

LPS HDX

Chemwatch Material Safety Data Sheet

Issue Date: 9-Jul-2009

NC477ECP

CHEMWATCH 8024-94

Version No:4

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

LPS HDX

STATEMENT OF HAZARDOUS NATURE

Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation.

OTHER NAMES

"HDX Heavy-Duty Degreaser"

PROPER SHIPPING NAME

AEROSOLS

PRODUCT USE

Aerosol applied degreaser.

SUPPLIER

Company: ITW POLYMERS & FLUIDS

Address:

100 Hassall Street

Wetherill Park

NSW, 2164

AUS

Telephone: +61 2 9757 8800

Emergency Tel: +61 2 9757 8800

Fax: +61 2 9757 3855

Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Aquatic Hazard Category 3

Carcinogen Category 1B

Eye Irritation Category 2A

Reproductive Toxicity Category 1B

Skin Corrosion/Irritation Category 2

EMERGENCY OVERVIEW

HAZARD

DANGER

Determined by Chemwatch using GHS/HSNO criteria:

6.3A 6.4A 6.7A 6.8A 9.1C

Causes skin irritation

Causes serious eye irritation

May cause CANCER

May damage the unborn child

Harmful to aquatic life

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Section 2 - HAZARDS IDENTIFICATION

PRECAUTIONARY STATEMENTS

Prevention

Obtain special instructions before use.

Do not handle until all safety precautions have been read and understood.

Wash thoroughly after handling.

Avoid release to the environment.

Wear protective gloves/protective clothing/eye protection/face protection.

Use personal protective equipment as required.

Response

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

IF exposed or concerned: Get medical advice/ attention.

If eye irritation persists: Get medical advice/attention.

Storage

Store locked up.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
trichloroethylene	79-01-6	95-98
carbon dioxide	124-38-9	2-5

Section 4 - FIRST AID MEASURES

NEW ZEALAND POISONS INFORMATION CENTRE 0800 POISON (0800 764 766)

NZ EMERGENCY SERVICES: 111

SWALLOWED

» If poisoning occurs, contact a doctor or Poisons Information Centre.

» - If swallowed do NOT induce vomiting.

- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

- Observe the patient carefully.

- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious

- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.

- Seek medical advice.

» - Avoid giving milk or oils.

» - Avoid giving alcohol.

EYE

» If this product comes in contact with the eyes:

- Immediately hold eyelids apart and flush the eye continuously with running water.

- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.

- Transport to hospital or doctor without delay.

- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

» If skin contact occurs:

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Section 4 - FIRST AID MEASURES

- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- » - If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prosthesis such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

- » Treat symptomatically.

DO NOT administer sympathomimetic drugs as they may cause ventricular arrhythmias.

Following acute or short-term continued exposures to trichloroethylene:

- Trichloroethylene concentration in expired air correlates with exposure. 8 hours exposure to 100 ppm produces levels of 25 ppm immediately and 1 ppm 16 hours after exposure.
- Most mild exposures respond to removal from the source and supportive care. Serious toxicity most often results from hypoxemia or cardiac dysrhythmias so that oxygen, intubation, intravenous lines and cardiac monitoring should be started initially as the clinical situation dictates.
- Ipecac syrup should be given to alert patients who ingest more than a minor amount and present within 2 hours.
- The efficacy of activated charcoal and cathartics is unclear.
- The metabolites, trichloroacetic acid, trichloroethanol and to a lesser degree, chloral hydrate, may be detected in the urine up to 16 days postexposure. [Ellenhorn and Barceloux; Medical Toxicology]

EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Trichloroacetic acid in urine	10 mg/gm creatinine	End of work- week	NS
2. Trichloroacetic acid AND Trichloroethanol in urine	300mg/mg creatinine	End of shift at end of work- week	NS
3. Free Trichlorethanol in blood	4 mg/L	End of shift at end of work- week	NS
4. Trichloroethylene in end- exhaled air			SQ
5. Trichloroethylene in blood			SQ

NS: Non-specific determinant; also seen after exposure to other materials

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- » SMALL FIRE:

- Water spray, dry chemical or CO2

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Section 5 - FIRE FIGHTING MEASURES

LARGE FIRE:

- Water spray or fog.

FIRE FIGHTING

- » - Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 100 metres in all directions.

FIRE/EXPLOSION HAZARD

- » - Non flammable liquid.
 - However vapour will burn when in contact with high temperature flame.
 - Ignition ceases on removal of flame.
 - May form a flammable / explosive mixture in an oxygen enriched atmosphere
 - Heating may cause expansion/vapourisation with violent rupture of containers
 - Decomposes on heating and produces corrosive fumes of hydrochloric acid, carbon monoxide and small amounts of toxic phosgene.
- Aerosol cans may explode on exposure to naked flames.

FIRE INCOMPATIBILITY

- » - Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result.

Personal Protective Equipment

Gas tight chemical resistant suit.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- » - Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Wear protective clothing, impervious gloves and safety glasses.
- Shut off all possible sources of ignition and increase ventilation.
- Wipe up.
- If safe, damaged cans should be placed in a container outdoors, away from all ignition sources, until pressure has dissipated.
- Undamaged cans should be gathered and stowed safely.

MAJOR SPILLS

- » - Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse / absorb vapour.
- Absorb or cover spill with sand, earth, inert materials or vermiculite.
- If safe, damaged cans should be placed in a container outdoors, away from ignition sources, until pressure

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Section 6 - ACCIDENTAL RELEASE MEASURES

has dissipated.

- Undamaged cans should be gathered and stowed safely.
- Collect residues and seal in labelled drums for disposal.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

trichloroethylene 5000ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

trichloroethylene 500ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:

trichloroethylene 100ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- » - Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- DO NOT incinerate or puncture aerosol cans.
- DO NOT spray directly on humans, exposed food or food utensils.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

- » - DO NOT use aluminium or galvanised containers.
- Aerosol dispenser.
- Check that containers are clearly labelled.

STORAGE INCOMPATIBILITY

- » Trichloroethylene:

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Section 7 - HANDLING AND STORAGE

- reacts violently with caustics (e.g. lye, potassium hydroxide, sodium hydroxide, etc.)
- produces spontaneously explosive dichloroacetylene in presence of caustics, epichlorohydrin, epoxides
- forms an explosive mixture with nitrogen tetroxide
- reacts violently with finely divided chemically active metals
- may undergo self-accelerating polymerisation in presence of magnesium, titanium, aluminium
- may ignite on contact with alkaline metal earths
- reacts explosively with sodium, potassium, lithium
- may decompose with formation of chlorine gas, hydrogen chloride gas and phosgene at high temperatures, in contact with hot metals, open flame and high intensity UV light
- slowly decomposes in light, in the presence of moisture, forming hydrochloric acid
- reacts, possibly violently, with aluminium tripropyl, antimony triethyl, antimony trimethyl, dimethylformamide, liquid oxygen, ozone, potassium nitrate, trimethylaluminium
- attacks metals, coatings, and plastics in presence of moisture
- attacks natural rubber
- may accumulate static charge and cause ignition of vapors

Avoid storage with strong oxidisers (particularly oxygen in gas or liquid form and nitrogen dioxide), strong bases, acetone, sodium/sodium-potassium alloys, zinc.

STORAGE REQUIREMENTS

» - Keep dry to avoid corrosion of cans. Corrosion may result in container perforation and internal pressure may eject contents of can.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³
New Zealand Workplace Exposure Standards (WES)	trichloroethylene (Trichloroethylene)	50	269	200	1,070
New Zealand Workplace Exposure Standards (WES)	carbon dioxide (Carbon dioxide)	5,000	9,000	30,000	54,000

MATERIAL DATA

» Not available. Refer to individual constituents.

INGREDIENT DATA

CARBON DIOXIDE:

TRICHLOROETHYLENE:

» These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise.

CR = Cancer Risk/10000; UF = Uncertainty factor:

TLV believed to be adequate to protect reproductive health:

LOD: Limit of detection

Toxic endpoints have also been identified as:

D = Developmental; R = Reproductive; TC = Transplacental carcinogen

Jankovic J., Drake F.: A Screening Method for Occupational Reproductive

American Industrial Hygiene Association Journal 57: 641-649 (1996).

TRICHLOROETHYLENE:

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

» for trichloroethylene:

Odour Threshold Value: 82 ppm (detection), 108 ppm (recognition)

NOTE: Detector tubes for trichloroethylene, measuring in excess of 10 ppm, are commercially available. Long-term measurements (4 hrs) may be conducted to detect concentrations exceeding 2.5 ppm.

Organs systems reported to be affected by excessive exposures of humans and animals to TCE are the central nervous system (CNS) (nausea, ataxia, headache, euphoria, analgesia, anaesthesia); liver (degeneration, hepatocellular carcinomas, mice only); kidney (degeneration); lung (oedema, tachypnea); heart (arrhythmias); skin (irritation, vesication) and paralysis of the fingers following immersion.

Exposure at or below the recommended TLV-TWA is thought to minimise the potential for headache, fatigue and irritability. A STEL has been advised to protect against incoordination and other anaesthetic effects. Control of concentrations to these limits should also provide a substantial margin of safety in the prevention of liver and other systemic damage. The lower limit (REL-TWA) recommended by NIOSH is based on acute central nervous system (CNS) effects, headache and fatigue observed in health hazard evaluations at levels of 25 ppm to 50 ppm and upon the potential for cancer in humans (hepatocellular carcinomas in mice exposed by chronic gastric lavage is cited).

Notes on Trichloroethylene Toxicity:

Concentration	Clinical Effects
100 ppm	Odour Threshold barely perceptible to the unacclimated
200 ppm	Odour apparent, not unpleasant; slight eye irritation
400 ppm (3 hours)	Odour very definite, not unpleasant; slight eye irritation and minimal light-headedness
1000-1200 ppm (6 min)	Very strong odour, unpleasant; definite eye and nasal irritation with light-headedness and dizziness
2000 ppm (5 min)	Odour very strong, not tolerable; marked eye and respiratory irritation with drowsiness, dizziness and nausea.

Odour Safety Factor(OSF)

OSF=1.8 (TRICHLOROETHYLENE).

CARBON DIOXIDE:

» May act as a simple asphyxiants; these are gases which, when present in high concentrations, reduce the oxygen content in air below that required to support breathing, consciousness and life; loss of consciousness, with death by suffocation may rapidly occur in an oxygen deficient atmosphere.

CARE: Most simple asphyxiants are odourless or possess low odour and there is no warning on entry into an oxygen deficient atmosphere. If there is any doubt, oxygen content can be checked simply and quickly. It may not be appropriate to only recommend an exposure standard for simple asphyxiants rather it is essential that sufficient oxygen be maintained. Air normally has 21 percent oxygen by volume, with 18 percent regarded as minimum under normal atmospheric pressure to maintain consciousness / life. At pressures significantly higher or lower than normal atmospheric pressure, expert guidance should be sought.

For carbon dioxide:

NOTE: Detector tubes for carbon dioxide, measuring in excess of 0.01 % vol., are commercially available. Long-term measurements (4 hrs) may be conducted to detect concentrations exceeding 250 ppm.

Studies using physically fit males in confined spaces indicate the TLV-TWA and STEL provides a wide margin of safety against asphyxiation and from undue metabolic stress, provided normal amounts of oxygen are present in inhaled air. Lowered oxygen content, increased physical activity and prolonged exposures each impact on systemic and respiratory effects.

Stimulation of the respiratory centre is produced at 50,000 ppm (5%). The gas is weakly narcotic at 30,000 ppm giving rise to reduced acuity of hearing and increasing blood pressure and pulse, Persons exposed a 20,000 ppm for several hours developed headaches and dyspnea on mild exertion, Acidosis and adrenal cortical exhaustion occurred as a result of prolonged continuous exposure at 10,000-20,000 ppm.

Intoxication occurs after a 30 minute exposure at 50,000 ppm whilst exposure at 70,000-100,000 ppm produces unconsciousness within a few minutes.

Odour Safety Factor (OSF)

OSF=0.068 (CARBON DIOXIDE).

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

PERSONAL PROTECTION

EYE

» No special equipment for minor exposure i.e. when handling small quantities.

OTHERWISE: For potentially moderate or heavy exposures:

- Safety glasses with side shields.

- NOTE: Contact lenses pose a special hazard; soft lenses may absorb irritants and ALL lenses concentrate them.

HANDS/FEET

» - No special equipment needed when handling small quantities.

- OTHERWISE:

- For potentially moderate exposures:

- Wear general protective gloves, eg. light weight rubber gloves.

- For potentially heavy exposures:

- Wear chemical protective gloves, eg. PVC. and safety footwear.

OTHER

» No special equipment needed when handling small quantities.

OTHERWISE:

- Overalls.

- Skin cleansing cream.

- Eyewash unit.

- Do not spray on hot surfaces.

RESPIRATOR

» Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	A- AUS	-
1000	50	-	A- AUS
5000	50	Airline *	-
5000	100	-	A- 2
10000	100	-	A- 3
	100+		Airline**

* - Continuous Flow

** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

» General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in specific circumstances. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Clear colorless liquid with sweet odour; does not mix with water.

PHYSICAL PROPERTIES

Liquid.

Gas.

Does not mix with water.

Sinks in water.

Molecular Weight: Not available

Melting Range (°C): Not available

Solubility in water (g/L): Immiscible

pH (1% solution): Not available

Volatile Component (%vol): 100

Relative Vapour Density (air=1): 4.5

Lower Explosive Limit (%): 8.0

Autoignition Temp (°C): >420

State: Liquid

Boiling Range (°C): 86.7

Specific Gravity (water= 1): 1.45

pH (as supplied): Not available

Vapour Pressure (kPa): 58

Evaporation Rate: 0.1 BuAC = 1

Flash Point (°C): Not applicable

Upper Explosive Limit (%): 10.5

Decomposition Temp (°C): Not available

Viscosity: Not Available

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

» - Presence of incompatible materials.

- Product is considered stable.

- Hazardous polymerisation will not occur.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

» The liquid is highly discomforting.

» Accidental ingestion of the material may be damaging to the health of the individual.

» Ingestion may result in nausea, abdominal irritation, pain and vomiting.

» At sufficiently high doses the material may be nephrotoxic(i.e. poisonous to the kidney).

» At sufficiently high doses the material may be hepatotoxic(i.e. poisonous to the liver).

EYE

» This material can cause eye irritation and damage in some persons.

» The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

SKIN

» This material can cause inflammation of the skin on contact in some persons.

» The material may cause severe skin irritation after prolonged or repeated exposure and may produce on

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Section 11 - TOXICOLOGICAL INFORMATION

contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.

» Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.

INHALED

» The vapour is mildly discomforting.

» Inhalation hazard is increased at higher temperatures.

» Anaesthetics and narcotic effects (with dulling of senses and odour fatigue) are a consequence of exposure to chlorinated solvents.

Individual response varies widely; odour may not be considered objectionable at levels which quickly induce central nervous system effects. High vapour concentrations may give a feeling of euphoria. This may result in reduced responses, followed by rapid onset of unconsciousness, possible respiratory arrest and death.

» If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death.

» **WARNING:** Intentional misuse by concentrating/inhaling contents may be lethal.

CHRONIC HEALTH EFFECTS

» There is ample evidence that this material can be regarded as being able to cause cancer in humans based on experiments and other information.

» Strong evidence exists that this substance may cause irreversible mutations (though not lethal) even following a single exposure.

Chronic effects of exposure to TCE include fatigue, headache, irritability, vomiting, skin flush and intolerance to alcohol. Liver, kidney, heart and neurological damage may also result from chronic overexposure.

Alcohol intake may increase the toxic effects of the material.

TOXICITY AND IRRITATION

» Not available. Refer to individual constituents.

TRICHLOROETHYLENE:

» unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

Oral (human) LDLo: 7000 mg/kg

Oral (man) TDLo: 2143 mg/kg

Oral (rat) LD50: 5650 mg/kg

Inhalation (man) LCLo: 2900 ppm

Inhalation (human) TDLo: 812 mg/kg

Inhalation (human) TCLo: 6900 mg/m³/10 m

Inhalation (man) TCLo: 2900 ppm

Inhalation (man) TCLo: 110 ppm/8h

Inhalation (man) TCLo: 160 ppm/83 m

» The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.

for trichloroethylene:

Inhalation effects: Humans have died from breathing high concentrations of trichloroethylene fumes. Most of the reported deaths have been associated with accidental breathing of unusually high levels of trichloroethylene vapors in the workplace, often during its use in degreasing operations. These studies usually attributed death to ventricular fibrillation or central nervous system depression, since gross post-mortem abnormalities were not apparent. A number of the deaths occurred after the trichloroethylene exposure ended and involved physical exertion that may have contributed to the sudden deaths. Death associated with liver damage has also been reported in persons occupationally exposed to trichloroethylene for intermediate and chronic durations, followed by a high acute-duration exposure. Animal experimentation has revealed inhaled concentrations that result in death following acute, intermediate, and chronic exposure. Death was often caused by the central nervous system depression that occurs with very high exposure levels.

IRRITATION

Skin(rabbit): 500 mg/24h - SEVERE

Eye(rabbit): 20 mg/24h - SEVERE

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Section 11 - TOXICOLOGICAL INFORMATION

Cardiovascular effects: High doses of hydrocarbons such as trichloroethylene could act upon the heart to cause cardiac sensitization to catecholamines. This is supported by animal studies. For example, dogs rabbits exposed to very high concentrations of trichloroethylene (5,000 or 10,000 ppm, and 3,000 ppm, respectively) for .1 hour showed increased arrhythmias when injected intravenously with epinephrine (adrenaline) . In animals, trichloroethylene itself, rather than its metabolites, is apparently responsible for the cardiac sensitization because chemicals that inhibit the metabolism of trichloroethylene increase its potency, while chemicals that enhance the metabolism of trichloroethylene decrease its potency.**Gastrointestinal Effects:**Case reports indicate that acute inhalation exposure to trichloroethylene results in nausea and vomiting Anorexia, nausea, and vomiting have also been reported as chronic effects of occupational exposure to trichloroethylene. The exposure levels were not measured. Anorexia and vomiting were reported in a woman chronically exposed to occupational levels between 40 and 800 ppm . Trichloroethylene-induced effects on the autonomic nervous system may contribute to these effects. Cases of pneumatosis cystoides intestinalis (a rare condition characterised by gas-filled cysts in the submucosa of the small intestine) seen in Japanese lens cleaners and polishers were attributed to trichloroethylene exposure in the workplace.

Hepatic Effects. There is some evidence for trichloroethylene-induced hepatotoxic effects in humans. However, much of this information is limited by the fact that the exposure levels associated with these effects were usually not reported, and the individuals may have been exposed to other substances as well.

Renal Effects. Trichloroethylene may have effects in the kidney; however, studies in humans are limited by having poor or no exposure data and by concomitant exposure to other chemicals. There was no evidence of kidney damage in 250 neurosurgery patients who underwent prolonged trichloroethylene anaesthesia women who had caesarean sections and were exposed to trichloroethylene anaesthesia. There are few reports renal dysfunction in workers exposed to trichloroethylene. Exposure of rats to extremely high levels (1,000 ppm or higher) for periods of less than 1 day led to the dysfunction of the tubular and glomerular regions of the nephron, as indicated by increases in urinary glucose, proteins, glucosaminidase, gamma glutamyl transpeptidase, and serum urea nitrogen.

Dermal Effects. Stevens-Johnson syndrome, a severe erythema, was seen in five people occupationally exposed to trichloroethylene for 2-5 weeks at levels ranging from 19 to 164 ppm . The study authors suggested that the erythema was caused by a hypersensitivity reaction to trichloroethylene. An exfoliative dermatitis and scleroderma, also thought to have an immune component, have been reported in persons occupationally exposed to trichloroethylene.

Neurological Effects: Trichloroethylene has been used as a surgical anesthetic (Hewer 1943). Some patients were reported to have experienced trigeminal neuropathy following anesthesia using trichloroethylene in association with soda-lime. The reaction of trichloroethylene with the soda-lime was thought to have produced dichloroacetylene which triggered neuropathies in 13 patients over a 4-month period in a county hospital. No new cases were discovered for 3 months after the discontinuation of the use of soda-lime.

Acute exposure to trichloroethylene and its decomposition products (e.g., dichloroacetylene) has also led to residual neuropathy, characterized by nerve damage. This neuropathy is characterized by facial numbness, jaw weakness, and facial discomfort (indicating damage to cranial nerves V and VII) which can persist for several months . Chronic exposure in the workplace has also been associated with damage to the cranial nerves in several cases . Persons who have died from overexposure have shown degeneration of cranial nuclei in the brain stem). Some of these effects may be attributed to dichloroacetylene, a decomposition product of trichloroethylene, which may form under nonbiological conditions of heat or alkalinity.

Intermediate and chronic exposures of workers to trichloroethylene have produced neurological effects similar to those found in acute exposure situations. Workers chronically exposed to levels between 38 and 172 ppm reported symptoms of sleepiness, dizziness, headache, and nausea, but no apparent trigeminal nerve disorders. Other reported neurological effects of chronic occupational exposure to unquantified trichloroethylene levels include memory loss mood swings , trigeminal neuropathy.

Reproductive Effects: Increases in miscarriages have been reported among nurses exposed to unspecified concentrations of trichloroethylene and other chemicals in operating rooms. The occurrence of miscarriages could not conclusively be attributed to trichloroethylene because there was concomitant exposure to other chemicals. A retrospective case-control study conducted in humans compared spontaneous abortion rates among women who had been exposed occupationally or non-occupationally to trichloroethylene and other solvents to rates among women without solvent exposure . The authors observed approximately three times the risk of spontaneous abortion with exposure to trichloroethylene. This risk increased further when women with less than a half hour of exposure to trichloroethylene each week were excluded from the analysis. However, a consistent dose-response relationship was not observed, and most of the women were exposed to a variety of solvents, not just trichloroethylene.

Developmental Effects: No increase in malformed babies was observed among approximately 2,000 fathers and

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Section 11 - TOXICOLOGICAL INFORMATION

mothers exposed to unspecified concentrations of trichloroethylene in the workplace. A retrospective case-control study conducted in humans compared spontaneous abortion rates among women who had been exposed occupationally or nonoccupationally to trichloroethylene and other solvents to rates among women without solvent exposure. The authors observed about a 3-fold increase in risk of spontaneous abortion associated with exposure to trichloroethylene (TCE). This risk increased further when women with less than 1/2 hour of exposure to TCE per week were excluded from the analysis. However, a consistent dose-response relationship was not observed and most of the women were exposed to a variety of solvents other than TCE. In this same study, the relationship between exposure to halogenated solvents during the first 20 weeks of pregnancy and fetal growth were examined. No association between exposure to solvents and decreased fetal growth was observed. However, the number of small infants was too low to specifically analyze TCE exposures and most fetal growth would occur after the first 20 weeks of pregnancy.

Pregnant laboratory animals have been exposed to trichloroethylene vapors, but no conclusive studies have been encountered that clearly indicate teratogenic effects. Available data from animals suggest that the conceptus is not uniquely susceptible to trichloroethylene.

Genotoxic Effects: Investigations into the genotoxicity of trichloroethylene in humans have not been conclusive but are suggestive of clastogenic effects. A study of chromosomal aberrations among trichloroethylene-exposed workers detected an increase in hypodiploid cells but found no evidence of chromosomal breaks in lymphocytes. men using trichloroethylene as a degreasing agent were tested for lymphocyte chromosomal abnormalities- specifically, breaks, gaps, deletions, inversions, translocations, and hyperdiploidy. The same study also investigated the rate of nondisjunction for the Y chromosome in sperm. Positive results were observed for chromosomal aberrations and hyperdiploid cells, but the results were negative for chromosomal nondisjunction. Some authors suggest that smoking and trichloroethylene exposure may act together to produce increased sister chromatid exchange frequencies.

Carcinogenicity: Three European studies have found slight but statistically significant increases in cancer in workers exposed to trichloroethylene. A survey of Finnish workers exposed to primarily trichloroethylene found an association of limited statistical significance between exposure and incidence of stomach, liver, prostate, and lymphohematopoietic cancers.

A significant association between workplace exposure to trichloroethylene and kidney cancer was found in a retrospective cohort study of German cardboard factory workers. In a study of Swedish workers, a statistically significant increase in non-Hodgkin's lymphoma was observed. These workers were exposed to solvents in addition to trichloroethylene, and exposures were self-reported. A study of dry cleaners found a significant increase in the incidence of all malignant neoplasms combined as well as increased incidences of cancer at several sites (lung/bronchus/trachea, cervix, and skin).

Some laboratory studies with rats and mice have linked trichloroethylene exposure to various types of cancers. Several of these studies, however, should be viewed cautiously, since the tumorigenic activity might be influenced by the presence of direct-acting compounds, namely the epoxides (e.g., epichlorohydrin) added as stabilizers in trichloroethylene. Epoxides are known to be very reactive, and some, such as epichlorohydrin, are potent carcinogens themselves.

CARBON DIOXIDE:

» unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY

Inhalation (rat) LCLo: 657190 ppm/15 m
Inhalation (human) TCLo: 2000 ppm
Inhalation (human) LCLo: 9 pph/5 m (9%)
- pulmonary effects
IDLH: 50,000 ppm

IRRITATION

CARCINOGEN

trichloroethylene	International Agency for Research on Cancer (IARC) Carcinogens	Group	2A
-------------------	--	-------	----

REPROTOXIN

trichloroethylene	ILO Chemicals in the electronics industry that have toxic effects on reproduction	Reduced fertility or sterility	H si
carbon dioxide	ILO Chemicals in the electronics industry	Reduced fertility or	

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that have toxic effects on reproduction

sterility

Section 12 - ECOLOGICAL INFORMATION

Marine Pollutant: Not Determined

» DO NOT discharge into sewer or waterways.
Refer to data for ingredients, which follows:

TRICHLOROETHYLENE:

» Hazardous Air Pollutant:	Yes
» Fish LC50 (96hr.) (mg/l):	40.7- 66.8
» Algae IC50 (72hr.) (mg/l):	63- 1000
» log Kow (Sangster 1997):	2.42
» Half- life Soil - High (hours):	8640
» Half- life Soil - Low (hours):	4320
» Half- life Air - High (hours):	272
» Half- life Air - Low (hours):	27
» Half- life Surface water - High (hours):	8640
» Half- life Surface water - Low (hours):	4320
» Half- life Ground water - High (hours):	39672
» Half- life Ground water - Low (hours):	7704
» Aqueous biodegradation - Aerobic - High (hours):	8640
» Aqueous biodegradation - Aerobic - Low (hours):	4320
» Aqueous biodegradation - Anaerobic - High (hours):	39672
» Aqueous biodegradation - Anaerobic - Low (hours):	2352
» Photooxidation half- life air - High (hours):	272
» Photooxidation half- life air - Low (hours):	27
» First order hydrolysis half- life (hours):	7704

» Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

» Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters. Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

» for trichloroethylene:

log Kow : 2.2-3.3

log Koc : 2

Koc : 87-150

Henry's atm m³ /mol: 0.0103

BCF : 17-1160

Drinking Water Standards:

trichloroethylene: 30 mg/l (UK max.)

70 mg/l (WHO provisional guideline)

hydrocarbon total: 10 ug/l (UK max.)

Soil Guidelines: Dutch Criteria:

0.001 mg/kg (target)

60 mg/kg (intervention)

Air Quality Standards:

1 mg/m³ averaging time 24 hours (WHO Guideline)

Trichloroethylene quickly reacts in air, especially under smog conditions; atmospheric residence time is up to 5 days. Phosgene, dichloroacetylchloride, and formyl chloride may form.

Photo-oxidative degradation may occur (half-life 7 days). The relatively short predicted half-life of trichloroethylene in the atmosphere indicates that long-range global transport is unlikely. However, its constant release, as well as its role as an intermediate in tetrachloroethylene degradation, may account for its persistence and the fact that trichloroethylene is often present in remote areas.

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The Henry's law constant value of 2.0×10^{-2} atm-m³/mol at 20 C suggests that trichloroethylene partitions rapidly to the atmosphere from surface water. The major route of removal of trichloroethylene from water is volatilisation. Although volatilisation is rapid, actual volatilization rates are dependent upon temperature, water movement and depth, associated air movement, and other factors.

Soil: The majority of trichloroethylene present on soil surfaces will volatilise to the atmosphere or leach into the subsurface. Once trichloroethylene leaches into the soil, it appears not to become chemically transformed or undergo covalent bonding with soil components. Because trichloroethylene is a dense nonaqueous phase liquid, it can move through the unsaturated zone into the saturated zone where it can displace soil pore water.

Volatilisation of trichloroethylene from soil is slower than it is from water but more rapid than that of many other volatile organic compounds. One study found that an average of 37% of the applied trichloroethylene was volatilized 168 hours after treatment at 12 C and 45% was volatilised at 21 C. Sorption of organic compounds to soil has been found to be most reliably predicted when related to the organic carbon content of the soil. The components of soil organic matter had widely varying affinities for trichloroethylene, with the fats-waxes-resins fraction ($K_{oc} = 460$) being responsible for stronger adsorption of trichloroethylene. The calculated K_{oc} values are indicative of medium-to-high mobility in soil. Others have also shown that trichloroethylene is highly mobile in sandy soil. Another study comparing predicted and observed sorption on clay and organic soils suggested that sorption/desorption to inorganic mineral surfaces may also play a role, and the reactions generally follow reversible pseudo first-order kinetics. Sorption of trichloroethylene to the surfaces of soil particles, which may decrease its transport and bioavailability, is dependent on soil moisture content, since polar water molecules will compete aggressively with nonpolar vapor phase trichloroethylene for polar sorption sites. This has been experimentally confirmed with real soil samples, in which it was found that the solid/vapor partition coefficient decreased dramatically with increased moisture content.

Accurate prediction of trichloroethylene transport in groundwater is complicated by the sorption effect of organic and inorganic solids.

It has been shown that the biodegradation of trichloroethylene in soil increases with the organic content of the soil. There is evidence that trichloroethylene may inhibit total soil biomass and fungi, possibly resulting in the inhibition of microbial transformation processes. However, the same authors observed an increase in anaerobic and specialised aerobic bacteria, which might indicate an opportunistic response to a suitable substrate by these microorganisms. Degradation of trichloroethylene by anaerobes via reductive dehalogenation can be problematic because a common product is vinyl chloride, a known carcinogen. Microbial activity is greater in vegetated soils and that trichloroethylene degradation occurs faster in the vegetated than in the non vegetated soils. An anaerobic bacterium that dechlorinates tetrachloroethylene and trichloroethylene to ethylene using hydrogen as the electron donor has been isolated. The isolated strain did not appear to belong to any presently known genus or species.

Methane-utilizing bacteria were shown to aerobically degrade trichloroethylene to carbon dioxide in soil columns perfused with natural gas within 2 weeks. A possible reason for the persistence of trichloroethylene in the environment despite these natural decomposition processes lies in the sensitive balance which must be maintained between enough co-substrate to induce the degrading enzymes and too much co-substrate, which could outcompete the trichloroethylene and inhibit its decomposition. Such balance may rarely be achieved in nature.

Bioaccumulation: Experimentally measured bioconcentration factors (BCFs), which provide an indication of the tendency of a chemical to partition to the fatty tissue of organisms, have been found to range between 10 and 100 for trichloroethylene in fish. Somewhat lower BCFs were determined for blue mussel (4.52) and killifish (2.71). These numbers are suggestive of a low tendency to bioaccumulate.

Trichloroethylene has also been detected in small amounts in fruits and vegetables, suggesting a potential for bioconcentration in plants. Laboratory studies with carrot and radish plants and radioactively labelled trichloroethylene revealed that uptake occurred mainly through the foliage as opposed to the roots in these plants, although subsequent translocation resulted in substantial distribution throughout the plants. The study authors determined fairly moderate BCFs of between 4.4 and 63.9.

Air: The dominant transformation process for trichloroethylene in the atmosphere is reaction with photochemically produced hydroxyl radicals. Using the recommended rate constant for this reaction at 25 C (2.36×10^{12} cm³/molecule-second) and a typical atmospheric hydroxyl radical concentration (5×10^5 molecules/cm³), the half-life can be estimated to be 6.8 days. It should be noted that the half-lives determined by assuming first-order kinetics represent the calculated time for loss of the first 50% of trichloroethylene; the time required for the loss of the remaining 50% may be substantially longer. The reaction of volatile chlorinated hydrocarbons with hydroxyl radicals is temperature dependent and thus varies with the seasons, although such variation in the atmospheric concentration of trichloroethylene may be minimal because of its brief residence time. The degradation products of this reaction include phosgene,

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dichloroacetyl chloride, and formyl chloride. Reaction of trichloroethylene with ozone in the atmosphere is too slow to be an effective agent in trichloroethylene removal.

Water: Oxidation of trichloroethylene in the aquatic environment does not appear to be a significant fate process, probably because of its having already been oxidised by the chlorine atoms. The rate of hydrolysis is also too slow to be an important transformation process. One study indicated that the rate of volatilisation of trichloroethylene proceeds more rapidly than photooxidation or hydrolysis. Chemical hydrolysis appeared to occur only at elevated temperature in a high pH environment and, even then, at a very slow rate. Studies of the degradation of trichloroethylene in water during ultraviolet irradiation indicated that degradation decreased with increases in the total organic content of the water.

Biotransformation was also strongly indicated as a factor in the degradation of trichloroethylene in a case of soil and groundwater pollution. Since neither biodegradation nor hydrolysis occurs at a rapid rate, most trichloroethylene present in surface waters can be expected to volatilize into the atmosphere. However, because trichloroethylene is denser than and only moderately soluble in water, that which is not immediately volatilized may be expected to submerge and thus be removed from contact with the surface.

» Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect human health. The potential for surfaces in an enclosed space to facilitate reactions should be considered.

Source of unsaturated substances	Unsaturated substances (Reactive Emissions)	Major Stable Products produced following reaction with ozone.
Occupants (exhaled breath, ski oils, personal care products)	Isoprene, nitric oxide, squalene, unsaturated sterols, oleic acid and other unsaturated fatty acids, unsaturated oxidation products	Methacrolein, methyl vinyl ketone, nitrogen dioxide, acetone, 6MHQ, geranyl acetone, 4OPA, formaldehyde, nonanol, decanal, 9- oxo- nonanoic acid, azelaic acid, nonanoic acid.
Soft woods, wood flooring, including cypress, cedar and silver fir boards, houseplants	Isoprene, limonene, alpha-pinene, other terpenes and sesquiterpenes	Formaldehyde, 4- AMC, pinoaldehyde, pinic acid, pinonic acid, formic acid, methacrolein, methyl vinyl ketone, SOAs including ultrafine particles
Carpets and carpet backing	4- Phenylcyclohexene, 4-vinylcyclohexene, styrene, 2-ethylhexyl acrylate, unsaturated fatty acids and esters	Formaldehyde, acetaldehyde, benzaldehyde, hexanal, nonanal, 2- nonenal
Linoleum and paints/polishes containing linseed oil	Linoleic acid, linolenic acid	Propanal, hexanal, nonanal, 2-heptenal, 2- nonenal, 2-decenal, 1- pentene- 3- one, propionic acid, n- butyric acid
Latex paint Certain cleaning products, polishes, waxes, air fresheners	Residual monomers Limonene, alpha- pinene, terpinolene, alpha- terpineol, linalool, linalyl acetate and other terpenoids, longifolene and other sesquiterpenes	Formaldehyde Formaldehyde, acetaldehyde, glycoaldehyde, formic acid, acetic acid, hydrogen and organic peroxides, acetone, benzaldehyde, 4- hydroxy- 4-methyl- 5- hexen- 1- al, 5-ethenyl- dihydro- 5- methyl- 2(3H)- furanone, 4- AMC, SOAs including ultrafine particles
Natural rubber adhesive	Isoprene, terpenes	Formaldehyde, methacrolein, methyl vinyl ketone
Photocopier toner, printed paper, styrene polymers	Styrene	Formaldehyde, benzaldehyde
Environmental tobacco smoke	Styrene, acrolein, nicotine	Formaldehyde, benzaldehyde, hexanal, glyoxal, N-methylformamide, nicotinaldehyde, cotinine

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Soiled clothing, fabrics, bedding	Squalene, unsaturated sterols, oleic acid and other saturated fatty acids	Acetone, geranyl acetone, 6MHO, 40PA, formaldehyde, nonanal, decanal, 9- oxo- nonanoic acid, azelaic acid, nonanoic acid
Soiled particle filters	Unsaturated fatty acids from plant waxes, leaf litter, and other vegetative debris; soot; diesel particles	Formaldehyde, nonanal, and other aldehydes; azelaic acid; nonanoic acid; 9- oxo- nonanoic acid and other oxo- acids; compounds with mixed functional groups (=O, - OH, and - COOH) C5 to C10 aldehydes
Ventilation ducts and duct liners	Unsaturated fatty acids and esters, unsaturated oils, neoprene	
" Urban grime"	Polycyclic aromatic hydrocarbons	Oxidized polycyclic aromatic hydrocarbons
Perfumes, colognes, essential oils (e.g. lavender, eucalyptus, tea tree)	Limonene, alpha- pinene, linalool, linalyl acetate, terpinene- 4- ol, gamma- terpinene	Formaldehyde, 4- AMC, acetone, 4- hydroxy- 4- methyl- 5- hexen- 1- al, 5- ethenyl- dihydro- 5- methyl- 2(3H) furanone, SOAs including ultrafine particles
Overall home emissions	Limonene, alpha- pinene, styrene	Formaldehyde, 4- AMC, pinonaldehyde, acetone, pinic acid, pinonic acid, formic acid, benzaldehyde, SOAs including ultrafine particles

Abbreviations: 4-AMC, 4-acetyl-1-methylcyclohexene; 6MHQ, 6-methyl-5-heptene-2-one, 4OPA, 4-oxopentanal, SOA, Secondary Organic Aerosols

Reference: Charles J Weschler; Environmental Health Perspectives, Vol 114, October 2006.

CARBON DIOXIDE:

» log Kow (Sangster 1997): 0.83

» For carbon dioxide:

Environmental fate:

Carbon dioxide in earth's atmosphere is considered a trace gas currently occurring at an average concentration of about 385 parts per million by volume or 582 parts per million by mass. The mass of the Earth atmosphere is 5.14×10^{18} kg, so the total mass of atmospheric carbon dioxide is 3.0×10^{15} kg (3,000 gigatonnes). Atmospheric concentrations of carbon dioxide fluctuate slightly with the change of the seasons, driven primarily by seasonal plant growth.

Due to human activities such as the combustion of fossil fuels and deforestation, the concentration of atmospheric carbon dioxide has increased by about 35% since preindustrial times. In 1999, 2,244,804,000 ($\approx 2.2 \times 10^9$) metric tons of CO₂ were produced in the U.S. as a result of electric energy generation. This is an output rate of 0.6083 kg (1.341 pounds) per kWh.

There is about 50 times as much carbon dissolved in the oceans in the form of CO₂ and CO₂ hydration products as exists in the atmosphere. The oceans act as an enormous carbon sink, having "absorbed about one-third of all human-generated CO₂ emissions to date." Generally, gas solubility decreases as water temperature increases. Accordingly the ability of the oceans to absorb carbon dioxide from the atmosphere decreases as ocean temperatures rise.

Carbon dioxide is soluble in water, in which it spontaneously interconverts between CO₂ and H₂CO₃ (carbonic acid). The relative concentrations of CO₂, H₂CO₃, and the deprotonated forms HCO₃⁻ (bicarbonate) and CO₃²⁻ (carbonate) depend on the pH. In neutral or slightly alkaline water (pH > 6.5), the bicarbonate form predominates (>50%) becoming the most prevalent (>95%) at the pH of seawater, while in very alkaline water (pH > 10.4) the predominant (>50%) form is carbonate. The bicarbonate and carbonate forms are very soluble, such that air-equilibrated ocean water (mildly alkaline with typical pH = 8.2 - 8.5) contains about 120 mg of bicarbonate per liter.

Most of the CO₂ taken up by the ocean forms carbonic acid. Some is consumed in photosynthesis by organisms in the water, and a small proportion of that sinks and leaves the carbon cycle. There is considerable concern that as a result of increased CO₂ in the atmosphere the acidity of seawater has been increasing and may

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adversely affect organisms living in the water. In particular, with increasing acidity, the availability of carbonates for forming shells decreases.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
LPS HDX		No data		
trichloroethylene		No data	LOW	HIGH
carbon dioxide		No data	LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

- » - Consult State Land Waste Management Authority for disposal.
- Discharge contents of damaged aerosol cans at an approved site.
- Allow small quantities to evaporate.
- DO NOT incinerate or puncture aerosol cans.
- Bury residues and emptied aerosol cans at an approved site.

Section 14 - TRANSPORTATION INFORMATION



Labels Required: NON-FLAMMABLE COMPRESSED GAS, TOXIC

HAZCHEM: (1) Not applicable to the carriage of dangerous goods under RID or ADR

Land Transport UNDG:

Class or division:	2	Subsidiary risk:	None
UN No.:	1950	UN packing group:	None
Shipping Name:	AEROSOLS		

Air Transport IATA:

ICAO/IATA Class:	2.2	ICAO/IATA Subrisk:	6.1
UN/ID Number:	1950	Packing Group:	None
Special provisions:	A1 A145 A153		
Cargo Only			
Packing Instructions:	212	Maximum Qty/Pack:	50 kg
Passenger and Cargo		Passenger and Cargo	
Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden
Passenger and Cargo		Passenger and Cargo	
Limited Quantity		Limited Quantity	
Packing Instructions:	-	Maximum Qty/Pack:	-
Shipping Name:	AEROSOLS, NON-FLAMMABLE (TEAR GAS DEVICES)		

Maritime Transport IMDG:

IMDG Class:	2.2	IMDG Subrisk:	SP63
UN Number:	1950	Packing Group:	None
EMS Number:	F- D, S- U	Special provisions:	63 190 277 327 959
Limited Quantities:	See SP277	Marine Pollutant:	Not Determined
Shipping Name:	AEROSOLS		

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Section 15 - REGULATORY INFORMATION

REGULATIONS

LPS HDX (CAS: None):
No regulations applicable

Regulations for ingredients

trichloroethylene (CAS: 79-01-6) is found on the following regulatory lists;
GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships
IMO IBC Code Chapter 17: Summary of minimum requirements
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
International Agency for Research on Cancer (IARC) Carcinogens
International Chemical Secretariat (ChemSec) REACH SIN* List (*Substitute It Now!) 1.0
New Zealand Biological Exposure Indices
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Hazardous Substances Register
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Scheduled Toxic Substances
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Workplace Exposure Standards (WES)
OECD Representative List of High Production Volume (HPV) Chemicals
WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water

carbon dioxide (CAS: 124-38-9) is found on the following regulatory lists;
CODEX General Standard for Food Additives (GSFA) - Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Dangerous Goods
New Zealand Hazardous Substances and New Organisms (HSNO) Act - Hazardous Substances Register
New Zealand Inventory of Chemicals (NZIoC)
New Zealand Workplace Exposure Standards (WES)
OECD Representative List of High Production Volume (HPV) Chemicals

Specific advice on controls required for materials used in New Zealand can be found at
<http://www.ermanz.govt.nz/search/registers.html>

Section 16 - OTHER INFORMATION

NEW ZEALAND POISONS INFORMATION CENTRE

0800 POISON (0800 764 766)

NZ EMERGENCY SERVICES: 111

REPRODUCTIVE HEALTH GUIDELINES

» Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
trichloroethyl ene	5.5 mg/m ³	100	D	NA	-
carbon dioxide	1800 mg/m ³	10	D/R	NA	-

» These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise.

CR = Cancer Risk/10000; UF = Uncertainty factor:

TLV believed to be adequate to protect reproductive health:

LOD: Limit of detection

Toxic endpoints have also been identified as:

D = Developmental; R = Reproductive; TC = Transplacental carcinogen
Jankovic J., Drake F.: A Screening Method for Occupational Reproductive
American Industrial Hygiene Association Journal 57: 641-649 (1996).

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» Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net/references.

» The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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Print Date: 9-Jul-2009