CS INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY

Health and Safety Guide No. 55

# 1,2-DICHLOROETHANE HEALTH AND SAFETY GUIDE

UNITED NATIONS
ENVIRONMENT PROGRAMME


INTERNATIONAL
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WORLD HEALTH ORGANIZATION, GENEVA 1991

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# 1,2-DICHLOROETHANE HEALTH AND SAFETY GUIDE

This is a companion volume to
Environmental Health Criteria 62: 1,2-Dichloroethane

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

WORLD HEALTH ORGANIZATION, GENEVA 1991

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# INTRODUCTION

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

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

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

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

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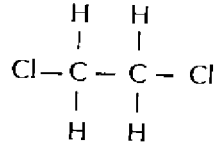
World Health Organization
1211 Geneva 27
Switzerland

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

# 1. PRODUCT IDENTITY AND USES

## 1.1 Identity

| | |
|---|---|
| Common name: | 1,2-dichloroethane |
| Molecular formula: | $C_2H_4Cl_2$ |
| Chemical structure: |  |
| Common trade names: | Borer-Sol; Brocide; Destruxol; Dichlor-emulsion; Dichlor-mulsion; Dutch Liquid; Dutch Oil; ENT 1656; Gaze Olefiant |
| Common synonyms: | alpha,beta-dichloroethane; 1,2-bichloroethane; ethane dichloride; ethylene chloride; ethylene dichloride; 1,2-ethylene dichloride; sym(metric)-dichloroethane |
| Abbreviation: | EDC |
| CAS registry number: | 107-06-2 |
| RTECS registry number: | KI0525000 |
| Conversion factor | 1 ppm = 4.05 mg/m$^3$ air, and<br>1 mg/m$^3$ = 0.25 ppm<br>at 25 °C and 101.3 kPa (760 mmHg) |

### 1.2 Physical and Chemical Properties

1,2-Dichloroethane is a colourless liquid, with a sweet taste and a chloroform-like odour. Reported odour thresholds are 25–450 mg/m$^3$ for perception and 162–750 mg/m$^3$ for recognition. 1,2-Dichlorethane is a volatile and flammable compound. When dry, it is stable at ordinary temperatures. In the presence of air, moisture, and light, the liquid decomposes slowly. Some physical and chemical properties of 1,2-dichloroethane are given in the Summary of Chemical Safety Information (section 6).

### 1.3 Composition

Most commercial 1,2-dichloroethane is 97–99% pure and contains approximately 0.1%, by weight, of alkylamines, to inhibit decomposition. Impure 1,2-dichloroethane may contain polychlorinated ethanes, and the uninhibited product may also contain chorine and/or hydrogen chlorine.

### 1.4 Uses

1,2-Dichloroethane has not been reported to occur naturally. It is used mainly for the synthesis of vinyl chloride. Other chemicals produced from 1,2-dichloroethane are 1,1,1-trichloroethane, ethyleneamines, vinylidene chloride, trichloroethylene, and tetrachloroethylene. Small quantities are used as a lead scavenger in gasoline, and for solvent and seed fumigant applications.

# 2. SUMMARY AND EVALUATION

## 2.1 Human Exposure

Human exposure mainly occurs at, and in the vicinity of, production facilities, through inhalation and skin contact. Further human exposure to the vapour of this compound can occur, when it is used in gasoline, as a solvent, or as a seed fumigant. Accidental, oral intoxication has frequently been reported. Average concentrations near production facilities have been below 40$\mu g/m^3$. In the air of cities, average concentrations of between 0.3 and 6.5 $\mu g/m^3$, with a reported maximum of 30 $\mu g/m^3$, have been measured. Average levels in drinking-water are generally below 1 $\mu g$/litre. There are no recent data on occupational exposure levels.

## 2.2 Fate of 1,2-Dichloroethane

Approximately 0.2% of the total volume of 1,2-dichloroethane produced is estimated to be lost to the air, water, and soil (two-thirds from production facilities and one-third following dispersive use). Approximately 35% of the emissions of 1,2-dichloroethane, associated with the production of the compound itself and end-products, were estimated to occur via disposal of heavy ends, the so-called EDC-tars, a mixture of low- and high-boiling chlorinated hydrocarbons. In the atmosphere, 1,2-dichloroethane is degraded by sunlight, fairly rapidly. The products of this degradation are oxides of carbon and hydrogen chloride. The process is rapid enough to prevent accumulation of the compound in the atmosphere. Evaporation is the major pathway by which 1,2-dichloroethane is lost from water. Chemical degradation and biodegradation are relatively insignificant processes. Bioconcentration is unlikely.

## 2.3 Uptake, Metabolism, and Excretion

1,2-Dichloroethane is readily absorbed via the dermal, oral, and inhalation routes. In rodents, it is distributed widely over the body, with a preference for adipose tissue and liver, directly after oral exposure, and for adipose tissue alone, directly after inhalation. Most of the absorbed chemical is excreted rapidly via the urine, mainly as glutathione conjugates, and via the lungs, as carbon dioxide or the unchanged compound.

*In vivo*, the metabolism of 1,2-dichloroethane appears to be a saturable process in rodents. At low exposure levels, most of the body burden is recovered in the form of urinary metabolites. As exposure levels increase, a greater fraction of the compound is excreted unchanged via the lungs.

Metabolism takes place through two known pathways: one via P-450-mediated microsomal oxidation and the other via glutathione conjugation. The former pathway involves the formation of 2-chloroacetaldehyde and 2-chloroethanol. This pathway does not appear to be important in producing DNA damage *in vivo*. Reactive intermediates, capable of interacting with DNA, are formed when 1,2-dichloroethane is metabolized via glutathione conjugation.

### 2.4 Effects on Organisms in the Environment

Concentrations of between 85 and 550 mg/litre water are lethal for half the number of fish exposed for 1–4 days ($LC_{50}$). The $LC_{50}$ value (1 or 2 days) for *Daphnia magna* varies between 250 and 320 mg/litre. In a 28-day test with *Daphnia magna*, the no-observed-effect levels were 11 mg/litre, on the basis of reproduction, and 42 mg/litre on the basis of length. Bioaccumulation in fish is unlikely. Although 1,2-dichloroethane was slightly toxic for the aquatic species tested, it does not pose a significant hazard for the aquatic environment, except in the case of accident or inappropriate disposal.

1,2-Dichloroethane, at an influent concentration of 258 mg/litre, did not affect the treatment efficiency of a bench-scale activated sludge system. In a batch anaerobic assay, 1,2-dichloroethane, at a concentration of 2.5 mg/litre, was slightly toxic for the digestive process.

### 2.5 Effects on Animals and Cell Systems

Single oral doses of 680 and 850 mg/kg body weight and exposure to vapour concentrations of 5100–6666 mg/m$^3$, for 6 h, have been shown to be lethal for half the number of exposed rats in a population ($LD_{50}$ and $LC_{50}$, respectively). Thus, the compound is slightly toxic, according to the scale of Hodge & Sterner. The $LD_{50}$ and 6-h $LC_{50}$ for mice were 413–489 mg/kg body weight and 1060 mg/m$^3$, respectively.

# SUMMARY AND EVALUATION

In an exposure-related inhalation study on rats, no adverse effects were observed with a 7-h exposure to 1200 mg/m$^3$. At higher levels, central nervous system depression and an increased mortality rate were noted. Liver and kidney damage was found in most animals that died. After a single oral dose of 615–770 mg/kg body weight, liver damage, myocardial oedema, and damage to coronary vessels were observed.

In 3 short-term inhalation studies, various species were exposed to concentrations of between 405 and 3900 mg 1,2-dichloroethane/m$^3$ air, for 6 or 7 h per day, and 5 days per week. Mice and rats appeared to be more sensitive than guinea-pigs, rabbits, monkeys, dogs, or cats. The overall no-observed-effect level in the rat, for exposure periods ranging from 4 to 9 months, was about 400 mg/m$^3$. Signs of toxicity, including central nervous system depression and death, were observed in all species exposed to concentrations of between 1620 and 3900 mg/m$^3$. In rats, fatty changes in the liver were observed at concentrations from 1540 mg/m$^3$ upwards. Repeated oral administration of 1,2-dichloroethane, at a dose of 300 mg/kg body weight, was lethal for rats, and produced necrosis and fatty changes in the liver. No effects were observed in rats when the chemical was given orally at 10 mg/kg body weight per day, for 90 days, or at 150 mg/kg body weight, 5 times per week, for 2 weeks.

1,2-Dichloroethane causes corneal damage in animals, but no gross skin reactions occurred with a patch test on guinea-pigs. Corneal opacity was observed in dogs, following subcutaneous injection.

1,2-Dichloroethane is weakly mutagenic in *Salmonella typhimurium* T1535. A stronger response was obtained after metabolic activation by cytosolic glutathione *S*-transferase. Mutagenicity also occurs in fungi, *Drosophila*, and mammalian cells *in vitro*. In two human cell lines, the incidence of gene mutations was found to increase with increasing levels of glutathione *S*-transferase. A weak mutagenic effect was reported in a spot test on mice. DNA damage has been observed in bacteria, mammalian cells *in vitro*, and in mammals *in vivo*. 1,2-Dichloroethane did not induce cell transformation in one of two assays, and enhanced virus-induced cell transformation in the other. Negative results were obtained in one dominant-lethal assay and in 2 micronucleus assays on mice.

1,2-Dichloroethane was carcinogenic in B6C3F1 mice and Osborne-Mendel rats, following oral administration of doses of 50–300 mg/kg body

weight, given, in oil, by gavage. The compound produced a statistically-significant increase in squamous cell carcinoma of the forestomach, haemangiosarcoma, and mammary adenocarcinoma in rats, and mammary adenocarcinoma and hepatocellular carcinoma in mice. In inhalation studies on Swiss mice and Sprague Dawley rats, using concentrations of up to 607 mg/m$^3$, no increase in tumour incidence was reported. Taking into consideration that cancer has been produced in two species of experimental animals and in several target organs, it can be concluded that 1,2-dichloroethane is carcinogenic for rats and mice, when administered by gavage.

1,2-Dichloroethane has been found in the fetuses of rats following inhalation by the dams. Fetal toxicity was observed in two studies on rats at low exposure levels. However, fetal toxicity could not be observed in two other studies on rats and one on rabbits at higher exposure levels.

### 2.6 Effects on Human Beings

The first symptoms of acute intoxication in human beings include depression of the central nervous system, gastroenteritis, and irritation of the mucous membranes of the eyes and respiratory tract. An interval relatively free of symptoms can be experienced. The intoxication can also lead to cardiovascular insufficiency (often the cause of death), blood coagulation disorders, lung oedema, and functional abnormalities of the liver and kidneys.

Quantitative exposure–effect data on human beings are limited to two early reports on small groups of occupationally-exposed men.

Evaluation of these data indicate that repeated inhalation exposure in the range of approximately 40–800 mg/m$^3$ may lead to depression of the central nervous system and gastrointestinal and liver abnormalities. Because of the limitations of the human data base, it is necessary to rely on the data available from animal studies, to derive a no-observed-effect level for human beings. This is possible because of the similarity in the spectrum of adverse effects in man and laboratory animals. These effects include central nervous system depression, liver, and possibly kidney, abnormalities, lung oedema, and cardiovascular disorders. The dose-response data from animal studies include a no-observed-effect level of 400 mg 1,2-dichloroethane/m$^3$ air. After considering current human exposure levels in air and drinking-water, it can be concluded that, even in the

context of a worst-case scenario, 1,2-dichloroethane is unlikely to present a toxic hazard for the general population, under prevailing exposure conditions.

In the absence of human data, and taking into account that 1,2-dichloroethane produces a reactive intermediate that alkylates the DNA, is weakly positive in a number of *in vitro* mutagenicity tests, and results in the production of both rare and common tumours in rats and mice, it would be prudent to consider it as a possible human carcinogen. Therefore, 1,2-dichloroethane should be regarded, for practical purposes, as if it presented a carcinogenic risk for man, and levels in the environment should be kept as low as feasible.

Since there are no human data, it is necessary to rely on the limited data available from laboratory animal investigations in evaluating human reproduction hazards and teratogenicity. The weight of evidence suggests that exposure to prevailing environmental levels does not pose a reproductive or teratogenic hazard.

# 3. CONCLUSIONS

Taking into account the body of available data, it would be prudent to consider 1,2-dichloroethane as a possible human carcinogen and, for practical purposes, to regard it as a carcinogenic risk for human beings. Thus, levels in the environment should be kept as low as feasible.

After a single oral or inhalation exposure, 1,2-dichloroethane may irritate the mucous membranes of the eyes and gastrointestinal and respiratory tracts, and may cause systemic changes in the central nervous system, gastrointestinal tract, and liver in human beings. Liquid 1,2-dichloroethane is severely irritating to the skin.

It is not possible to derive a no-observed-effect level for non-carcinogenic effects on the basis of available human data. However, a no-observed-effect level of 400 $mg/m^3$ can be established on the basis of animal toxicity data. After considering current human exposure levels in air and in drinking-water, it can be concluded that, under prevailing exposure conditions, 1,2-dichloroethane is unlikely to present a toxic hazard for the general population.

There are no human data for the evaluation of the reproductive hazards and teratogenicity. The weight of evidence from experimental animal studies does not suggest that exposure of human beings to prevailing environmental levels would pose a reproductive or teratogenic hazard.

# CONCLUSIONS

1,2-Dichloroethane will not accumulate in the atmosphere. Bioconcentration is unlikely. Although it was slightly toxic for the aquatic species tested, 1,2-dichloroethane does not pose a significant hazard for the aquatic environment, except in the case of accident or inappropriate disposal.

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

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

The human health hazards associated with certain types of exposure to 1,2-dichloroethane, together with preventive and protective measures and first aid recommendations, are listed in the Summary of Chemical Safety Information (section 6).

## 4.2 Advice to Physicians

No specific antidote to 1,2-dichloroethane poisoning is known. Treat symptomatically. Be aware that, following the initial symptoms of oral poisoning, central nervous system depression and respiratory and circulatory failure may occur after an interval relatively free of symptoms.

## 4.3 Health Surveillance Advice

Human beings potentially exposed to 1,2-dichloroethane should undergo periodic medical examination, with emphasis on effects on the eyes, skin, central nervous system, gastrointestinal tract, liver, kidneys, and cardiovascular system, and on the functioning of the central nervous system.

## 4.4 Explosion and Fire Hazards

### 4.4.1 *Explosion hazards*

Above 13 °C, explosive vapour–air mixtures may be formed that can be ignited by open fires, sparks, or glowing surfaces. Because of its low electroconductivity, the compound can generate electrostatic charges as a result of flow or agitation. The vapours are heavier than air, may travel along the ground, and be ignited from a distance. 1,2-Dichloroethane will react violently with oxidants (e.g., nitric acid). Mixtures with dinitrogen tetroxide ($N_2O_4$), sodium, potassium, aluminium, magnesium, liquid ammonia, or dimethylaminopropylamine may be explosive.

4.4.2 *Fire hazards*

1,2-Dichloroethane is a flammable liquid. It decomposes in a flame or on a hot surface, to form phosgene and hydrochloric acid.

4.4.3 *Prevention*

Use closed systems, ventilation, and explosion-proof electrical equipment. Make connections to earth. Do not use the compound near sources of ignition. Do not use compressed air for filling, discharging, or handling. In case of fire, keep drums cool by spraying with water. Fire-fighters should use self-contained breathing apparatus.

4.4.4 *Fire-extinguishing agents*

Use dry chemical, carbon dioxide, alcohol foam, halons, water sprays.

**4.5 Storage**

1,2-Dichloroethane should be stored in a dark, dry, fire-proof, and properly labelled room, with ventilation across the floor. It should be kept away from food, oxidants, and other incompatible substances (section 4.4.1).

**4.6 Transport**

In case of accident, stop the engine. Remove all sources of ignition. Keep bystanders at a distance and mark the roads. Keep upwind. In case of spillage or fire, use the methods advised in sections 4.7 and 4.4, respectively. Notify the police and the fire brigade immediately. In case of poisoning, follow the advice in section 4.1.

**4.7 Spillage and Disposal**

4.7.1 *Spillage*

Remove all ignition sources and evacuate the danger area. Collect leaking liquid in a sealable container. Absorb spilled liquid in sand, earth, or other inert absorbent. Do not allow run-off into a sewer. Remove the inert

absorbent to a safe place, then flush the area with water. Ensure personal protection by using a self-contained breathing apparatus.

4.7.2 *Disposal (based on the IRPTC waste disposal file)*

Solvent wastes may be regenerated commercially using fractional distillation. Concentrated wastes, such as distillation residues, spent catalysts, and complex sludges (tars), are disposed of in special waste incinerators, since phosgene is liberated during burning. Dilute with kerosene or fuel oil, because of high chlorine content. Aqueous wastes that contain 1,2-dichloroethane (process effluents) are aerated, until the volatile chlorohydrocarbon has evaporated. Special attention should be paid to emission limits.

# 5. HAZARDS FOR THE ENVIRONMENT AND THEIR PREVENTION

1,2-Dichloroethane will not accumulate in the atmosphere. Bioconcentration is unlikely. Although it was slightly toxic for the aquatic species tested, 1,2-dichloroethane does not pose a signficant hazard for the aquatic environment, except in case of accident or inappropriate disposal.

Contamination of soil, water, and the atmosphere can be avoided by proper methods of storage, transport, handling, and waste disposal. In cases of spillage, apply methods recommended in section 4.7.1.

# 6. SUMMARY OF CHEMICAL SAFETY INFORMATION

*This summary should be easily available to all health workers concerned with, and users of, 1,2-dichloroethane It should be displayed at, or near, entrances to areas where there is potential exposure to 1,2-dichloroethane, and on processing equipment and containers. The summary should be translated into the appropriate language(s). All persons potentially exposed to the chemical should also have the instructions in the summary clearly explained.*

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

# SUMMARY OF CHEMICAL SAFETY INFORMATION

## 1,2-DICHLOROETHANE

(EDC, ethane dichloride, ethylene dichloride, glycol dichloride) ($ClCH_2$-$CH_2Cl$)

| PHYSICAL PROPERTIES | | OTHER CHARACTERISTICS |
|---|---|---|
| Relative molecular mass | 98.96 | Colourless liquid with a sweet taste and a chloroform-like odour; can have adverse effects well below the odour threshold; the compound can generate electrostatic charges through flow or agitation; it will react violently with oxidizing agents, which are mixed with dinitrogen tetroxide ($N_2O_4$), sodium, potassium, aluminium, magnesium, liquid ammonia, or dimethylaminopropylamine; may be explosive; vapours are heavier than air, travel along the ground, and can be ignited from a distance; the compound decomposes in contact with a flame or on a hot surface forming phosgene and hydrochloric acid |
| Melting point (°C) | -35 | |
| Boiling point (°C) | 83 | |
| Water solubility (20 °C) (g/litre) | 8.69 | |
| Specific density (20 °C) | 1.23 | |
| Relative vapour density | 3.42 | |
| Vapour pressure (20 °C) (kPa) | 8.53 | |
| Flash point (°C) (closed cup) | 13 | |
| Flammability (explosive) limits (Vol. %) | 6-16 | |
| Log *n*-octanol/water partition coefficient | 1.48 | |

| HAZARDS/SYMPTOMS | PREVENTION AND PROTECTION | FIRST AID |
|---|---|---|
| SKIN: irritation and degreasing; redness; may enter body through skin | Wear clean protective gloves and protective clothing | Remove contaminated clothing; wash with water and soap |
| EYES: irritation and inflammation; redness; blurred vision | Wear face-shield | Rinse with plenty of water for at least 15 min; send to a doctor |

| HAZARDS/SYMPTOMS | PREVENTION AND PROTECTION | FIRST AID |
|---|---|---|
| INHALATION: irritation and inflammation of respiratory and gastrointestinal tracts; central nervous system depression; effects on liver and kidneys; cyanosis, vomiting, diarrhoea, headache, dizziness, dullness | Explosion-proof exhaust ventilation or, for non-routine activities, air-supplied or self-contained breathing breathing apparatus | Remove victims to fresh air and keep quiet; if breathing has stopped, apply artificial respiration |
| GENERAL: should be regarded as posing a carcinogenic risk for man | | |
| INGESTION: irritation and inflammation of gastrointestinal tract; central nervous system depression; effects on liver and kidneys; effects may be delayed; cyanosis, vomiting, diarrhoea, headache, dizziness, dullness | Do not eat, drink, or smoke during work | Rinse mouth; give plenty of water to drink; induce vomiting in conscious patients |
| ENVIRONMENT: the compound can be slightly toxic for aquatic life | Apply proper methods of storage, transport, waste disposal, and and handling of spills | |

## SUMMARY OF CHEMICAL SAFETY INFORMATION (*continued*)

| SPILLAGE | STORAGE | FIRE AND EXPLOSION |
|---|---|---|
| Remove ignition sources; evacuate area; collect leaking liquid in a sealable container; do not allow run-off into a sewer; absorb spills in sand or other inert absorbent, and remove to a safe place; ensure personal protection by using a self-contained breathing apparatus | Store in dark, dry, fire-proof, and properly labelled room, with ventilation across the floor; store away from foodstuffs, oxidants, and other incompatible substances; containers should be tightly closed and labelled | Flammable; vapour-air mixtures may be explosive; no sources of ignition; make connections to earth; do not use compressed air for handling; use closed systems, ventilation, and explosion-proof electrical equipment; in case of fire, keep drums cool by spraying with water; extinguish fire with dry chemical, carbon dioxide, alcohol foam, halons, or water sprays |

| WASTE DISPOSAL | NATIONAL INFORMATION | |
|---|---|---|
| Disposal in special waste incinerators with dilution by kerosene or fuel oil; aqueous wastes should be aerated; solvent wastes may be regenerated | National Occupational Exposure Limits:<br><br>National Poison Control Centre: | UN: 1184 |

# 7. CURRENT REGULATIONS, GUIDELINES, AND STANDARDS

The information given in this section has been extracted from the International Register of Potentially Toxic Chemicals (IRPTC) legal file. A full reference to the original national document from which the information was extracted can be obtained from IRPTC. When no effective date appears in the IRPTC legal file, the year of the reference from which the data are taken is indicated by (r).

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

## 7.1 Exposure Limit Values

Some exposure limit values are given in the table on pp. 26–28.

## 7.2 Specific Restrictions

The European Economic Community prohibits the use and marketing of 1,2-dichloroethane as part of the composition of cosmetic products (effective date: 1986). Member states should ensure that dangerous preparations (solvents) are not placed on the market, unless their packages and fastenings and labels comply with the requirements laid down (effective date: 1984).

In the German Democratic Republic, the use of 1,2-dichloroethane is not permitted in the manufacture of consumer goods (effective date: 1977).

In the USSR, the compound is approved as an insecticide for agricultural use with specifications for application, dose, mode, and treatment frequency (effective date: 1982).

In the USA, the compound is exempted from tolerance requirements in plant products and animal products, when used according to good agricultural practice as an inert (or occasionally active) ingredient of

## CURRENT REGULATIONS, GUIDELINES, AND STANDARDS

| Medium | Specification | Country/ organization | Exposure limit description[a] | Value | Effective date |
|---|---|---|---|---|---|
| AIR | Occupational | Australia | Threshold limit value (TLV)<br>- Time-weighted average (TWA) | <br>200 $mg/m^3$ | 1985 (r) |
| | | Brazil | Acceptable limit<br>- 48 h/week | <br>156 $mg/m^3$ | 1982 (r) |
| | | Czechosłovakia | Maximum allowable concentration<br>- Time-weighted average (TWA)<br>Ceiling value | <br>50 $mg/m^3$<br>100 $mg/m^3$ | 1985<br><br>1985 |
| | | Germany, Federal Republic of | Maximum work-site concentration<br>- Time-weighted average (TWA)<br>Short-term exposure limit (STEL)<br>- 30 min | <br>80 $mg/m^3$ [b]<br><br>160 $mg/m^3$ | 1986 (r)<br><br>1986 (r) |
| | | Japan | Maximum allowable concentration (MAC) | 40 $mg/m^3$ | 1984 |
| | | Netherlands | Maximum limit<br>- Time-weighted average (TWA) | <br>200 $mg/m^3$ | 1985 (r) |
| | | Poland | Ceiling value | 10 $mg/m^3$ [c] | 1985 (r) |

| | | | | | |
|---|---|---|---|---|---|
| | | Sweden | Threshold limit value (TLV) | | 1985 |
| | | | - Time-weighted average (TWA) | 4 mg/m$^3$ [d] | |
| | | | Short-term exposure limit (STEL) | | 1985 |
| | | | - 15-min time-weighted average | 20 mg/m$^3$ | |
| | | United Kingdom | Recommended threshold limit value | | 1985 (r) |
| | | | - Time-weighted average (TWA) | 40 mg/m$^3$ | |
| | | | Short-term exposure limit (STEL) | | 1985 (r) |
| | | | - 10-min time-weighted average | 60 mg/m$^3$ | |
| | | USA (ACGIH) | Threshold limit value (TLV) | | 1985 (r) |
| | | | - Time-weighted average (TWA) | 40 mg/m$^3$ | |
| | | USA (ACGIH) | Short-term exposure limit (STEL) | 60 mg/m$^3$ | 1985 (r) |
| | | USA (OSHA) | Threshold limit value (TLV) | | 1974 |
| | | | - Time-weighted average (TWA) | 202 mg/m$^3$ | |
| | | | Ceiling value | | 1974 |
| | | | - Acceptable | 405 mg/m$^3$ | |
| | | | Ceiling value | | 1974 |
| | | | - 5 min/3 h | 810 mg/m$^3$ | |
| | | USA (NIOSH) | Threshold limit value (TLV) | | |
| | | | - Time-weighted average (TWA) | 40 mg/m$^3$ | |
| | | | Short-term exposure limit (STEL) | | |
| | | | - 15 min | 80 mg/m$^3$ | |
| AIR | Ambient | Czechoslovakia | Maximum allowable concentration (MAC) | | 1982 (r) |
| | | | - Average per day | 1 mg/m$^3$ | |
| | | | Maximum allowable concentration (MAC) | | 1982 (r) |
| | | | - Average per 0.5 h | 3 mg/m$^3$ | |

## CURRENT REGULATIONS, GUIDELINES, AND STANDARDS (*continued*)

| Medium | Specification | Country/ organization | Exposure limit description[a] | Value | Effective date |
|---|---|---|---|---|---|
| WATER | Surface | USSR | Preliminary safety level | 0.21 mg/litre | 1983 |
| | Drinking- | WHO | Guideline | 0.01 mg/litre | 1983 (r) |
| FOOD | | FAO/WHO | Allowable daily intake | none [e] | 1983 (r) |
| | Bread, cereal products | | Guideline | 0.1 mg/kg | 1982 (r) |
| | Cereal grains | | Guideline | 50 mg/kg | 1982 (r) |

[a] TWA = time-weighted average over one working day (usually 8 h).
[b] Suspected potential carcinogen; the exposure limits are therefore tentatively retained.
[c] Skin absorption.
[d] Skin absorption; carcinogenic.
[e] The substance should be used in accordance with good manufacturing practice.

pesticides, applied for some specified purposes (effective date: 1983 (r)). It is exempted from residue tolerance requirements, when used as a fumigant, after harvest, on certain specified grains (effective date: 1983 (r)). It is permitted as a food additive in feed and drinking-water for animals, with restriction on the use as a solvent in the extraction processing of animal by-products for use in animal feed (effective date: 1983 (r)).

### 7.3 Labelling, Packaging, and Transport

The European Economic Community regulations state that the label should read as follows (effective date: 1976 (r)):

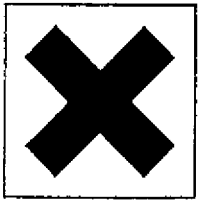
*Highly flammable; harmful by inhalation; keep container tightly closed; keep away from sources of ignition – no smoking; do not empty into drains; take precautionary measures against static discharges.*

The recommended labels are:

F+

Yderet let antændelig
Hochentzündlich
Εξόχως εύφλεκτο
Extremely flammable
Extrêmement inflammable
Estremamente infiammabile
Zeer licht ontvlambaar

Xn



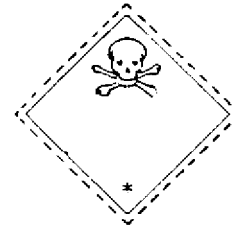
Sundhedsskadelig
Mindergiftig

Harmful
Nocif
Nocivo
Schadelijk

# CURRENT REGULATIONS, GUIDELINES, AND STANDARDS

The United Nations Committee of Experts on the Transportation of Dangerous Goods classifies 1,2-dichloroethane as a flammable liquid (Class 3) and a poisonous substance (Subsidiary Risk Class 6.1) presenting medium danger for packing purposes (Packing Group II). Packing methods and labels are recommended (effective date: 1982 (r)). The recommended labels are:

Background: red



The International Maritime Organization classifies 1,2-dichloroethane as a flammable liquid (Class 3.1) with medium danger for packing purposes (Packing Group II) (effective date: 1982 (r)).

### 7.4 Waste Disposal

In the Federal Republic of Germany, the air emissions of organic compounds in Class I, which include 1,2-dichloroethane, must not exceed (as the sum of all compounds in this class) a mass concentration of 20 mg/m$^3$ at a mass flow of 0.1 kg/h. If compounds of different classes are present, the mass concentration must not exceed 30 mg/m$^3$ (effective date: 1982 (r)).

In the USA, any solid waste (except domestic) that contains chlorinated ethanes must be listed as hazardous waste (subject to handling, transport, treatment, storage, and disposal regulations, and permit and notification requirements), unless it is found that the waste cannot pose a threat to human health or the environment when improperly managed. Certain specified industrial solid wastes containing 1,2-dichloroethane are identified as hazardous wastes. If 1,2-dichloroethane is a commercial chemical product, it is identified as a "toxic waste", subject to handling,

transport, treatment, storage, and disposal regulations, and permit notification requirements (effective date: 1983 (r)). An owner or operator of a hazardous waste incinerator must achieve 99.99% destruction and removal efficiency for the substance, if it is designated as a principal organic hazardous constituent in its EPA permit (effective date: 1981). Permits are required for the discharge of 1,2-dichloroethane from any point source into USA waters (effective date: 1980). EPA is required to set, or has set, effluent limitations and pretreatment standards for 21 major industries, regarding chlorinated ethanes (effective date: 1983 (r)).

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

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