICSC an International Chemical Safety Card, JMPR an evaluation by the Joint FAO/WHO Meeting on Pesticide Residues (the year of evaluation is shown) and JECFA an evaluation by the Joint FAO/WHO Expert Committee on Food Additives. These publications can be found on the INCHEM website maintain by WHO (www.inchem.org). Further information on chemicals from WHO can be found on the IPCS web site (http://www.who.int/ipcs/).

Definition of Highly Hazardous Pesticides

The Joint FAO/WHO Meeting on Pesticide Management recommended[10] that highly hazardous pesticides should be defined as having one or more of the following characteristics:

- **Criterion 1:** Pesticide formulations that meet the criteria of classes Ia or Ib of the *WHO Recommended Classification of Pesticides by Hazard;* or
- **Criterion 2:** Pesticide active ingredients and their formulations that meet the criteria of carcinogenicity Categories 1A and 1B of the *Globally Harmonized System of Classification and Labelling of Chemicals* (GHS); or
- **Criterion 3:** Pesticide active ingredients and their formulations that meet the criteria of mutagenicity Categories 1A and 1B of the *Globally Harmonized System of Classification and Labelling of Chemicals* (GHS); or
- **Criterion 4:** Pesticide active ingredients and their formulations that meet the criteria of reproductive toxicity Categories 1A and 1B of the *Globally Harmonized System of Classification and Labelling of Chemicals* (GHS); or
- **Criterion 5:** Pesticide active ingredients listed by the *Stockholm Convention* in its Annexes A and B, and those meeting all the criteria in paragraph 1 of Annex D of the Convention; or
- **Criterion 6:** Pesticide active ingredients and formulations listed by the *Rotterdam Convention* in its Annex III; or
- **Criterion 7:** Pesticides listed under the *Montreal Protocol;* or
- **Criterion 8:** Pesticide active ingredients and formulations that have shown a high incidence of severe or irreversible adverse effects on human health or the environment.

[10] See http://apps.who.int/iris/bitstream/10665/205561/1/9789241510417_eng.pdf?ua=1

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1973	JMPR (1974) 1973 Evaluations of some pesticide residues in food. FAO/AGP/1973/M/9/1; WHO Pesticide Residues Series, No. 3.
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1981	JMPR (1982) Pesticide residues in food:1981 evaluations. FAO Plant Production and Protection Paper 42.
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2010	JMPR (2011) Pesticide residues in food – 2010. Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group. Evaluations 2010. Part II Toxicological. World Health Organization, Geneva.
2011	JMPR (2012) Pesticide residues in food – 2011. Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group. Evaluations 2011. Part II Toxicological. World Health Organization, Geneva.
2012	JMPR (2013) Pesticide residues in food – 2012. Joint Meeting of the FAO Panel of Experts on Pesticide Residues in Food and the Environment and the WHO Core Assessment Group. Evaluations 2012. Part II Toxicological. World Health Organization, Geneva.
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Table 1. Extremely hazardous (Class Ia) technical grade active ingredients in pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Aldicarb [ISO]	116-06-3	2757	C	S	I-S	1	0.93	*See note 3;* EHC 121; HSG 64; ICSC 94; JMPR 1992, 1995
Brodifacoum [ISO]	56073-10-0	3027	CO	S	R	1	0.3	EHC 175; HSG 93
Bromadiolone [ISO]	28772-56-7	3027	CO	S	R	1	1.12	EHC 175; HSG 94
Bromethalin [ISO]	63333-35-7	2588		S	R	1	2	
Calcium cyanide [C]	592-01-8	1575		S	FM	2	39	Adjusted classification; see note 1; ICSC 407
Captafol [ISO]	2425-06-1			S	F	5	5000	Adjusted classification; see notes 2 and 3; HSG 49; IARC 53 *(Group 2A)*; ICSC 119; JMPR 1977, 1985
Chlorethoxyfos [ISO]	54593-83-8	3018	OP	L	I	1	1.8	Extremely hazardous by skin contact (LD_{50} = 12.5 mg/kg); ICSC 1681
Chlormephos [ISO]	24934-91-6	3018	OP	L	I	2	D27	ICSC 1682
Chlorophacinone [ISO]	3691-35-8	2588		S	R	1	3.1	EHC 175; *ICSC 1756*
Difenacoum [ISO]	56073-07-5	3027	CO	S	R	1	1.8	EHC 175; HSG 95
Difethialone [ISO]	104653-34-1	2588		S	R	1	0.56	EHC 175
Diphacinone [ISO]	82-66-6	2588		S	R	1	2.3	EHC 175; *ICSC 1757*
Disulfoton [ISO]	298-04-4	3018	OP	L	I	1	2.6	ICSC 1408; JMPR 1992, 1996
EPN	2104-64-5	2783	OP	S	I	2	14	See note 4; ICSC 753
Ethoprophos [ISO]	13194-48-4	3018	OP	L	I-S	2	D26	ICSC 1660; JMPR 1999; [Oral LD_{50} = 33 mg/kg]
Flocoumafen	90035-08-8	3027		S	R	1	0.25	EHC 175; ICSC 1267
Hexachlorobenzene [ISO]	118-74-1	2729	OC	S	FST	5	D10000	Adjusted classification (notes 3 and 5); EHC 195; IARC 79 *(Group 2B)*; ICSC 895
Mercuric chloride [ISO]	7487-94-7	1624	HG	S	F-S	1	1	See note 3; ICSC 979
Mevinphos [ISO]	7786-34-7	3018	OP	L	I	1	D4	ICSC 924; JMPR 1996; [Oral LD_{50} = 3.7 mg/kg]
Oxamyl [ISO]	*23135-22-0*	*2757*	*C*	*S*	*I*	*1*	*2.5*	*JMPR 2017*

Table 1. Extremely hazardous (Class Ia) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Parathion [ISO]	56-38-2	3018	OP	L	I	2	13	See note 3; HSG 74; *IARC 112 (Group 2B)*; ICSC 6; JMPR 1995; *High case fatality reported – see note 6*
Parathion-methyl [ISO]	298-00-0	3018	OP	L	I	2	14	See note 3; EHC 145; HSG 75; ICSC 626; JMPR 1984, 1995
Phenylmercury acetate [ISO]	62-38-4	1674	HG	S	FST	2	24	Adjusted classification; see notes 3 and 7; ICSC 540
Phorate [ISO]	298-02-2	3018	OP	L	I	1	2	*See note 3;* JMPR 1996, 2004; ICSC 1060
Phosphamidon	13171-21-6	3018	OP	L	I	2	7	See note 3; ICSC 189; JMPR 1986
Sodium fluoroacetate [C]	62-74-8	2629		S	R	1	0.2	ICSC 484
Sulfotep [ISO]	3689-24-5	1704	OP	L	I	1	5	ICSC 985
Tebupirimfos [ISO]	96182-53-5	3018	OP	L	I	1	1.3	Extremely hazardous by skin contact (LD_{50} 9.4 mg/kg in rats); *ICSC 1767*
Terbufos [ISO]	13071-79-9	3018	OP	L	I-S	1	c2	*ICSC 1768;* JMPR 1990, 2003

EHC = Environmental Health Criteria Monograph; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

Notes to Class Ia

1. Calcium cyanide is in Class Ia as it reacts with moisture to produce hydrogen cyanide gas. *Hydrogen cyanide is fatal if swallowed, in contact with skin or if inhaled (ICSC 492).*
2. Captafol is carcinogenic in both rats and mice.
3. The international trade of *aldicarb,* captafol, hexachlorobenzene, mercury compounds, parathion, parathion-methyl, *phorate* and phosphamidon is regulated by the Rotterdam Convention on Prior Informed Consent (see http://www.pic.int/), which entered into force on 24 February 2004 and has subsequently been amended. See table 7, p. 65
4. EPN has been reported as causing delayed neurotoxicity in hens.
5. Hexachlorobenzene has caused a serious outbreak of porphyria in humans. The use and production of hexachlorobenzene is severely restricted by the Stockholm Convention on persistent organic pollutants (see http://www.pops.int/), which entered into force on 17 May, 2004 and has subsequently been amended.
6. *A high case fatality has been reported in poisoning cases with this substance (Dawson et al, 2010).*
7. Phenylmercury acetate is highly toxic to mammals and very small doses have produced renal lesions: teratogenic in the rat.

THE FINAL CLASSIFICATION OF ANY PRODUCT DEPENDS ON ITS FORMULATION

See Pages 8 & 9, and the Annex

Table 2. Highly hazardous (Class Ib) technical grade active ingredients in pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Abamectin [ISO]	*71751-41-2*	*2588*		*S*	*AC,I,N*	*2*	*8.7*	*JMPR 2015*
Acrolein [C]	107-02-8	1092		L	H	2	29	EHC 127; HSG 67; ICSC 90
Allyl alcohol [C]	107-18-6	1098		L	H	3	64	Highly irritant to skin and eyes; ICSC 95; Adjusted classification (see note 3)
Azinphos-ethyl [ISO]	2642-71-9	2783	OP	S	I	2	12	JMPR 1973
Azinphos-methyl [ISO]	86-50-0	2783	OP	S	I	2	16	*See note 2;* ICSC 826; JMPR 1992, 2007
Blasticidin-S	2079-00-7	2588		S	F	2	16	*ICSC 1758*
Bromophos-ethyl [ISO]	*4824-78-6*		*OP*	*L*	*I*	*3*	*71*	*Adjusted classification (see note 3)*
Butocarboxim [ISO]	34681-10-2	2992	C	L	I	3	158	JMPR 1985; Adjusted classification (see note 3)
Butoxycarboxim [ISO]	34681-23-7	2992	C	L	I	3	D288	Adjusted classification (see note 3)
Cadusafos [ISO]	95465-99-9	3018	OP	L	N,I	2	*30*	JMPR *2009*
Calcium arsenate [C]	7778-44-1	1573	AS	S	I	2	20	EHC 18, 224; IARC 84 *(see note 5)*; ICSC 765; JMPR 1969
Carbofuran [ISO]	1563-66-2	2757	C	S	I	2	8	See note 2; ICSC 122; JMPR 1996, 2002, 2008
Chlorfenvinphos [ISO]	470-90-6	3018	OP	L	I	2	31	ICSC 1305; JMPR 1994
3-Chloro-1,2-propanediol [C]	96-24-2	2689		L	R	3	112	*IARC 101 (Group 2B); ICSC 1664;* Adjusted classification (see notes 1 and 3)
Coumaphos [ISO]	56-72-4	2783	OP	S	AC,MT	2	7.1	ICSC 422; JMPR 1990
Coumatetralyl [ISO]	5836-29-3	3027	CO	S	R	2	16	
Cyfluthrin [ISO]	68359-37-5		PY	S	I	2	c15	*ICSC 1764*; JMPR 2006; See note 4
Beta-cyfluthrin [ISO]	1820573-27-0		PY	S	I	2	c11	JMPR 2006; See note 4

Table 2. Highly hazardous (Class Ib) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Demeton-S-methyl [ISO]	919-86-8	3018	OP	L	I	2	40	EHC 197; ICSC 705; JMPR 1989
Dichlorvos [ISO]	62-73-7	3018	OP	L	I	3	*57-108*	Volatile; EHC 79; HSG 18; IARC 53 *(Group 2B)*; ICSC 690; JMPR 1993, *2011*; Adjusted classification (see note 3)
Dicrotophos [ISO]	141-66-2	3018	OP	L	I	2	22	ICSC 872
Dinoterb [ISO]	1420-07-1	2779	NP	S	H	2	25	
DNOC [ISO]	534-52-1	1598	NP	S	I-S,H	2	25	JMPR 1965a; EHC 220; ICSC 462. See note 2.
Edifenphos [ISO]	17109-49-8	3018	OP	L	F	3	150	JMPR 1981. Adjusted classification (see note 3)
Ethiofencarb [ISO]	29973-13-5	2992	C	L	I	3	200	*ICSC 1754*; JMPR 1982. Adjusted classification (see note 3)
Famphur	52-85-7	2783	OP	S	I	2	48	
Fenamiphos [ISO]	22224-92-6	2783	OP	S	N	2	15	ICSC 483; JMPR 1997, 2002
Flucythrinate [ISO]	70124-77-5	3352	PY	L	I	3	c67	JMPR 1985; see note 4; Adjusted classification (see note 3)
Fluoroacetamide [C]	640-19-7	2588		S	R	2	13	ICSC 1434. See note 2
Formetanate [ISO]	22259-30-9	2757	C	S	AC	2	21	
Furathiocarb	65907-30-4	2992	C	L	I-S	2	42	
Heptenophos [ISO]	23560-59-0	3018	OP	L	I	3	96	Adjusted classification (see note 3)
Isoxathion [ISO]	18854-01-8	3018	OP	L	I	3	112	Adjusted classification (see note 3)
Lead arsenate [C]	7784-40-9	1617	AS	S	L	2	c10	EHC 18, 224; ICSC 911; JMPR 1969
Mecarbam [ISO]	2595-54-2	3018	OP	Oil	I	2	36	*ICSC 1755*; JMPR 1986
Mercuric oxide [ISO]	21908-53-2	1641	HG	S	O	2	18	ICSC 981; CICAD 50. See note 2
Methamidophos [ISO]	10265-92-6	2783	OP	S	I	2	30	HSG 79; ICSC 176; JMPR 1990, 2002; See note 2
Methidathion [ISO]	950-37-8	3018	OP	L	I	2	25	ICSC 1659; JMPR 1997

Table 2. Highly hazardous (Class Ib) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Methiocarb [ISO]	2032-65-7	2757	C	S	I	2	20	*ICSC 1766*; JMPR 1998
Methomyl [ISO]	16752-77-5	2757	C	S	I	2	17	EHC 178; HSG 97; ICSC 177, JMPR 1989, 2001
Monocrotophos [ISO]	6923-22-4	2783	OP	S	I	2	14	See note 2; HSG 80; ICSC 181; JMPR 1995; *High case fatality reported – see note 6.*
Nicotine [ISO]	54-11-5	1654		L		1	D50	ICSC 519
Omethoate [ISO]	1113-02-6	3018	OP	L	I	2	50	JMPR 1985; 1996
Oxydemeton-methyl [ISO]	301-12-2	3018	OP	L	I	3	65	JMPR 1989, 2002; Adjusted classification (see note 3)
Paris green [C]	12002-03-8	1585	AS	S	L	2	22	Copper-arsenic complex
Pentachlorophenol [ISO]	87-86-5	3155		S	I,F,H	2	D80	See note 2; Irritant to skin; EHC 71; HSG 19; *IARC 117 (Group 1)*; ICSC69
Propetamphos [ISO]	31218-83-4	3018	OP	L	I	3	106	Adjusted classification (see note 3)
Sodium arsenite [C]	7784-46-5	2027	AS	S	R	2	10	EHC 224; IARC 84 *(see note 5)*; ICSC 1603
Sodium cyanide [C]	143-33-9	1689		S	R	2	6	ICSC 1118; CICAD 61
Strychnine [C]	57-24-9	1692		S	R	2	16	ICSC 197
Tefluthrin	79538-32-2	3349	PY	S	I-S	2	c22	See note 4
Thallium sulfate [C]	7446-18-6	1707		S	R	2	11	EHC 182; ICSC 336
Thiofanox [ISO]	39196-18-4	2757	C	S	I-S	2	8	
Thiometon [ISO]	640-15-3	3018	OP	Oil	I	3	120	ICSC 580; JMPR 1979; Adjusted classification (see note 3)
Triazophos [ISO]	24017-47-8	3018	OP	L	I	3	82	JMPR 1993, 2002; Adjusted classification (see note 3)
Vamidothion [ISO]	2275-23-2	3018	OP	L	I	3	103	JMPR 1988; ICSC 758; Adjusted classification (see note 3)
Warfarin [ISO]	81-81-2	3027	CO	S	R	2	10	EHC 175; HSG 96; ICSC 821
Zinc phosphide [C]	1314-84-7	1714		S	R	2	*40.5*	EHC 73; ICSC 602

Table 2. Highly hazardous (Class Ib) technical grade active ingredients in pesticides (cont.)

EHC = Environmental Health Criteria Monograph; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

Notes to Class Ib

1. 3-Chloro-1,2-propanediol in nonlethal dosage is a sterilant for male rats. This compound is also known as alpha-chlorohydrin.
2. The international trade of *azinphos-methyl,* carbofuran, DNOC, fluoroacetamide, mercury compounds, methamidophos, monocrotophos and pentachlorophenol is regulated by the Rotterdam Convention on Prior Informed Consent (see http://www.pic.int/), which entered into force on 24 February 2004 and has subsequently been amended. See table 7, p. 65. *In addition, the production and use of pentachlorophenol and its salts and esters are strictly limited by the Stockholm Convention on persistent organic pollutants (see* http://www.pops.int/*), which entered into force on 17 May, 2004 and has subsequently been amended.*
3. As a precautionary measure, the classification of certain liquid pesticides has been adjusted to avoid those pesticides being assigned to a less hazardous Class in the process of aligning the WHO Classification with the GHS. Details of how the WHO Classification has been aligned with the GHS Acute Toxicity Hazard Categories are described in the introductory notes for Part II.
4. *The toxicity data for pyrethroids is highly variable according to isomer ratios, the vehicle used for oral administration, and the husbandry of the test animals e.g. fasting prior to dosing. The variability is reflected in the prefix 'c' before LD_{50} values. The single LD_{50} value chosen for classification purposes is generally based on administration in corn oil and can be much lower than that in aqueous solutions. This underlines the need for classification by formulation if the classification is to reflect true hazard.*
5. *IARC Monograph 84 concluded that there was* **limited evidence** *in experimental animals for the carcinogenicity of calcium arsenate and sodium arsenite (IARC 84).*
6. *A high case fatality has been reported in poisoning cases with this substance (Dawson et al, 2010).*

THE FINAL CLASSIFICATION OF ANY PRODUCT DEPENDS ON ITS FORMULATION

See Pages 8 & 9, and the Annex

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Acephate [ISO]	30560-19-1		OP	S	I	4	945	JMPR 1990, 2002, 2005; ICSC 748
Acetamiprid [ISO]	*135410-20-7*	*2588*		*S*	*I*	*3*	*c140*	*JMPR 2011*
Acifluorfen [ISO]	50594-66-6			S	H	4	1370	Strong irritant to eyes
Alachlor [ISO]	15972-60-8	2588		S	H	4	930	See notes 1 *and 3*; ICSC 371
Alanycarb [ISO]	83130-01-2		C	S	I	4	330	
Allethrin [ISO]	584-79-2		PY	Oil	I	4	c685	See note 10; EHC 87; HSG 24; ICSC 212; JMPR 1965a
Allidochlor [ISO]	*93-71-0*			*L*	*H*	*3*	*700*	*Irritant to skin and eyes*
Ametryn [ISO]	834-12-8		T	S	H	4	110	
Amitraz [ISO]	33089-61-1			S	AC	4	800	ICSC 98; JMPR 1998
Anilofos [ISO]	64249-01-0		OP	S	H	4	472	
Azaconazole	60207-31-0			S	F	4	308	
Azamethiphos [ISO]	35575-96-3		OP	S	I	4	1010	
Azocyclotin [ISO]	41083-11-8	2786	OT	S	AC	3	80	JMPR 1989, 1994, 2005
Barban [ISO]	*101-27-9*			*S*	*H*	*4*	*1300*	
Bendiocarb [ISO]	22781-23-3	2757	C	S	I	3	55	
Benfuracarb [ISO]	82560-54-1	2992	C	L	I	3	205	
Bensulide [ISO]	741-58-2	2902		L	H	3	270	ICSC 383
Bensultap [ISO]	17606-31-4			S	I	4	1100	
Bentazone [ISO]	25057-89-0			S	H	4	1100	HSG 48; ICSC 828; JMPR 1998, 2004, *2012*, *2016*
Benzovindiflupyr [ISO]*	*1072957-71-1*	*2588*	*PZ*	*S*	*F*	*3*	*55*	*JMPR 2013*
Bifenthrin	82657-04-3	3349	PY	S	I	3	c55	JMPR 1992, *2009*
Bilanafos [ISO]	71048-99-2			S	H	3	268	

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Bioallethrin [C]	260359-57-7		PY	L	I	4	c700	See notes 2 and 10; ICSC 227
Bis(tributyltin) oxide [C]	*56-35-9*			*L*	*F,M*	*3*	*194*	*See note 3; EHC 15; Irritant to skin*
Bromofenoxim [ISO]	*13181-17-4*			*S*	*H*	*4*	*1217*	
Bromophos [ISO]	*2104-96-3*		*OP*	*S*	*I*	*4*	*c1600*	
Bromoxynil [ISO]	1689-84-5	2588		S	H	3	190	
Bromuconazole	116255-48-2			S	F	4	365	ICSC 1264
Bronopol	52-51-7	3241		S	B	3	254	ICSC 415
Butamifos [ISO]	36335-67-8		OP	L	H	4	630	
Butralin [ISO]	33629-47-9			S	H	4	1049	
Butroxydim [ISO]	138164-12-2			S	H	4	1635	
Butylamine [ISO]	13952-84-6	1992		L	F	4	380	Irritant to skin; ICSC 401; JMPR 1981, 1984
Carbaryl [ISO]	63-25-2	2757	C	S	I	3	c300	EHC 153; HSG 78; ICSC 121; JMPR 1996, 2000, 2001
Carbosulfan [ISO]	55285-14-8	2992	C	L	I	3	250	JMPR 1986, 2003; *High case fatality reported – see note 15*
Cartap [ISO]	15263-53-3		*TC*	S	I	4	325	EHC 76; JMPR 1995; *Usually used in the form of cartap hydrochloride (CAS 15263-52-2)*
Chloralose [C]	15879-93-3			S	R	4	400	
Chlordane [ISO]	57-74-9	2996	OC	L	I	4	460	See notes 3 and 4; EHC 34; HSG 13; IARC 79 *(Group 2B)*; ICSC 740; JMPR 1994
Chlorfenac [ISO]	*85-34-7*		*OC*	*S*	*H*	*4*	*575*	
Chlorfenapyr [ISO]	122453-73-0			S	I,MT	4	441	
Chlormequat chloride [ISO]	999-81-5			S	PGR	4	*433*	ICSC 781; JMPR 1997, 1999, *2017*
Chloroacetic acid [C]	79-11-8	1751		S	H	4	650	Irritant to skin and eyes; data refer to sodium salt; ICSC 235

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Chlorphonium chloride [ISO]	115-78-6	2588		S	PGR	3	178	Irritant to skin and eyes
Chlorpyrifos [ISO]	2921-88-2	2783	OP	S	I	3	135	ICSC 851; JMPR 1999
Chlorthiamid [ISO]	*1918-13-4*			*S*	*H*	*4*	*757*	*ICSC 852*
Clomazone [ISO]	81777-89-1			L	H	4	1369	
Clothianidin [ISO]	*210880-92-5*			*S*	*I*	*4*	*389*	*JMPR 2010*
Copper hydroxide [C]	20427-59-2		CU	S	F	4	1000	
Copper oxychloride [C]	1332-40-7		CU	S	F	4	1440	
Copper sulfate [C]	7758-98-7		CU	S	F	3	300	ICSC 751
4-CPA [ISO]	122-88-3		PAA	S	PGR	4	850	
Cuprous oxide [C]	1317-39-1		CU	S	F	4	470	ICSC 421, EHC 200
Cyanazine [ISO]	21725-46-2		T	S	H	3	288	ICSC 391
Cyanophos [ISO]	2636-26-2		OP	L	I	4	610	
Cyhalothrin [ISO]	68085-85-8	3352	PY	Oil	Ix	3	c144	See note 10; EHC 99; HSG 38; ICSC 858; JMPR 1984; 2007; JECFA 2000b
Lambda-cyhalothrin	*91465-08-6*	*2588*	PY	S	I	3	c56	*See notes 10 and 11*; EHC 142; HSG 38; JMPR 2007; ICSC 859
Cyhexatin [ISO]	13121-70-5		OT	S	AC	3	265	EHC 15; JMPR 1994, 2005
Cymoxanil [ISO]	57966-95-7			S	F	4	1196	
Cypermethrin [ISO]	52315-07-8	3352	PY	L	I	3	c250	See note 10; EHC 82; HSG 22;ICSC 246; JECFA 1996; JMPR 2006
Alpha-cypermethrin [ISO]	67375-30-8	3349	PY	S	I	3	c79	See note 10; EHC 142; JECFA 1996; JMPR 2006
Zeta-cypermethrin [ISO]	*1315501-18-8*	*3352*	*PY*	*L*	*I*	*3*	*c269*	*See note 10; HSG 22; ICSC 246; JMPR 2006; JMPS 2019*
Cyphenothrin [ISO]	39515-40-7	3352	PY	L	I	4	318	

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Cyproconazole	94361-06-5			S	F	4	1020	
2,4-D [ISO]	94-75-7	3345	PAA	S	H	4	375	EHC 29, 84; HSG 5; *IARC 113 (Group 2B)*; ICSC 33; JMPR 1996
Dazomet [ISO]	533-74-4			S	F-S	4	640	Irritant to skin and eyes; ICSC 786
2,4-DB	94-82-6			S	H	4	700	
DDT [ISO]	50-29-3	2761	OC	S	I	3	113	See notes 3 and 4; EHC 9, 83; *IARC 113 (Group 2A)*; ICSC 34; JMPR 1984, 1994, 2000
Deltamethrin [ISO]	52918-63-5	3349	PY	S	I	3	c135	See note 10; EHC 97; HSG 30; IARC 53 *(Group 3)*; ICSC 247; JMPR 2000
Diazinon [ISO]	333-41-5	3018	OP	L	I	4	300	EHC 198; *IARC 112 (Group 2A);* ICSC 137; JMPR 1993, 2001, 2006, *2016*
Dicamba [ISO]	1918-00-9			S	H	4	1707	ICSC 139
Dichlorobenzene [C]	106-46-7			S	FM	4	500-5000	Mixture of isomers: ortho (3) 95-50-1, meta (3) 541-73-1, para (2B) 106-46-7; ICSC 37
Dichlorophen [ISO]	97-23-4		OC	S	F	4	1250	
Dichlorprop [ISO]	120-36-5			S	H	4	800	ICSC 38
Diclofop [ISO]	40843-25-2			S	H	4	565	
Dicofol [ISO]	115-32-2		OC	S	AC	4	c690	*See note 4;* IARC 30 *(Group 3)*; ICSC 752; JMPR 1992, *2011*
Difenoconazole [ISO]	119446-68-3			S	F	4	1453	JMPR 2007
Difenzoquat [ISO]	43222-48-6	2588		S	H	4	470	
Dimepiperate [ISO]	61432-55-1		TC	S	H	4	946	
Dimethachlor [ISO]	50563-36-5			S	H	4	1600	
Dimethipin [ISO]	55290-64-7			S	H	4	1180	JMPR 1999, 2004

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Dimethenamid [ISO]	87674-68-8			L	H	4	371	LD_{50} of P isomer is 429 mg/kg bw; JMPR 2005
Dimethylarsinic acid [C]	75-60-5	1572	AS	S	H	4	1350	
Dimethyl disulfide [C]	*624-92-0*	*2381*		*L*	*FM,H,I,N*	*3*	*190*	*ICSC 1586; US EPA Pesticide Fact Sheet 2010; Used as a fumigant – classified as Toxic if inhaled (GHS Cat. 3)*
Dimethoate [ISO]	60-51-5	2783	OP	S	I	3	c150	EHC 90; HSG 20; ICSC 741; JMPR 1996, 2003; *High case fatality reported – see note 15*
Diniconazole [ISO]	83657-24-3			S	F	4	639	
Dinobuton [ISO]	973-21-7	2779	NP	S	AC,F	3	140	
Dinocap [ISO]	39300-45-3		NP	S	AC,F	4	980	ICSC 881; JMPR 2000
Diphenamid [ISO]	957-51-7			S	H	4	970	ICSC 763
Diquat [ISO]	2764-72-9	2781	BP	S	H	3	231	Irritant to skin and eyes and damages nails; EHC 39; HSG 52; ICSC 1363; JMPR 1993, *2013*
Dithianon [ISO]	3347-22-6			S	F	4	640	JMPR 1993, *2010*, *2013*
Dodine [ISO]	2439-10-3			S	F	4	1000	JMPR 2000
Emamectin Benzoate [ISO]	*155569-91-8*	*2588*		*S*	*I*	*3*	*53-237*	*JMPR 2011*
Endosulfan [ISO]	115-29-7	2761	OC	S	I	3	80	*See notes 3 and 4*; EHC 40; HSG 17; ICSC 742; JMPR 1998; *High case fatality reported – see note 15*
Endothal-sodium [(ISO)]	129-67-9	2588		S	H	3	51	
EPTC [ISO]	759-94-4		TC	L	H	4	1652	ICSC 469
Esfenvalerate [ISO]	66230-04-4	3349	PY	S	I	3	87	JMPR 2002; ICSC 1516
Ethion [ISO]	563-12-2	3018	OP	L	I	3	208	ICSC 888; JMPR 1990
Fenazaquin [ISO]	120928-09-8	2588		S	AC	3	134	*JMPR 2017*
Fenitrothion [ISO]	122-14-5		OP	L	I	4	503	EHC 133; HSG 65; ICSC 622; JMPR 2000, 2007

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Fenobucarb	3766-81-2		C	S	I	4	620	
Fenothiocarb [ISO]	62850-32-2		C	S	L	4	1150	
Fenpropidin [ISO]	67306-00-7			L	F	4	1440	
Fenpropathrin [ISO]	39515-41-8	3349	PY	S	I	3	c66	See note 10; JMPR 1993, *2012*
Fenpyroximate [ISO]	134098-61-6			S	AC	3	245	Highly toxic by inhalation (LC_{50} = 0.21-0.36 mg/l); JMPR 2007, *2017*
Fenthion [ISO]	55-38-9	3018	OP	L	I,L	3	D586	ICSC 655; JMPR 1997; *High case fatality reported – see note 15*
Fentin acetate[(ISO)]	900-95-8	2786	OT	S	F	3	125	EHC 15; JMPR 1991; CICAD 13
Fentin hydroxide[(ISO)]	76-87-9	2786	OT	S	F	3	108	EHC 15; ICSC 1283; JMPR 1991; CICAD 13
Fenvalerate [ISO]	51630-58-1	3352	PY	L	I	4	c450	See note 10; EHC 95, HSG 34; IARC 53 *(Group 3)*; ICSC 273; JMPR 1986, *2012*
Ferimzone [ISO]	89269-64-7			S	F	4	725	
Fipronil	120068-37-3	2588		S	I	3	92	JMPR 1997, 2000; ICSC 1503
Flonicamid [ISO]	*158062-67-0*			*S*	*I*	*4*	*884*	*JMPR 2015*
Fluchloralin [ISO]	33245-39-5			S	H	4	1550	
Fluensulfone [ISO]*	*318290-98-1*			*L*	*N*	*4*	*671*	*JMPR 2013, 2016*
Flufenacet [ISO]	142459-58-3			S	H	4	600	May cause skin sensitization
Fluoroglycofen	77501-60-1			S	H	4	1550	
Flupyradifurone [ISO]*	*951659-40-8*			*S*	*I*	*3*	*300-2000*	*JMPR 2015*
Flurprimidol [ISO]	56425-91-3			S	PGR	4	709	
Flusilazole	85509-19-9			S	F	4	672	JMPR 1995, 2007

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Flutriafol [ISO]	76674-21-0			S	F,FST	4	1140	
Fluvalinate [ISO]	*69409-94-5*			*oil*	*I*	*3*	*282*	
Fluxofenim [ISO]	88485-37-4			oil	H	4	670	
Fomesafen [ISO]	72178-02-0		OC	S	H	4	1250	
Formothion [ISO]	*2540-82-1*	*3018*	*OP*	*L*	*I*	*4*	*365*	*JMPR 1998*
Fuberidazole [ISO]	3878-19-1			S	F	4	336	
Furalaxyl [ISO]	57646-30-7			S	F	4	940	
Gamma-HCH [ISO], Lindane	58-89-9	2761	OC	S	I	3	88	See notes 3 and 4; *IARC 113 (Group 1);* ICSC 53; JMPR 2003
Glufosinate-ammonium [ISO]	*77182-82-2*			S	H	4	*>1500*	*JMPR 2012*
Guazatine	108173-90-6			S	FST	3	230	LD_{50} value refers to triacetate; JMPR 1997
Haloxyfop	69806-34-4			S	H	4	300	JMPR 1995, 2008 (includes Haloxyfop-R and esters)
HCH [ISO]	608-73-1	2761	OC	S	I	3	100	See notes 3, 4 and 5; EHC 123; IARC 20 (see lindane); ICSC 487; JMPR 1997, 2002
Hexazinone [ISO]	51235-04-2			S	H	4	1690	
Hydramethylnon	67485-29-4			S	I	4	1200	
Imazalil [ISO]	35554-44-0	2588		S	F	3	227	ICSC 1303; JMPR 2000, 2001, 2005, *2018*
Imidacloprid [ISO]	138261-41-3			S	I	4	450	ICSC 1501; JMPR 2001
Iminoctadine [ISO]	13516-27-3			S	F	3	300	Eye irritant
Imiprothrin [ISO]	*72963-72-5*		*PY*	*L*	*I*	*4*	*550*	*See note 12; ECHA 2018; US EPA Pesticide Fact Sheet 1998*
Indoxacarb [ISO]	173584-44-6			S	I	3	268	JMPR 2005; LD_{50} applies to 3:1 mixture of isomers in commercial use

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Ioxynil [ISO]	1689-83-4	2588		S	H	3	110	ICSC 900
Ioxynil octanoate [(ISO)]	3861-47-0			S	H	4	390	
Iprobenfos	26087-47-8			S	F	4	600	
Isoprocarb [ISO]	2631-40-5	2757	C	S	I	4	403	
Isoprothiolane [ISO]	50512-35-1			S	F	4	*≥300*	*JMPR 2017*
Isoproturon [ISO]	34123-59-6			S	H	4	1800	
Isopyrazam [ISO]*	*881685-58-1*		*PZ*	*S*	*F*	*4*	*C310*	*JMPR 2011*
Isouron [ISO]	55861-78-4			S	H	4	630	
Lambda-cyhalothrin – see above								
Lindane – see Gamma-HCH								
MCPA [ISO]	94-74-6		PAA	S	H	4	700	IARC 30, 41 *(Group 2B)*; ICSC 54
MCPA-thioethyl [ISO]	25319-90-8		PAA	S	H	4	790	
MCPB [ISO]	94-81-5			S	H	4	680	
Mecoprop [ISO]	7085-19-0			S	H	4	930	ICSC 55
Mecoprop-P [ISO]	16484-77-8			S	H	4	1050	
Mefluidide [ISO]	53780-34-0			S	H	4	1920	
Mepiquat [ISO]	15302-91-7			S	PGR	4	1490	
Mercurous chloride [C]	10112-91-1	2025	HG	S	F	3	210	See note 3; ICSC 984; CICAD 50
Metalaxyl [ISO]	57837-19-1			S	F	4	670	JMPR 1982, 2002
Metaldehyde [ISO]	108-62-3	1332		S	M	3	227	
Metamitron [ISO]	41394-05-2			S	H	4	1183	ICSC 1361

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Metam-sodium [(ISO)]	137-42-8	2771		S	F-S	3	285	
Metconazole [ISO]	125116-23-6			S	F	4	660	
Methacrifos [ISO]	62610-77-9		OP	L	I	4	678	JMPR 1990
Methasulfocarb [ISO]	66952-49-6	2757		S	F	3	112	
Methylarsonic acid [ISO]	124-58-3		AS	S	H	4	1800	ICSC 755; EHC 224
Methyl iodide [C]	*74-88-4*	*2644*		*L*	*FM*	*3*	*76*	*IARC 71 (Group 3); ICSC 509; Used as a fumigant – classified as Toxic if inhaled (GHS Cat. 3)*
Methyl isothiocyanate [ISO]	556-61-6	2477		S	F-S	3	72	See note 6; Skin and eye irritant
Epsilon-metofluthrin [ISO]*	*240494-71-7*		*PY*	*L*	*I*	*3*	*C50-300*	*See note 12; ECHA 2016a*
Metolcarb [ISO]	1129-41-5		C	S	I	3	268	
Metribuzin [ISO]	21087-64-9			S	H	4	322	ICSC 516
Molinate [ISO]	2212-67-1		TC	L	H	4	720	
Myclobutanil	88671-89-0			S	F	4	1600	JMPR 1992, *2014*
Nabam [ISO]	142-59-6	2771		S	F	4	395	Goitrogenic in rats
Naled [ISO]	300-76-5	3018	OP	L	I	4	430	ICSC 925
Naphthalene [C]	*91-20-3*	*1334*		*S*	*FM*	*4*	*490*	*IARC 82 (Group 2B); ICSC 667*
2-Napthyloxyacetic acid [ISO]	120-23-0			S	PGR	4	600	
Nitenpyram [ISO]	*150824-47-8*			*S*	*I*	*4*	*867*	*See note 13.*
Nitrapyrin [ISO]	1929-82-4			S	B-S	4	1072	ICSC 1658
Norflurazon [ISO]	*27314-13-2*			*S*	*H*	*4*	*1080*	*See note 14; JMPR 2018*
Nuarimol [ISO]	63284-71-9			S	F	4	1250	

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Octhilinone [ISO]	26530-20-1			S	F	4	1470	
Oxadixyl	77732-09-3			S	F	4	1860	
Paclobutrazol [ISO]	76738-62-0			S	PGR	4	1300	JMPR 1988
Paraquat [ISO]	*4685-14-7*	2781	BP	S	H	3	150	*See note 7;* EHC 39; HSG 51; ICSC 5; JMPR 1982, 1985, 1986, 2003; *High case fatality reported – see note 15*
Pebulate [ISO]	1114-71-2		TC	L	H	4	1120	
Pendimethalin [ISO]	40487-42-1			S	H	4	1050	
Permethrin [ISO]	52645-53-1	3352	PY	L	I	*3*	*c220*	See note 10; EHC 94; HSG 33; IARC 53 *(Group 3)*; ICSC 312; JMPR 2002
Phenthoate [ISO]	2597-03-7	3018	OP	L	I	4	c400	JMPR 1984
Phosalone [ISO]	2310-17-0	2783	OP	S	I	3	120	ICSC 797; JMPR 1997, 2001
Phosmet [ISO]	732-11-6	2783	OP	S	I,AC	3	113	ICSC 543; JMPR 1998, 2003
Phoxim [ISO]	14816-18-3		OP	L	I	4	D1975	JECFA 2000a
Piperophos [ISO]	24151-93-7	3018	OP	oil	H	4	324	
Pirimicarb [ISO]	23103-98-2	2757	C	S	AP	3	147	JMPR 1982, 2004
Pirimiphos-methyl [ISO]	29232-93-7		OP	L	I	4	1667	JMPR 1992, 2006
Prallethrin [ISO]	23031-36-9	3352	PY	oil	I	4	460	
Prochloraz [ISO]	67747-09-5			S	F	4	1600	JMPR 1983, 2001
Profenofos [ISO]	41198-08-7	3018	OP	L	I	4	358	JMPR 1990, 2007
Propachlor [ISO]	1918-16-7			S	H	4	1500	EHC 147; HSG 77
Propanil [ISO]	709-98-8			S	H	4	c1400	ICSC 552; *High case fatality reported – see note 15*
Propiconazole [ISO]	60207-90-1			L	F	4	1520	JMPR 1987, 2004

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Propoxur [ISO]	114-26-1	2757	C	S	I	3	95	ICSC 191; JMPR 1989
Propylene oxide [ISO]	*75-56-9*	*1280*		*L*	*FM*	*3*	*300-1000*	*IARC 60 (Group 2B); ICSC 192; JMPR 2011, 2017; Used as a fumigant – classified as Toxic if inhaled (GHS Cat. 3)*
Prosulfocarb [ISO]	52888-80-9		TC	L	H	4	1820	
Prothiofos [ISO]	34643-46-4		OP	L	I	4	925	
Pyraclofos [ISO]	77458-01-6	3018	OP	L	I	3	237	
Pyrazophos [ISO]	13457-18-6	2784		S	F	4	435	JMPR 1992
Pyrazoxyfen [ISO]	71561-11-0			S	H	4	1644	
Pyrethrins [C]	8003-34-7			L	I	4	500-1000	See note 8; JMPR 1999, 2003; ICSC 1475
Pyridaben [ISO]	96489-71-3			S	AC	4	820	
Pyridaphenthion	119-12-0		OP	S	I	4	769	
Pyroquilon [ISO]	57369-32-1			S	F	4	320	
Quinalphos [ISO]	13593-03-8	2783	OP	S	I	3	62	
Quinoclamine [ISO]	2797-51-5			S	H	4	1360	
Quizalofop	76578-12-6			S	H	4	1670	
Quizalofop-p-tefuryl [ISO]	119738-06-6			L	H	4	1012	
Rotenone [C]	83-79-4	2588		S	I	3	132-1500	See note 9; HSG 73; ICSC 944
Simetryn [ISO]	1014-70-6		T	S	H	4	1830	
Sodium chlorate *[C]*	7775-09-9	1495		S	H	4	1200	ICSC 1117
Sodium fluoride [C]	*7681-49-4*	*1690*		*S*	*I*	*3*	*180*	*ICSC 951*
Spiroxamine [ISO]	118134-30-8			L	F	4	500	Dermal LD_{50} 1068 mg/kg; may cause skin sensitisation

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Sulfallate [ISO]	*95-06-7*			*oil*	*H*	*4*	*850*	*Irritant to skin and eyes*
Sulfluramid [ISO]	4151-50-2			S	I	4	543	
Sulfoxaflor [ISO]*	*946578-00-3*			*S*	*I*	*4*	*1000*	*JMPR 2011*
2,3,6-TBA [ISO]	50-31-7			S	H	4	1500	
TCA [ISO] (acid)	76-03-9	1839		S		4	400	See note 8 to Table 4, p. 48; ICSC 586
Tebuconazole [ISO]	107534-96-3			S	F	4	1700	JMPR 1994, *2010*
Tebufenpyrad [ISO]	119168-77-3			S	MT	4	595	
Tebuthiuron [ISO]	34014-18-1			S	H	4	644	
Terbumeton [ISO]	33693-04-8		T	S	H	4	483	
Tetraconazole [ISO]	112281-77-3			Oil	F	4	1031	
Thiacloprid	111988-49-9			S	I	4	396	JMPR 2006
Thiamethoxam [ISO]	*153719-23-4*			*S*	*I*	*4*	*871*	*JMPR 2010*
Thiazafluron [ISO]	*25366-23-8*			*S*	*H*	*3*	*278*	
Thiobencarb [ISO]	28249-77-6		TC	L	H	4	1300	
Thiocyclam [ISO]	31895-22-4			S	I	4	310	Refers to thiocyclam oxalate
Thiodicarb [ISO]	59669-26-0	2757	C	S	I	3	66	JMPR 2000
Thiram [ISO]	137-26-8			S	F	4	560	See note 3; EHC 78; IARC 12, 53 *(Group 3)*; ICSC 757; JMPR 1992
Tralkoxydim [ISO]	87820-88-0			S	H	4	934	
Tralomethrin	66841-25-6	3349	PY	S	I	3	c85	
Triadimefon [ISO]	43121-43-3			S	F	4	602	JMPR 1985, 2004
Triadimenol [ISO]	55219-65-3			S	FST	4	900	JMPR 1989, 2004

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Triazamate [ISO]	112143-82-5	2588		S	AP	3	50-100	
Trichlorfon [ISO]	52-68-6		OP	S	I	3	250	*See note 3;* EHC 132; HSG 66; IARC 30, Suppl 7 *(Group 3)*; ICSC 585; JMPR 1978; JECFA 2000b, 2003
Triclopyr [ISO]	55335-06-3			S	H	4	710	
Tricyclazole [ISO]	41814-78-2			S	F	4	305	
Tridemorph [ISO]	81412-43-3			Oil	F	4	650	
Triflumizole	99387-89-0			S	F	4	695	ICSC 1252
Uniconazole [ISO]	83657-22-1			S	PGR	4	1790	
Vernolate [ISO]	*1929-77-7*		*TC*	*L*	*H*	*4*	*1780*	
XMC	2655-14-3		C	S	I	4	542	
Xylylcarb	2425-10-7		C	S	I	4	380	
Ziram [ISO]	137-30-4			S	F	4	1400	Irritant to skin; EHC 78; IARC 12, 53 *(Group 3)*; ICSC 348; JMPR 1996

EHC = Environmental Health Criteria Monograph; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JECFA = Evaluation by the Joint FAO/WHO Expert Committee on Food Additives; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues; JMPS = Evaluation by the Joint FAO/WHO Meeting on Pesticide Specifications.

Notes to Class II

1. Alachlor was previously classified as a Class Ia pesticide due to its carcinogenicity in rats. However mechanistic studies have indicated that tumors are induced by a mechanism not relevant to humans.
2. Bioallethrin, esbiothrin, esbiol, and esdepalléthrine are members of a series; their toxicity varies considerably within this series, according to concentrations of isomers.
3. The international trade of *alachlor,* chlordane, DDT, *endosulfan,* Gamma-HCH (lindane), HCH, mercury compounds, thiram, *tributyltin compounds and trichlorfon* is regulated by the Rotterdam Convention on Prior Informed Consent (see http://www.pic.int/), which entered into force on 24 February 2004 and has subsequently been amended. See Table 7, p. 65.
4. The production and use of chlordane, DDT, *dicofol, technical endosulfan and its related isomers,* Gamma-HCH (lindane) and HCH (specifically alpha-HCH and beta-HCH) are strictly limited by the Stockholm Convention on persistent organic pollutants (see http://www.pops.int/), which entered into force on 17 May, 2004 and has subsequently been amended.
5. HCH: The LD_{50} varies according to the mixture of isomers. The value shown has been chosen, and the technical product placed in Class II, as a result of the cumulative properties of the beta isomer.
6. The melting point of methyl isothiocyanate (S) is 35°C.

Table 3. Moderately hazardous (Class II) technical grade active ingredients in pesticides (cont.)

7. Paraquat has serious delayed effects if absorbed. It is of relatively low hazard in normal use but may be fatal if the concentrated product is taken by mouth or spread on the skin. *May be used as paraquat dichloride (CAS number 1910-42-5)*.
8. Mixture of compounds present in *Pyrethrum cineraefolium* and other flowers.
9. Compounds from roots of *Derris* and *Lonchocarpus* spp.
10. *The toxicity data for pyrethroids is highly variable according to isomer ratios, the vehicle used for oral administration, and the husbandry of the test animals e.g. fasting prior to dosing. The variability is reflected in the prefix 'c' before LD_{50} values. The single LD_{50} value chosen for classification purposes is generally based on administration in corn oil and can be much lower than that in aqueous solutions. This underlines the need for classification by formulation if the classification is to reflect true hazard.*
11. *LD_{50} values of <50 mg/kg have sometimes been recorded with lambda-cyhalothrin in studies in mice, but in the context that toxicity data for pyrethroids are highly variable, the LD_{50} value listed as the critical end-point by the JMPR (JMPR 2007 – based on data in rats) has been used as the basis for the classification.*
12. *No WHO evaluations are available, but detailed evaluations of classification are available from stringent regulatory authorities.*
13. *No WHO evaluations are available. Publications indicate moderate hazard (see for example The Pesticides Manual (2003)).*
14. *Norflurazon was previous classified as "Unlikely to present acute hazard". A subsequent JMPR evaluation concluded that older studies with this substance showing contradictory results could not be relied upon and that norflurazon should be considered to be of moderate acute oral toxicity, based on a study conducted with an 80% formulation (JMPR 2018).*
15. *A high case fatality has been reported in poisoning cases with this substance (Dawson et al, 2010).*

THE FINAL CLASSIFICATION OF ANY PRODUCT DEPENDS ON ITS FORMULATION

See Pages 8 & 9, and the Annex

Table 4. Slightly hazardous (Class III) technical grade active ingredients in pesticides

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Acetochlor [ISO]	34256-82-1			L	H	5	2950	
Alloxydim	55634-91-8			S	H	5	2260	
Ametoctradin [ISO]*	*865318-97-4*			*S*	*F*	*5*	*>2000*	*JMPR 2012*
Ammonium sulfamate	7773-06-0			S	H	5	3900	
Ancymidol [ISO]	12771-68-5			S	PGR	5	4500	
Anilazine [ISO]	*101-05-3*		*T*	*S*	*F*	*5*	*2710*	*Irritant to eyes and skin; JMPR 1989*
Asulam [ISO]	3337-71-1			S	H	5	4000	
Atrazine [ISO]	1912-24-9		T	S	H	4	c2000	HSG 47; IARC 53, 73 *(Group 3)*; ICSC 99
Bacillus thuringiensis (Bt)	68038-71-1			S	I	5	>4000	EHC 217
Benalaxyl [ISO]	71626-11-4			S	F	5	4200	JMPR 1987, 2005
Benazolin [ISO]	3813-05-6			S	H	5	3200	Irritant to skin and eyes
Benfuresate	68505-69-1			S	H	5	2031	
Biphenyl	92-52-4			S	F	5	3280	ICSC 106
Bispyribac	125401-75-4			S	H	5	2635	
Borax [ISO]	1303-96-4			S	F	5	4500	ICSC 567
Bupirimate [ISO]	41483-43-6			S	F	5	c4000	
Buprofezin [ISO]	69327-76-0			S	I	5	2200	JMPR 1991, *2008*
Butachlor	23184-66-9			L	H	5	3300	
Butylate [ISO]	2008-41-5		TC	L	F	5	>4000	
Carboxin [ISO]	5234-68-4			S	FST	5	3820	
Chinomethionat [ISO]	2439-01-2			S	AC,F	5	2500	JMPR 1987
Chloridazon [ISO]	1698-60-8			S	H	5	2420	

Table 4. Slightly hazardous (Class III) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Chlorimuron	99283-00-8			S	H	5	4102	
Chloroxuron [ISO]	*1982-47-4*			*S*	*H*	*5*	*>3000*	
Chlorpyrifos methyl [ISO]	5598-13-0		OP	S	I	5	>3000	JMPR 1992, 2001, *2009*
Chlorthal-dimethyl	1861-32-1			S	H	5	>3000	*Chlorthal (with CAS no. 2136-79-0) is an approved ISO common name*
Chlozolinate	84332-86-5			S	F	5	>4000	
Cinmethylin	87818-31-3			L	H	5	3960	
Clofentezine [ISO]	74115-24-5			S	AC	5	>3200	JMPR 1986, 2005
Clopyralid [ISO]	*1702-17-6*			S	H	5	4300	Severe irritant to eyes; ICSC 443
Cyclaniliprole	*1031756-98-5*				*I*	*5*	*>2000*	*JMPR 2017*
Cycloate [ISO]	1134-23-2		TC	L	H	5	>2000	
Cycloxydim	101205-02-1			S	H	5	3900	JMPR 1992, *2009*
Cyflumetofen [ISO]	*400882-07-7*			*S*	*AC*	*5*	*>2000*	*JMPR 2014*
Cyromazine	66215-27-8			S	L	5	3300	JMPR 1999, 2006
Diafenthiuron [ISO]	80060-09-9			S	AC	5	2068	
Dichlobenil [ISO]	1194-65-6			S	H	5	3160	ICSC 867
Dichlormid	37764-25-3			L	H	5	2080	
Dicloran	99-30-9			S	F	5	4000	ICSC 871; JMPR 1998
Dienochlor	*2227-17-0*		*OC*	*S*	*AC*	*5*	*3160*	*Acutely toxic by inhalation; skin sensitiser*
Diethyltoluamide [ISO]	134-62-3			L	RP	4	c2000	
Diflubenzuron	35367-38-5			S	L	5	>4640	EHC 184; HSG 99; JMPR 2001
Diflufenican [ISO]	83164-33-4			S	H	5	>2000	

Table 4. Slightly hazardous (Class III) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Dimefuron [ISO]	34205-21-5			S	H	5	>2000	
Dimethametryn [ISO]	22936-75-0		T	L	H	5	3000	
Dimethirimol	5221-53-4			S	F	5	2350	
Dimethomorph [ISO]	110488-70-5			S	F	5	3500	JMPR 2007
Dinitramine [ISO]	29091-05-2			S	H	5	3000	
Dinotefuran [ISO]	*165252-70-0*			*S*	*I*	*5*	*2450*	*JMPR 2012*
Diuron [ISO]	330-54-1			S	H	5	3400	
Dodemorph [ISO]	1593-77-7			L	H	5	4500	
Empenthrin [(1R) isomers] [ISO]	54406-48-3		PY	Oil	I	5	>2280	
Esprocarb [ISO]	85785-20-2		TC	L	H	5	>2000	Skin and eye irritant
Ethephon	16672-87-0			S	PGR	5	>4000	JMPR 2002, *2015*
Etoxazole [ISO]	*153233-91-1*			*S*	*AC*	*5*	*D>2000*	*JMPR 2010*
Etridiazole [ISO]	2593-15-9			L	F	4	2000	
Fenamidone [ISO]	*161326-34-7*			*S*	*F*	*5*	*>2000*	*JMPR 2013*
Fenarimol [ISO]	60168-88-9			S	F	5	2500	JMPR 1995
Fenbuconazole	114369-43-6			S	F	5	>2000	JMPR 1997, *2012*
Fenbutatin oxide [ISO]	13356-08-6		OT	S	MT	5	2630	EHC 15; JMPR 1992
Fenoxaprop-ethyl [ISO]	*66441-23-4*			*S*	*H*	*5*	*2350*	
Fenoxaprop-p-ethyl [(ISO)]	*71283-80-2*			*S*	*H*	*5*	*3150-4000*	*JMPS 2010*
Fenpicoxamid [ISO]*	*517875-34-2*				*F*	*5*	*>2000*	*JMPR 2018*
Fenpropimorph	67564-91-4			oil	F	5	3515	JMPR 1994, 2001, 2004, *2016*

Table 4. Slightly hazardous (Class III) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Fenpyrazamine [ISO]*	*473798-59-3*			*S*	*F*	*5*	*>2000*	*JMPR 2017*
Flamprop-M	90134-59-1			S	F	5	>3000	
Flazasulfuron [ISO]	*104040-78-0*			*S*	*H*	*5*	*D>2000*	*JMPS 2013*
Fluazifop-p-butyl [ISO]	79241-46-6			L	H	5	2451	
Flubendiamide [ISO]	*272451-65-7*			*S*	*I*	*4*	*>2000*	*JMPR 2010*
Flubenzimine [ISO]	*37893-02-0*			*S*	*AC*	*5*	*3000*	
Flufenoxuron	101463-69-8			S	I	5	>3000	
Flumioxazin [ISO]	*103361-09-7*			*S*	*I*	*5*	*D>2000*	*JMPR 2015*
Fluopyram [ISO]	*658066-35-4*			*S*	*F*	*5*	*>2000*	*JMPR 2010*
Flurochloridone	61213-25-0			S	H	5	4000	
Flutianil [ISO]*	*958647-10-4*			*S*	*F*	*5*	*>2000*	*See note 1; EFSA 2014b*
tau-Fluvalinate	102851-06-9		PY	oil	I	5	>3000	Skin and eye irritant
Fluxapyroxad [ISO]*	*907204-31-3*		*PZ*	*S*	*F*	*5*	*>2000*	*JMPR 2012*
Fosamine [ISO]	25954-13-6		OP	S	H	5	2400	
Glyphosate [ISO]	1071-83-6			S	H	5	4230	EHC 159, *IARC 112 (Group 2A)* ICSC 160; JMPR 1986, 2004, *2011*, *2016*
Halofenozide	112226-61-6			S	I	5	2850	
Hexaconazole	79983-71-4			S	F	5	2180	JMPR 1990
Hymexazol	10004-44-1			S	FST	5	3900	
Imazamox [ISO]	*114311-32-9*			*S*	*H*	*5*	*D>4000*	*JMPR 2014*
Imazapic [ISO]	*104098-48-8*			*S*	*H*	*5*	*D>2000*	*JMPR 2013*
Iprodione [ISO]	36734-19-7			S	F	5	3500	JMPR 1995

Table 4. Slightly hazardous (Class III) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Isoxaflutole [ISO]	*141112-29-0*			*S*	*H*	*5*	*D>2000*	*See note 2; JMPR 2013*
Kresoxim-methyl [ISO]	*143390-89-0*				*F*	*5*	*>2000*	*JMPR 2018*
Linuron [ISO]	330-55-2			S	H	5	4000	ICSC 1300
Lufenuron [ISO]	*103055-07-8*			*S*	*I*	*5*	*>2000*	*JMPR 2015*
Malathion [ISO]	121-75-5	3082	OP	L	I	5	c2100	See note 3; *IARC 112 (Group 2A)*; ICSC 172; JMPR 1997, 2003, *2016*
Mandestrobin [ISO]*	*173662-97-0*				*F*	*5*	*>2000*	*JMPR 2018*
Meptyldinocap [ISO]	*131-72-6*	*3013*	*NP*	*L*	*F*	*5*	*>2000*	*JMPR 2010*
Mesotrione [ISO]	*104206-82-8*			*S*	*H*	*5*	*D>2000*	*JMPR 2014*
Metazachlor	67129-08-2			S	H	5	2150	
Methabenzthiazuron [ISO]	18691-97-9			S	H	5	>2500	
Methyldymron	42609-73-4			S	H	5	3948	
Metobromuron [ISO]	3060-89-7			S	H	5	2500	
Metofluthrin [ISO]	*240494-70-6*		*PY*	*L*	*I*	*5*	*>2000*	*See note 1; US EPA Pesticide Fact Sheet 2006*
Metolachlor [ISO]	51218-45-2			L	H	5	2780	ICSC 1360
Metoxuron	19937-59-8			S	H	5	>3200	
Monalide [ISO]	*7287-36-7*			*S*	*H*	*5*	*>4000*	
Monolinuron	1746-81-2			S	H	5	2250	ICSC 1273
1-Naphthylacetic acid	86-87-3			S	PGR	5	c3000	
Nitrofen [ISO]	*1836-75-5*			*S*	*H*	*5*	*c3000*	
N-octylbicycloheptene dicarboximide [C]	113-48-4			L	SY	5	2800	

Table 4. Slightly hazardous (Class III) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Ofurace	58810-48-3			S	F	5	2600	
Oxycarboxin [ISO]	5259-88-1			S	F	4	2000	
Penconazole	66246-88-6			S	F	5	2120	JMPR 1992, *2015*
Penthiopyrad [ISO]	*183675-82-3*		*PZ*	*S*	*F*	*5*	*>2000*	*JMPR 2011*
2-Phenylphenol [C]	90-43-7			S	F	5	2480	IARC 73 *(Group 3)*; ICSC 669; JMPR 1999
Picoxystrobin [ISO]	*117428-22-5*			*S*	*F*	*5*	*D>2000*	*JMPR 2012*
Pimaricin	7681-93-8			S	F	5	*>2000*	See note 4; *JMPR 2017*
Pinoxaden [ISO]	*243973-20-8*		*PZ*	*S*	*H*	*5*	*D>2000*	*JMPR 2016; Eye irritant; May cause respiratory irritation; May cause skin sensitization*
Probenazole	27605-76-1			S	F	5	2030	
Prometon [ISO]	1610-18-0		T	S	H	5	2980	
Prometryn [ISO]	7287-19-6		T	S	H	5	3150	
Propargite [ISO]	2312-35-8			L	AC	5	2200	JMPR 1999
Pymetrozine [ISO]	*123312-89-0*			*S*	*I*	*5*	*D>2000*	*JMPR 2014*
Pyridate [ISO]	55512-33-9			S	H	5	c2000	
Pyrifenox [ISO]	88283-41-4			L	F	5	2900	
Pyrimethanil [ISO]	53112-28-0			S	F	5	4150	JMPR 2007
Pyriofenone [ISO]*	*688046-61-9*				*F*	*5*	*>2000*	*JMPR 2018*
Pyrithiobac sodium [ISO]	123343-16-8			S	H	5	3200	
Pyroxsulam [ISO]	*422556-08-9*			*S*	*H*	*5*	*>2000*	*See note 1; EFSA 2013; US EPA Pesticide Fact Sheet 2008*
Quinclorac	84087-01-4			S	H	5	2680	
Resmethrin [ISO]	10453-86-8		PY	S	I	4	2000	See note 5; EHC 92; HSG 25; ICSC 324

Table 4. Slightly hazardous (Class III) technical grade active ingredients in pesticides (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Saflufenacil [ISO]	*372137-35-4*			*S*	*H*	*5*	*>2000*	*JMPR 2011*
Sethoxydim [ISO]	74051-80-2			L	H	5	3200	
Spinosad [ISO]	168316-95-8			S	I	5	3738	For Spinosyn A and D, CAS numbers are 131929-60-7 and 131929-63-0; JMPR 2001; ICSC 1502
Spirodiclofen [ISO]	*148477-71-8*			*S*	*AC*	*5*	*D>2000*	*See note 6 regarding carcinogenic effects; JMPR 2009*
Spirotetramat [ISO]	203313-25-1			S	I	4	>2000	JMPR 2008
Sulphur	7704-34-9	1350		S	F,I	5	>3000	See note 7; Skin and mucous membrane irritant.; ICSC 1166
TCA (sodium salt) [ISO]	650-51-1			S	H	5	3200	See note 8; ICSC 1139; Irritant to skin and eyes
Temephos [ISO]	3383-96-8		OP	L	I	5	4000	ICSC 199; JMPR 2006
Terbuthylazine [ISO]	5915-41-3		T	S	H	5	2160	
Terbutryn [ISO]	886-50-0		T	S	H	5	2400	
Tetrachlorvinphos [ISO]	22248-79-9		OP	S	I	5	4000	*IARC 112 (Group 2B)*
Thiabendazole [ISO]	148-79-8			S	F	5	3330	JECFA 1997, 2002
Thidiazuron	51707-55-2			S	PGR	5	>4000	
Tri-allate [ISO]	2303-17-5		TC	L	H	5	2165	HSG 89; ICSC 201
Trietazine [ISO]	1912-26-1		T	S	H	5	2830	ICSC 202
Triflumezopyrim [ISO]*	*1263133-33-0*				*I*	*5*	*>4930*	*JMPR 2017*
Trinexapac-ethyl [ISO]	*95266-40-3*			*L*	*PGR*	*5*	*>2000*	*ICSC 1268; JMPR 2013*
Triticonazole [ISO]	131983-72-7			S	F	4	>2000	
Undecan-2-one [C]	112-12-9			Oil	RP	5	2500	

Table 4. Slightly hazardous (Class III) technical grade active ingredients in pesticides (cont.)

EHC = Environmental Health Criteria Monograph; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JECFA = Evaluation by the Joint FAO/WHO Expert Committee on Food Additives; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues; JMPS = Evaluation by the Joint FAO/WHO Meeting on Pesticide Specifications.

Notes to Class III

1. *No WHO evaluations are available, but detailed evaluations of classification are available from stringent regulatory authorities.*
2. *JMPR concluded that isoxaflutole is carcinogenic in mice and rats, but unlikely to pose a carcinogenic risk to humans from the diet (JMPR 2013).*
3. Malathion: LD_{50} value can vary according to impurities. This value has been adopted for classification purposes and is that of a technical product conforming to WHO specifications.
4. Pimaricin: antibiotic, identical with tennecetin and natamycin.
5. Resmethrin is a mixture of isomers, the trans isomer (70-80%) also being known as bioresmethrin and the cis isomer (20-30%) as cismethrin. Bioresmethrin alone is of much lower toxicity (oral LD_{50} >7000 mg/kg) and appears in Table 5.
6. *JMPR concluded that spirodiclofen is carcinogenic in mice and rats, but unlikely to pose a carcinogenic risk to humans from the diet (JMPR 2009). The European Union Committee for Risk Assessment (RAC) concluded that spirodiclofen should be classified as Category 1B for Carcinogenicity (H350) according to the GHS (ECHA 2016b).*
7. Sulphur dust can spontaneously ignite unless diluted about 50% with inert material.
8. TCA: The data shown refer to sodium trichloroacetic acid. In many countries, the same term (TCA) refers to the free acid (now accepted by ISO): this is a solid with an oral LD_{50} of 400 mg/kg bw and if used as a pesticide would be placed in Class II. It is highly corrosive to skin.

THE FINAL CLASSIFICATION OF ANY PRODUCT DEPENDS ON ITS FORMULATION

See Pages 8 & 9, and the Annex

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Aclonifen	74070-46-5			S	H	5	>5000	
Acrinathrin [ISO]	101007-06-1		PY	S	MT	5	>5000	
Aminocyclopyrachlor [ISO]*	*858956-08-8*			*S*	*H*	*5*	*>5000*	*JMPR 2014*
Aminopyralid [ISO]	150114-71-9			S	H	5	>5000	JMPR 2007
Amisulbrom [ISO]	*348635-87-0*			*S*	*F*	*5*	*>5000*	*See note 1; EFSA 2014a; US EPA Pesticide Fact Sheet 2011*
Amitrole [ISO]	61-82-5			S	H	5	5000	EHC 158, HSG 85; IARC 79 (*Group 3)*; ICSC 631; JMPR 1997
Anthraquinone	84-65-1			S	RP	5	>5000	ICSC 1605
Azimsulfuron [ISO]	120162-55-2			S	H	5	>5000	
Azoxystrobin [ISO]	131860-33-8			S	F	5	>5000	JMPR 2008
Bicyclopyrone [ISO]*	*352010-68-5*				*H*	*5*	*>5000*	*JMPR 2017*
Benfluralin [ISO]	1861-40-1			S	H	5	>10000	
Benodanil [ISO]	*15310-01-7*			*S*	*F*	*5*	*6400*	
Benomyl [ISO]	17804-35-2			S	F	5	>10000	See note 2; EHC 148, HSG 81; ICSC 382; JMPR 1995
Benoxacor [ISO]	98730-04-2			S	H	5	>5000	This molecule is not an active substance as such but is a "safener"
Bensulfuron-methyl	83055-99-6			S	H	5	>5000	
Bifenazate [ISO]	149877-41-8			S	AC	5	>5000	JMPR 2006
Bifenox [ISO]	42576-02-3			S	H	5	>6400	
Bioresmethrin [ISO]	28434-01-7		PY	L	I	5	>7000	EHC 92; HSG 25; ICSC 229; JMPR 1991
Bitertanol	55179-31-2			S	F	5	>5000	JMPR 1998
Boscalid [ISO]	188425-85-6			S	F	5	>5000	JMPR 2006

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Bromacil [ISO]	314-40-9			S	H	5	5200	ICSC 1448
Bromobutide	74712-19-9			S	H	5	>5000	
Bromopropylate [ISO]	18181-80-1			S	AC	5	>5000	JMPR 1993
Captan [ISO]	133-06-2			S	F	5	9000	Irritant to skin; HSG 50; IARC 30, Suppl 7 (*Group 3*); ICSC 120; JMPR 1995, 2004, 2007
Carbendazim [ISO]	10605-21-7			S	F	5	>10000	EHC 149; HSG 82; ICSC 1277; JMPR 1995, 1998, 2005
Carbetamide [ISO]	16118-49-3		C	S	H	5	>10000	
Carpropamid [ISO]	104030-54-8			L	F	5	>5000	
Chloransulam methyl	14750-35-4			S	H	5	>5000	
Chlorantraniliprole [ISO]	500008-45-7			S	I	5	>5000	JMPR 2008
Chlorfluazuron	71422-67-8			S	IGR	5	8500	
Chlorflurenol [ISO]	*2464-37-1*		*OC*	*S*	*PGR*	*5*	*>10000*	
Chloroneb [ISO]	*2675-77-6*		*OC*	*S*	*H*	*5*	*>10000*	
Chlorothalonil [ISO]	1897-45-6			S	F	5	>10000	EHC 183; HSG 98; IARC *73 (Group 2B)*; ICSC 134; JMPR 1992
Chlorotoluron [ISO]	15545-48-9			S	H	5	>10000	ICSC 1327
Chlorpropham [ISO]	101-21-3		C	S	PGR	5	>5000	IARC 12 (*Group 3*); ICSC 1500; JMPR 2000
Chlorsulfuron	64902-72-3			S	H	5	5545	
Cinosulfuron [ISO]	94593-91-6			S	H	5	>5000	
Clomeprop	84496-56-0			S	H	5	>5000	
Cloxyfonac	32791-87-0		PAA	S	PGR	5	>5000	
Cryolite [C]	15096-52-3			S	I	5	>10000	
Cyantraniliprole [ISO]*	*736994-63-1*		*PZ*	*S*	*I*	*5*	*>5000*	*JMPR 2013*

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Cyazofamid [ISO]	*120116-88-3*			*S*	*F*	*5*	*>5000*	*JMPR 2015*
Cycloprothrin	63935-38-6		PY	L	I	5	>5000	
Cyclosulfamuron [ISO(*)]	136849-15-5			S	H	5	>5000	
Cyhalofop [ISO]	122008-85-9			S	H	5	>5000	
Daimuron	42609-52-9			S	H	5	>5000	
Dalapon	75-99-0			S	H	5	9330	
Daminozide [ISO]	1596-84-5			S	H	5	8400	JMPR 1991
Desmedipham [ISO]	13684-56-5			S	H	5	>9600	
Dichlofluanid [ISO]	1085-98-9			S	F	5	>5000	JMPR 1983
Diclomezine	62865-36-5			S	F	5	>10000	
Diclosulam [ISO]	145701-21-9			S	H	5	>5000	
Diethofencarb	87130-20-9			S	F	5	>5000	
Dikegulac [ISO]	18467-77-1			S	PGR	5	>10000	
Dimethyl phthalate [C]	131-11-3			L	RP	5	8200	ICSC 261
Dipropyl isocinchomerate [C]	3737-22-2			L	RP	5	5230	
Dithiopyr [ISO]	97886-45-8			S	H	5	>5000	
Ethalfluralin [ISO]	55283-68-6			S	H	5	>10000	
Ethiprole [ISO]	*181587-01-9*				*I*	*5*	*>7080*	*JMPR 2018*
Ethirimol [ISO]	23947-60-6			S	FST	5	6340	
Ethofumesate [ISO]	26225-79-6			S	H	5	>6400	
Ethyl butylacetylaminopropionate	52304-36-6			L	RP	5	>5000	

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Etofenprox	80844-07-1			S	I	5	>10000	JMPR 1993, *2011*
Famoxadone [ISO]	131807-57-3			S	F	5	>5000	JMPR 2003
Fenchlorazole [ISO]	103112-36-3			S	H	5	>5000	This molecule is a herbicide "safener".
Fenclorim	3740-92-9			S	H	5	>5000	
Fenfuram [ISO]	24691-80-3			S	FST	5	>10000	
Fenhexamid [ISO]	126833-17-8			S	F	5	>5000	JMPR 2005
Fenoxycarb	72490-01-8		C	S	I	5	>10000	The CAS Registry Number 79127-80-3 was formerly used.
Fenpiclonil	74738-17-3			S	FST	5	>5000	
Ferbam [ISO]	14484-64-1			S	F	5	>10000	EHC 78; IARC 12 (*Group 3*); ICSC 792; JMPR 1996
Florasulam	145701-23-1			S	H	5	>5000	
Flucarbazone-sodium	181274-17-9			S	H	5	> 5000	
Flucycloxuron [ISO]	113036-88-7			S	AC	5	>5000	
Fludioxonil [ISO]	131341-86-1			S	F	5	>5000	JMPR 2004
Flumetralin	62924-70-3			S	PGR	5	>5000	
Flumetsulam [ISO]	98967-40-9			S	H	5	>5000	
Fluometuron [ISO]	2164-17-2			S	H	5	>8000	
Fluopicolide [ISO]	*239110-15-7*			*S*	*F*	*5*	*>5000*	*JMPR 2009*
Fluorodifen [ISO]	*15457-05-3*			*S*	*H*	*5*	*9000*	
Flupropanate	756-09-2			S	H	5	>10000	
Flupyrsulfuron [ISO]	144740-54-5			S	H	5	>5000	
Flurenol [ISO]	467-69-6			S	PGR	5	>5000	

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Fluridone [ISO]	59756-60-4			S	H	5	>10000	
Fluroxypyr	69377-81-7			S	H	5	>5000	
Fluthiacet	149253-65-6			S	H	5	>5000	
Flutolanil	66332-96-5			S	F	5	>10000	ICSC 1265; JMPR 2002
Folpet	133-07-3			S	F	5	>10000	HSG 72; ICSC 156; JMPR 1995, 2004, 2007
Fosetyl	15845-66-2			S	F	5	5800	
Fosetyl-aluminium	*39148-24-8*			*S*	*F*	*5*	*>2000*	*JMPR 2017*
Gibberellic acid	77-06-5			S	PGR	5	>10000	
Hexaflumuron [ISO]	86479-06-3			S	I	5	>5000	ICSC 1266
Hexythiazox	78587-05-0			S	AC	5	>5000	JMPR 1991, 2008
Hydroprene [ISO]	41096-46-2			L	IGR	5	>10000	
2-Hydroxyethyl octyl sulphide [C]	3547-33-9			L	RP	5	8530	
Imazamethabenzmethyl [(ISO)]	81405-85-8			S	H	5	>5000	
Imazapyr	81334-34-1			S	H	5	>5000	Irritant to eyes
Imazaquin	81335-37-7			S	H	5	>5000	
Imazethapyr	81335-77-5			S	H	5	>5000	
Imibenconazole [ISO]	86598-92-7			S	F	5	>5000	
Inabenfide	82211-24-3			S	PGR	5	>10000	
Iprovalicarb	140923-17-7			S	F	5	>5000	
Isoxaben	82558-50-7			S	H	5	>10000	
Kasugamycin	19408-46-9			S	F	5	>10000	

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Lenacil [ISO]	2164-08-1			S	H	5	>10000	
Maleic hydrazide [C]	123-33-1			S	PGR	5	6950	IARC 4 (*Group 3*); JMPR 1996
Mancozeb	8018-01-7			S	F	5	>8000	Irritant to skin on multiple exposure; EHC 78; ICSC 754; JMPR 1993
Mandipropamid [ISO]	374726-62-2			S	F	5	>5000	JMPR 2008
Maneb [ISO]	12427-38-2	2210		S	F	5	6750	Irritant to skin on multiple exposure; EHC 78; ICSC 173; JMPR 1993
Mefenacet	73250-68-7			S	H	5	>5000	
Mepanipyrim [ISO]	110235-47-7			S	F	5	>5000	
Mepronil [ISO]	55814-41-0			S	F	5	>10000	
Metaflumizone [ISO]	*139968-49-3*			*S*	*I*	*5*	*>5000*	*JMPR 2009*
Methoprene [ISO]	40596-69-8			L	IGR	5	>10000	JMPR 1987, 2001
Methoxychlor [ISO]	72-43-5		OC	S	I	5	6000	IARC 20 *(Group 3)*; ICSC 1306; JMPR 1977
Methozyfenozide	161050-58-4			S	I	5	>5000	Dermal LD_{50} > 5000; JMPR 2003
Metiram	9006-42-2			S	F	5	>10000	JMPR 1993
Metosulam	139528-85-1			S	H	5	>5000	
Metrafenone [ISO]	*220899-03-6*			*S*	*F*	*5*	*>5000*	*JMPR 2014*
Metsulfuron methyl	74223-64-6			S	H	5	>5000	
2-(1-Naphthyl) acetamide	86-86-2			S	PGR	5	6400	
Napropamide	15299-99-7			S	H	5	5000	
Naptalam	132-66-1			S	PGR	5	8200	
Neburon [ISO]	555-37-3			S	H	5	>10000	
Niclosamide [ISO]	50-65-7			S	M	5	5000	

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Nicosulfuron [ISO]	111991-09-4			S	H	5	>5000	Irritant to eyes
Nitrothal-isopropyl [ISO]	10552-74-6			S	F	5	6400	
Novaluron [ISO]	116714-46-6			S	I	5	>5000	JMPR 2005
Noviflumuron	121451-02-3			S	I	5	>5000	Dermal LD_{50} > 5000
Oryzalin [ISO]	19044-88-3			S	H	5	>10000	
Oxabetrinil	74782-23-3			S	H	5	>5000	
Oxadiazon [ISO]	19666-30-9			S	H	5	>8000	
Oxine-copper [ISO]	10380-28-6		CU	S	F	5	7792	
Oxyfluorfen [ISO]	42874-03-3			S	H	5	>5000	
Pencycuron	66063-05-6			S	F	5	>5000	
Penoxsulam	219714-96-2			S	H	5	>5000	Dermal LD_{50} > 5000
Pentanochlor	2307-68-8			S	H	5	>10000	
Phenmedipham [ISO]	13684-63-4			S	H	5	>8000	
Phenothrin [ISO]	26002-80-2		PY	L	I	5	>5000	EHC 96; HSG 32; ICSC 313; JMPR 1988
Phosphorus acid [C]	13598-36-2			L	F	5	>5000	
Phthalide	27355-22-2			S	F	5	>10000	
Picloram [ISO]	1918-02-1			S	H	5	8200	ICSC 1246
Piperonyl butoxide	51-03-6			Oil	SY	5	>7500	IARC 30 *(Group 3)*; JMPR 1995; ICSC 1347
Pretilachlor [ISO]	51218-49-6			L	H	5	6100	
Primisulfuron [ISO]	113036-87-6			S	H	5	>5050	
Procymidone [ISO]	32809-16-8			S	F	5	6800	JMPR 1989, 2007
Prodiamine [ISO]	29091-21-2			S	H	5	>5000	

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Propamocarb	24579-73-5			S	F	5	8600	JMPR 1986, 2005
Propaquizafop	111479-05-1			S	H	5	>5000	ICSC 1271
Propazine [ISO]	139-40-2		T	S	H	5	>5000	ICSC 697
Propham [ISO]	122-42-9			S	H	5	5000	IARC 12 *(Group 3)*; JMPR 1992
Propineb [ISO]	12071-83-9			S	H	5	8500	EHC 78; JMPR 1993
Propyzamide [ISO]	23950-58-5			S	H	5	5620	
Prothioconazole [ISO]	178928-70-6			S	F	5	>6200	JMPR 2008
Pydiflumetofen [ISO]*	*1228284-64-7*				*F*	*5*	*>5000*	*JMPR 2018*
Pyrazolynate [ISO]	58011-68-0			S	H	5	9550	
Pyrazosulfuron [ISO]	98389-04-9			S	H	5	>5000	
Pyriminobac	136191-56-5			S	H	5	>5000	
Pyriproxyfen [ISO]	95737-68-1			S	I	5	>5000	ICSC 1269; JMPR 2001
Quinmerac [ISO]	90717-03-6			S	H	5	>5000	
Quinoxyfen [ISO]	124495-18-7			S	F	5	>5000	JMPR 2006
Quintozene [ISO]	82-68-8			S	F	5	>10000	EHC 41; HSG 23; IARC 5 *(Group 3)*; ICSC 745; JMPR 1995
Rimsulfuron [C]	122931-48-0			S	H	5	>5000	
Sedaxane [ISO]*	*874967-67-6*		*PZ*	*S*	*F*	*5*	*>5000*	*JMPR 2012*
Siduron [ISO]	1982-49-6			S	H	5	>7500	
Silafluofen [ISO]	*105024-66-6*		*PY*	*L*	*I*	*5*	*>5000*	*See note 3*
Simazine [ISO]	122-34-9		T	S	H	5	>5000	ICSC 699
Spinetoram [ISO]	187166-40-1			S	I	5	>5000	JMPR 2008

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Sulfometuron	74223-56-6			S	H	5	>5000	
Tebufenozide	112410-23-8			S	I	5	>5000	Dermal LD_{50} > 5000; JMPR 1996, 2003
Tebutam	35256-85-0			Oil	H	5	6210	
Tecnazene [ISO]	117-18-0			S	F	5	>10000	EHC 42; HSG 12; JMPR 1994
Teflubenzuron	83121-18-0			S	I	5	>5000	JMPR 1994, *2016*
Terbacil [ISO]	5902-51-2			S	H	5	>5000	
Tetradifon [ISO]	116-29-0			S	AC	5	>10000	EHC 67; HSG 11; ICSC 747
Tetramethrin [ISO]	7696-12-0		PY	S	O	5	>5000	EHC 98; HSG 31; ICSC 334
Thifensulfuron-methyl	79277-27-3			S	H	5	>5000	
Thifluzamide	130000-40-7			S	F	5	>5000	Dermal LD_{50} > 5000
Thiophanate-methyl [ISO]	23564-05-8			S	F	5	*>5000*	JMPR 1995, 1998, 2006, *2017*
Tiocarbazil	36756-79-3		TC	L	H	5	10000	
Tioxazafen [ISO]*	*330459-31-9*				*N*	*5*	*>5000*	*JMPR 2018*
Tolclofos-methyl [ISO]	57018-04-9			S	F-S	5	c5000	JMPR 1994
Tolylfluanid [ISO]	731-27-1			S	F	5	>5000	JMPR 1988, 2002
Transfluthrin [ISO]	118712-89-3		PY	S	I	5	>5000	
Triasulfuron	82097-50-5			S	H	5	>5000	
Tribenuron [ISO]	106040-48-6			S	H	5	>5000	
Trifloxystrobin [ISO]	141517-21-7			S	F	5	>5000	JMPR 2004
Triflumuron	64628-44-0			S	PGR	5	>5000	
Trifluralin [ISO]	1582-09-8			S	H	5	>10000	IARC 53 *(Group 3)*; ICSC 205
Triflusulfuron-methyl [ISO]	126535-15-7			S	H	5	>5000	

Table 5. Technical grade active ingredients of pesticides unlikely to present acute hazard in normal use (cont.)

Common name	CAS no	UN no	Chem type	Phys state	Main use	GHS	LD_{50} mg/kg	Remarks
Triforine [ISO]	26644-46-2			S	F	5	>6000	JMPR 1997, *2014*
Validamycin	37248-47-8			S	F	5	>10000	
Vinclozolin [ISO]	50471-44-8			S	F	5	10000	JMPR 1995
Zineb [ISO]	12122-67-7			S	F	5	>5000	EHC 78; IARC 12 *(Group 3)*; ICSC 350; JMPR 1993
Zoxamide [ISO]	156052-68-5			S	F	5	>5000	JMPR 2007

EHC = Environmental Health Criteria Monograph; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

Notes to Table 5

1. *No WHO evaluations are available, but detailed evaluations of classification are available from stringent regulatory authorities.*
2. The international trade of benomyl is regulated by the Rotterdam Convention on Prior Informed Consent (see http://www.pic.int/), which entered into force on 24 February 2004 and has subsequently been amended. See Table 7, p. 65.
3. *No WHO evaluations are available. Information from stringent regulatory authorities indicates that this substance may damage fertility (Presumed human reproductive toxicant – GHS category 1B).*

THE FINAL CLASSIFICATION OF ANY PRODUCT DEPENDS ON ITS FORMULATION

See Pages 8 & 9, and the Annex

Table 6. Active ingredients believed to be obsolete or discontinued for use as pesticides

Ingredients discontinued have been identified from the previous edition of this classification, from the Pesticide Manual (Pesticide Manual, 1991, 1994; 1997, 2003), and in some cases from the manufacturer. It is difficult, in some cases, to be sure whether or not all commercial activity in a substance has ceased; some of these materials are known to be still in use for non-agricultural purposes. IPCS will be grateful for details of any materials in this Section, which are still in commercial use. Some active ingredients listed as obsolete in previous editions of this publication have been notified as in fact still holding active registrations in some countries. Entries for those active ingredients from previous editions have now been restored to the relevant classification tables. The common name and CAS number of each obsolete active ingredient are indicated.

Active ingredient	CAS no
Aldoxycarb	1646-88-4
Aldrin[1,2]	309-00-2
Allyxycarb	6392-46-7
Amidithion	919-76-6
Aminocarb	2032-59-9
ANTU	86-88-4
Aramite	140-57-8
Arsenous oxide	1327-53-3
Athidathion	19691-80-6
Atraton	1610-17-9
Aziprotryne	4658-28-0
Azothoate	5834-96-8
Barium carbonate	513-77-9
Benquinox	495-73-8
Benzoximate	29104-30-1
Benzoylprop-ethyl	*22212-55-1*
Benzthiazuron	1929-88-0
Binapacryl[1]	485-31-4
Bisthiosemi	39603-48-0
Bromocyclen	1715-40-8
Bufencarb	8065-36-9
Butacarb	2655-19-8
Butenachlor	87310-56-3
Buthidazole	55511-98-3
Buthiobate	51308-54-4
Butonate	126-22-7

Active ingredient	CAS no
Butopyronoxyl	532-34-3
Buturon	3766-60-7
Calcium cyanamide	156-62-7
Camphechlor[1,2]	8001-35-2
Carbamorph	31848-11-0
Carbanolate	671-04-5
Carbon disulfide	75-15-0
Carbophenothion	786-19-6
Chlomethoxyfen	32861-85-1
Chloramben	133-90-4
Chloranil	118-75-2
Chloranocryl	2164-09-2
Chlorbenside	103-17-3
Chlorbufam	1967-16-4
Chlorbicyclen	2550-75-6
Chlorbormuron	13360-45-7
Chlordecone[2]	143-50-0
Chlordimeform[1]	6164-98-3
Chlorfenethol	80-06-8
Chlorfenprop-methyl	14437-17-3
Chlorfenson	80-33-1
Chlorfensulfide	2274-74-0
Chlormebuform	37407-77-5
Chlormethiuron	28217-97-2
Chlornitrofen	1836-77-7
Chlorobenzilate[1]	510-15-6

Table 6. Active ingredients believed to be obsolete or discontinued for use as pesticides (cont.)

Active ingredient	CAS no
Chloropropylate	5836-10-2
Chlorquinox	3495-42-9
Chlorphoxim	14816-20-7
Chlorthiophos	21923-23-9
Cloethocarb	51487-69-5
Clofop	26129-32-8
Coumachlor	81-82-3
Crimidine	535-89-7
Credazine	14491-59-9
Crotoxyphos	7700-17-6
Crufomate	299-86-5
Cyanofenphos	13067-93-1
Cyanthoate	3734-95-0
Cycloheximide	66-81-9
Cycluron	2163-69-1
Cyometrinil	63278-33-1
Cypendazole	28559-00-4
Cyprofuram	69581-33-5
Cypromid	2759-71-9
Delachlor	24353-58-0
Demephion-O	682-80-4
Demephion-S	2587-90-8
Demeton-O	298-03-3
Demeton-S	126-75-0
Demeton-S-methylsulphon	17040-19-6
Desmetryn	1014-69-3
Dialifos	10311-84-9
Di-allate	2303-16-4
Diamidafos	1754-58-1
Dibromochloropropane	96-12-8
Dibutyl phthalate	84-74-2
Dibutyl succinate	141-03-7
Dichlofenthion	97-17-6
1,2-Dichloropropane	78-87-5
Dichlozoline	24201-58-9
Diclobutrazol	75736-33-3
Dieldrin[1,2]	60-57-1
Diethatyl	38727-55-8
Difenoxuron	14214-32-5
Dimefox	115-26-4
Dimetilan	644-64-4
Dimexano	1468-37-7
Dinex	131-89-5
Dinocton	32534-96-6
Dinoseb[1]	88-85-7
Dinoseb acetate[1]	2813-95-8
Dioxabenzophos	3811-49-2
Dioxacarb	6988-21-2
Dioxathion	78-34-2
Dipropetryn	4147-51-7
Disul	149-26-8
Ditalimfos	5131-24-8
Drazoxolon	5707-69-7
Eglinazine	6616-80-4
Endothion	2778-04-3
Endrin[2]	72-20-8
EPBP	3792-59-4
Erbon	136-25-4
ESP (Oxydeprofos)	2674-91-1
Etacelasil	37894-46-5
Etaconazole	60207-93-4
Ethidimuron	30043-49-3
Ethiolate	2941-55-1
Ethoate-methyl	116-01-8
Ethohexadiol	94-96-2
Etrimfos	38260-54-7

Table 6. Active ingredients believed to be obsolete or discontinued for use as pesticides (cont.)

Active ingredient	CAS no
EXD	502-55-6
Fenaminosulf	140-56-7
Fenazaflor	14255-88-0
Fenchlorphos	299-84-3
Fenitropan	65934-95-4
Fenoprop (Silvex)	93-72-1
Fenson	80-38-6
Fensulfothion	115-90-2
Fenthiaprop	95721-12-3
Fenuron	101-42-8
Fenuron-TCA	4482-55-7
Flamprop	58667-63-3
Fluazifop	69335-91-7
Fluenetil	4301-50-2
Fluoromide	13577-71-4
Fluotrimazole	31251-03-3
Fonofos	944-22-9
Fosmethilan	83733-82-8
Fosthietan	21548-32-3
Furconazole-cis	112839-32-4
Furmecyclox	60568-05-0
Glyodin	556-22-9
Glyphosine	2439-99-8
Griseofulvin	126-07-8
Halacrinate	34462-96-9
Haloxydine	2693-61-0
Heptachlor[1,2]	76-44-8
Heptopargil	73886-28-9
Hexachloroacetone	116-16-5
Hexaflurate	17029-22-0
Hydroxyquinoline sulfate	134-31-6
Ipazine	1912-25-0
IPSP	5827-05-4
Isazofos	42509-80-8
Isobenzan	297-78-9
Isobornyl thiocyano acetate	115-31-1
Isocarbamid	30979-48-7
Isocil	314-42-1
Isodrin	465-73-6
Isofenphos	25311-71-1
Isomethiozin	57052-04-7
Isonoruron	28805-78-9
Isopropalin	33820-53-0
Isothioate	36614-38-7
Isoxapyrifop	87757-18-4
Jodfenphos	18181-70-9
Karbutilate	4849-32-5
Kelevan	4234-79-1
Kinoprene	42588-37-4
Leptophos	21609-90-5
Lythidathion	2669-32-1
Malonoben	10537-47-0
Mebenil	7055-03-0
Mecarbinzid	27386-64-7
Mecarphon	29173-31-7
Medinoterb acetate	2487-01-6
Menazon	78-57-9
Mephospholan	950-10-7
Methazole	20354-26-1
Methiuron	21540-35-2
Methoprotryne	841-06-5
Methoxyethylmercury silicate[1]	64491-92-5
Methoxyphenone	41295-28-7
Methoxymethyl mercury chloride[1]	123-88-6
Methylmercury dicyandiamide[1]	502-39-6

Table 6. Active ingredients believed to be obsolete or discontinued for use as pesticides (cont.)

Active ingredient	CAS no
Metsulfovax	21452-18-6
Mexacarbate	315-18-4
Mipafox	371-86-8
Mirex[2]	2385-85-5
Monuron	150-68-5
Monuron-TCA	140-41-0
Morfamquat	4636-83-3
Myclozolin	54864-61-8
Naphthalic anhydride	81-84-5
Nitralin	4726-14-1
Norbormide	991-42-4
Noruron	*18530-56-8*
Oxapyrazon	4489-31-0
Oxydisulfoton	2497-07-6
Parafluron	7159-99-1
Perfluidone	37924-13-3
Phenisopham	57375-63-0
Phenkapton	2275-14-1
Phenobenzuron	3134-12-1
Phenylmercurydimethyl-dithiocarbamate[1]	32407-99-1
Phenylmercury nitrate[1]	8003-05-2
Phosacetim	4104-14-7
Phosdiphen	36519-00-3
Phosfolan	947-02-4
Pindone	83-26-1
Piproctanyl	69309-47-3
Pirimiphos-ethyl	23505-41-1
Potassium cyanate	590-28-3
Profluralin	26399-36-0
Proglinazine	68228-20-6
Promacyl	34264-24-9
Promecarb	2631-37-0
Propaphos	7292-16-2
Propyl isome	83-59-0
Prothoate	2275-18-5
Proxan	108-25-8
Pydanon	22571-07-9
Pyracarbolid	24691-76-7
Pyridinitril	1086-02-8
Quinacetol sulfate	57130-91-3
Quinonamid	27541-88-4
Ryania	8047-13-0
Salicylanilide	87-17-2
Schradan	152-16-9
Secbumeton	26259-45-0
Sesamex	51-14-9
Sodium hexafluorosilicate	16893-85-9
Sulfoxide	120-62-7
Sulprofos	35400-43-2
SWEP	1918-18-9
2,4,5-T[1]	93-76-5
TCA-ethadyl	*2514-53-6*
TDE	72-54-8
TEPP	107-49-3
Terbucarb	1918-11-2
Tetrasul	2227-13-6
Thicyofen	116170-30-0
Thionazin	297-97-2
Thiophanate	23564-06-9
Thioquinox	93-75-4
Toxaphene[1,2]	8001-35-2
Triamiphos	1031-47-6
Triapenthenol	76608-88-3
Triarimol	26766-27-8
Tricamba	2307-49-5

Table 6. Active ingredients believed to be obsolete or discontinued for use as pesticides (cont.)

Active ingredient	CAS no	Active ingredient	CAS no
Trichlamide	70193-21-4	Trifenmorph	1420-06-0
Trichloronat	327-98-0	Trimethacarb	12407-86-2
Tridiphane	58138-08-2		

[1] The international trade of aldrin, binapacryl, camphechlor (toxaphene), chlordimeform, chlorobenzilate, dieldrin, dinoseb and dinoseb salts, heptachlor, mercury compounds, and 2,4,5-T is regulated by the Rotterdam Convention on Prior Informed Consent (see http://www.pic.int/), which entered into force on 24 February 2004 and has subsequently been amended. See Table 7, p. 65.

[2] The use and production of aldrin, camphechlor (toxaphene), *chlordecone*, dieldrin, endrin, heptachlor and mirex is prohibited or severely restricted by the Stockholm Convention on persistent organic pollutants (see http://www.pops.int/), which entered into force on 17 May, 2004 and has subsequently been amended.

Table 7. Pesticides subject to the Rotterdam Convention[1]

Class	Pesticide	CAS number
II	*Alachlor*	*15972-60-8*
Ia	*Aldicarb*	*116-06-3*
O	Aldrin [2]	309-00-2
Ib	*Azinphos-methyl*	*86-50-0*
O	Binapacryl	485-31-4
Ia	Captafol	2425-06-1
Ib	Carbofuran	1563-66-2
II	Chlordane [2]	57-74-9
O	Chlordimeform	6164-98-3
O	Chlorobenzilate	510-15-6
II	DDT [2]	50-29-3
FM	1,2-Dibromoethane (EDB)	106-93-4
O	Dieldrin [2]	60-57-1
O	Dinoseb and its salts and esters	88-85-7
Ib	DNOC and its salts (such as ammonium salt, potassium salt and sodium salt)	534-52-1; 2980-64-5; 5787-96-2; 2312-76-7
II	*Endosulfan* [2]	*115-29-7*
FM	Ethylene dichloride	107-06-2
FM	Ethylene oxide	75-21-8
Ib	Fluoroacetamide	640-19-7
II	HCH (mixed isomers)	608-73-1
O	Heptachlor [2]	76-44-8
Ia	Hexachlorobenzene [2]	118-74-1
II	Lindane [2]	58-89-9
	Mercury compounds, including inorganic mercury compounds, alkyl mercury compounds and alkyloxyalkyl and aryl mercury compounds	
Ib	Pentachlorophenol and its salts and esters [2]	87-86-5
Ia	*Phorate*	*298-02-2*
O	2,4,5-T and its salts and esters	93-76-5
O	Toxaphene (Camphechlor) [2]	8001-35-2
II	*Trichlorfon*	*52-68-6*
	Dustable powder formulations containing a combination of benomyl at or above 7%, carbofuran at above 10%, thiram at or above 15% (Severely Hazardous Pesticide Formulation)	17804-35-2; 1563-66-2; 137-26-8
Ib	Methamidophos (all formulations)	10265-92-6

Table 7. Pesticides subject to the Rotterdam Convention[1] (cont.)

Class	Pesticide	CAS number
Ia	Methyl-parathion (emulsifiable concentrates (EC) at or above 19.5% active ingredient and dusts at or above 1.5% active ingredient (Severely Hazardous Pesticide Formulation)	298-00-0
Ib	Monocrotophos (all formulations)	6923-22-4
Ia	Parathion (all formulations)	56-38-2
Ia	Phosphamidon (soluble liquid formulations of the substance that exceed 1000 g active ingredient/L) (Severely Hazardous Pesticide Formulation)	13171-21-6 [mixture, (E) & (Z) isomers] 23783-98-4 [(Z)-isomer] 297-99-4 [(E)-isomer]
	Tributyltin compounds	

[1] According to the Rotterdam Convention, export of a chemical can only take place with the prior informed consent of the importing Party. The Prior Informed Consent (PIC) procedure is a means for formally obtaining and disseminating the decisions of importing countries as to whether they wish to receive future shipments of a certain chemical and for ensuring compliance to these decisions by exporting countries. The aim is to promote a shared responsibility between exporting and importing countries in protecting human health and the environment from the harmful effects of such chemicals (further information can be found at: http://www.pic.int/). The Rotterdam Convention (which entered into force on 24 February 2004 and has subsequently been amended) built on the voluntary PIC procedure which was initiated by UNEP and FAO in 1989.

[2] The use and production of aldrin, chlordane, DDT, dieldrin, *technical endosulfan and its related isomers,* heptachlor, hexachlorobenzene, lindane, *pentachlorophenol and its salts and esters and toxaphene (camphechlor)* is prohibited or severely restricted by the Stockholm Convention on persistent organic pollutants, which entered into force on 17 May, 2004 and has subsequently been amended. See http://www.pops.int/

Table 8. Gaseous or volatile fumigants not classified under the WHO Recommended Classification of Pesticides by Hazard

The Classification does not set out any criteria for air concentrations on which classification could be based. *In response to requests for more information on fumigants, classifications for inhalation toxicity from other sources are presented.* Most of these compounds are of high hazard and recommended exposure limits for occupational exposure have been adopted by national authorities in many countries.

Pesticide	CAS number	Classification for inhalation toxicity	Remarks
Acrylonitrile	*107-13-1*	*Toxic if inhaled; See note 1*	*ICSC 92*
Aluminium phosphide	20859-73-8	*See note 2*	EHC 73; HSG 28; *ICSC 472*; JMPR 1967; *High case fatality reported*
Chloropicrin	76-06-2	*Fatal if inhaled*	*ICSC 750* ; JMPR 1965b
1,2-Dibromoethane (*ethylene dibromide, EDB*)[1]	106-93-4	*Toxic if inhaled; see note 3*	EHC 177; IARC *71 (Group 2A)*; *ICSC 45*
1,3-Dichloropropene	542-75-6	*Toxic if inhaled; see note 3*	EHC 146; HSG 76; IARC *71 (Group 2B)*; *ICSC 995*
Ethylene dichloride[1]	107-06-2	*Toxic if inhaled; see note 4*	EHC 62, 176; HSG 55; IARC *71 (Group 2B)*; *ICSC 250*
Ethylene oxide[1]	75-21-8	*Toxic if inhaled; see note 5*	EHC 55; HSG 16; JMPR 1969; *IARC 100F (Group 1)*; *ICSC 155*
Formaldehyde	50-00-0	*Fatal if inhaled*	EHC 89; HSG 57; *IARC 100F (Group 1)*; *ICSC 275*
Hydrogen cyanide	74-90-8	*Fatal if inhaled; see note 6*	*ICSC 492*; JMPR 1965b
Magnesium phosphide	12057-74-8	*See note 7*	EHC 73; HSG 28; *ICSC 744*
Methyl bromide[2]	74-83-9	*Toxic if inhaled*	EHC 166; HSG 86; IARC *71 (Group 3)*; *ICSC 109*; JMPR 1967
Phosphine	7803-51-2	*Fatal if inhaled*	EHC 73; HSG 28; *ICSC 694*; JMPR 1967
Sulfuryl fluoride	2699-79-8	*Toxic if inhaled*	*ICSC 1402*; *JMPR 2005*

EHC = Environmental Health Criteria Monograph; HSG = Health and Safety Guide; IARC = IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; ICSC = International Chemical Safety Card; JMPR = Evaluation by the Joint FAO/WHO Meeting on Pesticide Residues.

[1] *The international trade of 1,2-dibromoethane (ethylene dibromide or EDB), ethylene dichloride and ethylene oxide is regulated by the Rotterdam Convention on Prior Informed Consent (see* http://www.pic.int/*), which entered into force on 24 February 2004 and has subsequently been amended.* *See Table 7, p. 65.*

[2] *The use and production of methyl bromide is prohibited or severely restricted by the Montreal Protocol on Substances that Deplete the Ozone Layer (see* https://www.informea.org/en/treaties/montreal-protocol*), which entered into force on 1 January 1989.*

Notes to Table 8

1. *Acrylonitrile is also toxic if swallowed or in contact with skin.*
2. *Aluminium phosphide is used in the form of solid pellets, which release phosphine gas following exposure to moisture (including exposure to air or following ingestion). Phosphine has a separate entry in Table 8. Solid aluminium phosphide is classified as fatal if swallowed. A high case fatality has been reported in poisoning cases with aluminium phosphide (Dawson et al, 2010).*
3. *In liquid form this substance is also classified as toxic if swallowed or in contact with skin.*

Table 8. Gaseous or volatile fumigants not classified under the WHO Recommended Classification of Pesticides by Hazard (cont.)

4. *In liquid form this substance is also classified as harmful if swallowed and may be harmful in contact with skin.*
5. *IARC has determined ethylene oxide to be carcinogenic to humans (Group 1).*
6. *In liquid form this substance is also fatal if swallowed or in contact with skin.*
7. *Magnesium phosphide is used in the form of solid pellets, which release phosphine gas following exposure to moisture (including exposure to air or following ingestion). Phosphine has a separate entry in Table 8. Solid magnesium phosphide is classified as fatal if swallowed.*

ANNEX: HOW TO FIND THE HAZARD CLASS OF A FORMULATION

The following tables A and B can be used to find the hazard class of a formulation. These should be used only if toxicity data is not available on the formulation itself; see the note at the top of page 8.

The tables should be used as follows:

Step 1: What is the approved name of the active ingredient in the pesticide? Use the index to find the entry in tables 1–5 of the Guidelines.

Step 2: From the entry in the Guidelines, what is the route of application used for the classification?

If the route is O (oral), use table A of this Annex. The same table is used for solids and liquids.

If the route is D (dermal), use table B of this Annex. The same table is used for solids and liquids.

Step 3: From the entry in the Guidelines, what is the LD_{50} of the active ingredient?

Using the table A or B, selected in Step 2, find the column along the top line which most nearly includes the LD_{50} figure.

Step 4: What is the concentration % of the active ingredient in the formulation?

Using the same table A or B, find the figure in the left hand column which most nearly includes this percentage figure.

Step 5: Find the square where the column selected in Step 3 crosses the line selected in Step 4. The number in this square is the approximate LD_{50} of the formulation.

Step 6: The hazard classes are shown by blocks of squares. The hazard class of the formulation is that of the block in which lies the square selected in Step 5.

These tables can also be used to find the hazard class of mixtures. First see pages 8 and 9, para. 4 of the Guidelines and select the method to be used to arrive at the LD_{50} of the mixture. For method (b), use the above method from Step 1, using the name of the more or most toxic ingredient. For method (c), pass to Step 4 using the total percentages of all active ingredients in the mixture.

Table A. LD_{50} values and classification of formulations when the route is ORAL

First row = Oral LD_{50} of the active ingredient

First column = Percent concentration of the active ingredient in the formulation

	Class Ia			Class Ib									Class II																			Class III					
	1	3	5	10	15	20	25	30	35	40	45	50	60	80	100	120	140	160	180	200	250	300	350	400	500	600	700	800	900	1000	1500	2000	2500	3000	3500	4000	4500	5000
100	1	3	5	10	15	20	25	30	35	40	45	50	60	80	100	120	140	160	180	200	250	300	350	400	500	600	700	800	900	1000	1500	2000	2500	3000	3500	4000	4500	5000
95	1	3	5	11	16	21	26	32	37	42	47	53	63	84	105	126	147	168	189	211	263	316	368	421	526	632	737	842	947	1053	1579	2105	2632	3158	3684	4211	4737	
90	1	3	6	11	17	22	28	33	39	44	50	56	67	89	111	133	156	178	200	222	278	333	389	444	556	667	778	889	1000	1111	1667	2222	2778	3333	3889	4444	5000	
85	1	4	6	12	18	24	29	35	41	47	53	59	71	94	118	141	165	188	212	235	294	353	412	471	588	706	824	941	1059	1176	1765	2353	2941	3529	4118	4706		
80	1	4	6	13	19	25	31	38	44	50	56	63	75	100	125	150	175	200	225	250	313	375	438	500	625	750	875	1000	1125	1250	1875	2500	3125	3750	4375	5000		
75	1	4	7	13	20	27	33	40	47	53	60	67	80	107	133	160	187	213	240	267	333	400	467	533	667	800	933	1067	1200	1333	2000	2667	3333	4000	4667			
70	1	4	7	14	21	29	36	43	50	57	64	71	86	114	143	171	200	229	257	286	357	429	500	571	714	857	1000	1143	1286	1429	2143	2857	3571	4286	5000			
65	2	5	8	15	23	31	38	46	54	62	69	77	92	123	154	185	215	246	277	308	385	462	538	615	769	923	1077	1231	1385	1538	2308	3077	3846	4615				
60	2	5	8	17	25	33	42	50	58	67	75	83	100	133	167	200	233	267	300	333	417	500	583	667	833	1000	1167	1333	1500	1667	2500	3333	4167	5000				
55	2	5	9	18	27	36	45	55	64	73	82	91	109	145	182	218	255	291	327	364	455	545	636	727	909	1091	1273	1455	1636	1818	2727	3636	4545					
50	2	6	10	20	30	40	50	60	70	80	90	100	120	160	200	240	280	320	360	400	500	600	700	800	1000	1200	1400	1600	1800	2000	3000	4000	5000					
45	2	7	11	22	33	44	56	67	78	89	100	111	133	178	222	267	311	356	400	444	556	667	778	889	1111	1333	1556	1778	2000	2222	3333	4444						
40	3	8	13	25	38	50	63	75	88	100	113	125	150	200	250	300	350	400	450	500	625	750	875	1000	1250	1500	1750	2000	2250	2500	3750	5000						
35	3	9	14	29	43	57	71	86	100	114	129	143	171	229	286	343	400	457	514	571	714	857	1000	1143	1429	1714	2000	2286	2571	2857	4286							
30	3	10	17	33	50	67	83	100	117	133	150	167	200	267	333	400	467	533	600	667	833	1000	1167	1333	1667	2000	2333	2667	3000	3333	5000							
25	4	12	20	40	60	80	100	120	140	160	180	200	240	320	400	480	560	640	720	800	1000	1200	1400	1600	2000	2400	2800	3200	3600	4000								
20	5	15	25	50	75	100	125	150	175	200	225	250	300	400	500	600	700	800	900	1000	1250	1500	1750	2000	2500	3000	3500	4000	4500	5000								
15	7	20	33	67	100	133	167	200	233	267	300	333	400	533	667	800	933	1067	1200	1333	1667	2000	2333	2667	3333	4000	4667											
10	10	30	50	100	150	200	250	300	350	400	450	500	600	800	1000	1200	1400	1600	1800	2000	2500	3000	3500	4000	5000													
5	20	60	100	200	300	400	500	600	700	800	900	1000	1200	1600	2000	2400	2800	3200	3600	4000	5000																	
3	33	100	167	333	500	667	833	1000	1167	1333	1500	1667	2000	2667	3333	4000	4667																					
1	100	300	500	1000	1500	2000	2500	3000	3500	4000	4500	5000																										
0.5	200	600	1000	2000	3000	4000	5000																															
0.3	333	1000	1667	3333	5000																																	
0.1	1000	3000	5000																																			
0.05	2000																																					

UNLIKELY TO PRESENT ACUTE HAZARD IN NORMAL USE

Table B. LD_{50} values and classification of formulations when the route is DERMAL

First row = Dermal LD_{50} of the active ingredient

First column = Percent concentration of the active ingredient in the formulation

	Class Ia							Class Ib										Class II													Class III					
	1	5	10	20	30	40	50	60	70	80	90	100	120	140	160	180	200	250	300	350	400	450	500	600	700	800	900	1000	1500	2000	2500	3000	3500	4000	4500	5000
100	1	5	10	20	30	40	50	60	70	80	90	100	120	140	160	180	200	250	300	350	400	450	500	600	700	800	900	1000	1500	2000	2500	3000	3500	4000	4500	5000
95	1	5	11	21	32	42	53	63	74	84	95	105	126	147	168	189	211	263	316	368	421	474	526	632	737	842	947	1053	1579	2105	2632	3158	3684	4211	4737	
90	1	6	11	22	33	44	56	67	78	89	100	111	133	156	178	200	222	278	333	389	444	500	556	667	778	889	1000	1111	1667	2222	2778	3333	3889	4444	5000	
85	1	6	12	24	35	47	59	71	82	94	106	118	141	165	188	212	235	294	353	412	471	529	588	706	824	941	1059	1176	1765	2353	2941	3529	4118	4706		
80	1	6	13	25	38	50	63	75	88	100	113	125	150	175	200	225	250	313	375	438	500	563	625	750	875	1000	1125	1250	1875	2500	3125	3750	4375	5000		
75	1	7	13	27	40	53	67	80	93	107	120	133	160	187	213	240	267	333	400	467	533	600	667	800	933	1067	1200	1333	2000	2667	3333	4000	4667			
70	1	7	14	29	43	57	71	86	100	114	129	143	171	200	229	257	286	357	429	500	571	643	714	857	1000	1143	1286	1429	2143	2857	3571	4286	5000			
65	2	8	15	31	46	62	77	92	108	123	138	154	185	215	246	277	308	385	462	538	615	692	769	923	1077	1231	1385	1538	2308	3077	3846	4615				
60	2	8	17	33	50	67	83	100	117	133	150	167	200	233	267	300	333	417	500	583	667	750	833	1000	1167	1333	1500	1667	2500	3333	4167	5000				
55	2	9	18	36	55	73	91	109	127	145	164	182	218	255	291	327	364	455	545	636	727	818	909	1091	1273	1455	1636	1818	2727	3636	4545					
50	2	10	20	40	60	80	100	120	140	160	180	200	240	280	320	360	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000	3000	4000	5000					
45	2	11	22	44	67	89	111	133	156	178	200	222	267	311	356	400	444	556	667	778	889	1000	1111	1333	1556	1778	2000	2222	3333	4444						
40	3	13	25	50	75	100	125	150	175	200	225	250	300	350	400	450	500	625	750	875	1000	1125	1250	1500	1750	2000	2250	2500	3750	5000						
35	3	14	29	57	86	114	143	171	200	229	257	286	343	400	457	514	571	714	857	1000	1143	1286	1429	1714	2000	2286	2571	2857	4286							
30	3	17	33	67	100	133	167	200	233	267	300	333	400	467	533	600	667	833	1000	1167	1333	1500	1667	2000	2333	2667	3000	3333	5000							
25	4	20	40	80	120	160	200	240	280	320	360	400	480	560	640	720	800	1000	1200	1400	1600	1800	2000	2400	2800	3200	3600	4000								
20	5	25	50	100	150	200	250	300	350	400	450	500	600	700	800	900	1000	1250	1500	1750	2000	2250	2500	3000	3500	4000	4500	5000								
15	7	33	67	133	200	267	333	400	467	533	600	667	800	933	1067	1200	1333	1667	2000	2333	2667	3000	3333	4000	4667											
10	10	50	100	200	300	400	500	600	700	800	900	1000	1200	1400	1600	1800	2000	2500	3000	3500	4000	4500	5000													
5	20	100	200	400	600	800	1000	1200	1400	1600	1800	2000	2400	2800	3200	3600	4000	5000																		
3	33	167	333	667	1000	1333	1667	2000	2333	2667	3000	3333	4000	4667																						
1	100	500	1000	2000	3000	4000	5000																													
0.5	200	1000	2000	4000																																
0.3	333	1667	3333																																	
0.1	1000	5000																																		

UNLIKELY TO PRESENT ACUTE HAZARD IN NORMAL USE

Pesticide active ingredients, which occur in Tables 1–8, in CAS no. order

For each active ingredient, the WHO Class (Ia, Ib, II, III or U) and page number(s) are given. The active ingredients without a WHO Class are shown as O (obsolete) or FM (fumigant).

CAS#	CLASS	PAGE
50-00-0	FM	67
50-29-3	II	30, 65
50-31-7	II	38
50-65-7	U	54
51-03-6	U	55
51-14-9	O	62
52-51-7	II	28
52-68-6	II	39, 65
52-85-7	Ib	24
54-11-5	Ib	25
55-38-9	II	32
56-35-9	*II*	28, 66
56-38-2	Ia	22, 66
56-72-4	Ib	23
57-24-9	Ib	25
57-74-9	II	28, 65
58-89-9	II	33, 65
60-51-5	II	31
60-57-1	O	60, 65
61-82-5	U	49
62-38-4	Ia	22
62-73-7	Ib	24
62-74-8	Ia	22
63-25-2	II	28
66-81-9	O	60
72-20-8	O	60
72-43-5	U	54
72-54-8	O	62
74-83-9	FM	67
74-88-4	*II*	35
74-90-8	FM	67
75-15-0	O	59
75-21-8	FM	65, 67
75-56-9	*II*	37
75-60-5	II	31
75-99-0	U	51
76-03-9	II	38
76-06-2	FM	67
76-44-8	O	61, 65
76-87-9	II	32
77-06-5	U	53
78-34-2	O	60
78-57-9	O	61
78-87-5	O	60
79-11-8	II	28
80-06-8	O	59
80-33-1	O	59
80-38-6	O	61
81-81-2	Ib	25
81-82-3	O	60
81-84-5	O	62
82-66-6	Ia	21
82-68-8	U	56
83-26-1	O	62
83-59-0	O	62
83-79-4	II	37
84-65-1	U	49
84-74-2	O	60
85-34-7	*II*	28
86-50-0	Ib	23, 65
86-86-2	U	54
86-87-3	III	45
86-88-4	O	59
87-17-2	O	62
87-86-5	Ib	25, 65
88-85-7	O	60, 65
90-43-7	III	46
91-20-3	*II*	35
92-52-4	III	41
93-71-0	*II*	27
93-72-1	O	61
93-75-4	O	62
93-76-5	O	62, 65
94-74-6	II	34
94-75-7	II	30
94-81-5	II	34
94-82-6	II	30
94-96-2	O	60
95-06-7	*II*	38
96-12-8	O	60
96-24-2	Ib	23
97-17-6	O	60
97-23-4	II	30
99-30-9	III	42
101-05-3	*III*	41
101-21-3	U	50
101-27-9	*II*	27
101-42-8	O	61
103-17-3	O	59
106-46-7	II	30
106-93-4	FM	65, 67
107-02-8	Ib	23
107-06-2	FM	65, 67
107-13-1	*FM*	67
107-18-6	Ib	23
107-49-3	O	62
108-25-8	O	62
108-62-3	II	34
112-12-9	III	47

CAS#	CLASS	PAGE
21609-90-5	O	61
21725-46-2	II	29
21908-53-2	Ib	24, 65
21923-23-9	O	60
22212-55-1	*O*	59
22224-92-6	Ib	24
22248-79-9	III	47
22259-30-9	Ib	24
22571-07-9	O	62
22781-23-3	II	27
22936-75-0	III	43
23031-36-9	II	36
23103-98-2	II	36
23135-22-0	*Ia*	21
23184-66-9	III	41
23505-41-1	O	62
23560-59-0	Ib	24
23564-05-8	U	57
23564-06-9	O	62
23783-98-4	Ia	22, 66
23947-60-6	U	51
23950-58-5	U	56
24017-47-8	Ib	25
24151-93-7	II	36
24201-58-9	O	60
24353-58-0	O	60
24579-73-5	U	56
24691-76-7	O	62
24691-80-3	U	52
24934-91-6	Ia	21
25057-89-0	II	27
25311-71-1	O	61
25319-90-8	II	34
25366-23-8	*II*	38
25954-13-6	III	44
26002-80-2	U	55
26087-47-8	II	34
26129-32-8	O	60
26225-79-6	U	51
26259-45-0	O	62
26399-36-0	O	62
26530-20-1	II	36
26644-46-2	U	58
26766-27-8	O	62
27314-13-2	*II*	35
27355-22-2	U	55
27386-64-7	O	61
27541-88-4	O	62
27605-76-1	III	46
28217-97-2	O	59
28249-77-6	II	38
28434-01-7	U	49
28559-00-4	O	60
28772-56-7	Ia	21
28805-78-9	O	61
29091-05-2	III	43
29091-21-2	U	55
29104-30-1	O	59
29173-31-7	O	61
29232-93-7	II	36
29973-13-5	Ib	24
30043-49-3	O	60
30560-19-1	II	27
30979-48-7	O	61
31218-83-4	Ib	25
31251-03-3	O	61
31848-11-0	O	59
31895-22-4	II	38
32407-99-1	O	62
32534-96-6	O	60
32791-87-0	U	50
32809-16-8	U	55
32861-85-1	O	59
33089-61-1	II	27
33245-39-5	II	32
33629-47-9	II	28
33693-04-8	II	38
33820-53-0	O	61
34014-18-1	II	38
34123-59-6	II	34
34205-21-5	III	43
34256-82-1	III	41
34264-24-9	O	62
34462-96-9	O	61
34643-46-4	II	37
34681-10-2	Ib	23
34681-23-7	Ib	23
35256-85-0	U	57
35367-38-5	III	42
35400-43-2	O	62
35554-44-0	II	33
35575-96-3	II	27
36335-67-8	II	28
36519-00-3	O	62
36614-38-7	O	61
36734-19-7	III	44
36756-79-3	U	57
37248-47-8	U	58
37407-77-5	O	59
37764-25-3	III	42
37893-02-0	*III*	44
37894-46-5	O	60
37924-13-3	O	62
38260-54-7	O	60
38727-55-8	O	60
39148-24-8	*U*	53
39196-18-4	Ib	25
39300-45-3	II	31
39515-40-7	II	29
39515-41-8	II	32
39603-48-0	O	59
40487-42-1	II	36
40596-69-8	U	54
40843-25-2	II	30
41083-11-8	II	27
41096-46-2	U	53
41198-08-7	II	36
41295-28-7	O	61
41394-05-2	II	34
41483-43-6	III	41
41814-78-2	II	39
42509-80-8	O	61
42576-02-3	U	49
42588-37-4	O	61
42609-52-9	U	51
42609-73-4	III	45
42874-03-3	U	55
43121-43-3	II	38
43222-48-6	II	30
50471-44-8	U	58
50512-35-1	II	34
50563-36-5	II	30

INDEX. CLASSIFICATION OF PESTICIDE ACTIVE INGREDIENTS

Ia = Extremely hazardous; Ib = Highly hazardous; II =Moderately hazardous; III = Slightly hazardous; U = Unlikely to present acute hazard in normal use; FM =Fumigant, not classified; O = Obsolete as pesticide, not classified.


World Health
Organization


9 789240 005662