

# Paraldehyde

sc-250650

Material Safety Data Sheet



The Power is Question

Hazard Alert Code Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

Paraldehyde

### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

### NFPA



### SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

2145 Delaware Ave

Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: CHEMWATCH: From within the US and Canada:

877-715-9305

Emergency Tel: From outside the US and Canada: +800 2436 2255

(1-800-CHEMCALL) or call +613 9573 3112

### PRODUCT USE

Substitute for acetaldehyde, rubber accelerators, rubber antioxidants, synthetic organic chemicals, dyestuff intermediates, solvent for fats, oils, waxes, gums, resins; leather, solvent mixture for cellulose derivatives, sedative (hypnotic).

### SYNONYMS

C6-H12-O3, paraacetaldehyde, PCHO, paracetaldehyde, triacetaldehyde, "2, 4, 6-trimethyl-s-trioxane", "2, 4, 6-trimethyl-s-trioxane", "2, 4, 6-trimethyl-1, 3, 5-trioxane", "2, 4, 6-trimethyl-1, 3, 5-trioxane", s-trimethyltrioxymethylene, s-trimethyltrioxymethylene, "acetaldehyde, trimer", "s-trioxane, 2, 4, 6-trimethyl-", "s-trioxane, 2, 4, 6-trimethyl-", elaldehyde, paral, paraldeide

## Section 2 - HAZARDS IDENTIFICATION

### CANADIAN WHMIS SYMBOLS



### EMERGENCY OVERVIEW

#### RISK

Harmful if swallowed.

Irritating to eyes.

HARMFUL - May cause lung damage if swallowed.  
Highly flammable.

## POTENTIAL HEALTH EFFECTS

### ACUTE HEALTH EFFECTS

#### SWALLOWED

- Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.
- Considered an unlikely route of entry in commercial/industrial environments.
- Persons exposed to this material at work are liable to the same side effects as those taking this material in supervised conditions. Persons with a psychiatric history taking drugs should be monitored carefully as they are more prone to dependence and addiction. Side effects of sleeping medication include drowsiness, dizziness, light-headedness and inco-ordination and alcohol can increase them. Drug dependency can occur after a few weeks of nightly administration. Withdrawal of the drug is associated with a range of unpleasant effects and severity; it can also cause rebound insomnia where the symptoms are worse than before. Rarely, behavior changes may follow administration of sleeping drugs. If used late in pregnancy it can sedate the fetus.

#### EYE

- This material can cause eye irritation and damage in some persons.
- The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

#### SKIN

- The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.
- The material may cause 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.

#### INHALED






- The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.
- Inhalation hazard is increased at higher temperatures.
- Inhalation of vapor may aggravate a pre-existing respiratory condition.
- Exposure to aldehydes causes neurological symptoms such as headache, drowsiness, dizziness, seizures, depression and coma. Cardiovascular involvement may result in increased heart rate, collapse and low blood pressure; respiratory effects include throat spasms, irritation, difficulty swallowing, pulmonary edema and an asthma-like condition. Gastrointestinal signs include nausea, blood in vomit, diarrhea, ulcers and abdominal pain. Massive exposures may damage the kidney and liver.

### CHRONIC HEALTH EFFECTS

- Principal routes of exposure are by accidental skin and eye contact and by inhalation of vapors especially at higher temperatures. Babies born to mothers taking sedatives/hypnotics may show withdrawal symptoms from the drug in the weeks after birth. Loss of muscle tone in these babies has also been noted. Abuse may lead to habituation or addiction.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

### HAZARD RATINGS

	Min	Max	
Flammability:	3		
Toxicity:	2		
Body Contact:	2		
Reactivity:	1		
Chronic:	2		
			Min/Nil=0 Low=1 Moderate=2 High=3 Extreme=4



NAME	CAS RN	%
paraldehyde	123-63-7	>99
decomposes on standing or in water/moisture to <a href="#">acetaldehyde</a>	75-07-0	

## Section 4 - FIRST AID MEASURES

### SWALLOWED

- If poisoning occurs, contact a doctor or Poisons Information Center.
- 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.

## EYE

- If this product comes in contact with the eyes:
  - Wash out immediately with fresh 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.
  - If pain persists or recurs seek medical attention.
  - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

## SKIN

- If skin contact occurs:
  - 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.
  - Prostheses 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.

## NOTES TO PHYSICIAN

- Treat symptomatically.

## Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	25.277 @ 20C.
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	0.99
Lower Explosive Limit (%):	1.3

## EXTINGUISHING MEDIA

- - Water spray or fog.
  - Foam.
  - Dry chemical powder.
  - BCF (where regulations permit).
  - Carbon dioxide.

## FIRE FIGHTING

- - Alert Emergency Responders 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 course.
  - Consider evacuation (or protect in place).
  - Fight fire from a safe distance, with adequate cover.
  - If safe, switch off electrical equipment until vapor fire hazard removed.
  - Use water delivered as a fine spray to control the fire and cool adjacent area.
  - Avoid spraying water onto liquid pools.
  - DO NOT approach containers suspected to be hot.
  - Cool fire exposed containers with water spray from a protective location.
  - If safe to do so, remove containers from path of fire.

## GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- - Liquid and vapor are flammable.
  - Moderate fire hazard when exposed to heat or flame.
  - Vapor forms an explosive mixture with air.
  - Moderate explosion hazard when exposed to heat or flame.
  - Vapor may travel a considerable distance to source of ignition.
  - Heating may cause expansion or decomposition leading to violent rupture of containers.
  - On combustion, may emit toxic fumes of carbon monoxide (CO).

Other combustion products include: carbon dioxide (CO<sub>2</sub>).

### FIRE INCOMPATIBILITY

• Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

### PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Type AX Filter of sufficient capacity

## Section 6 - ACCIDENTAL RELEASE MEASURES

### MINOR SPILLS

•

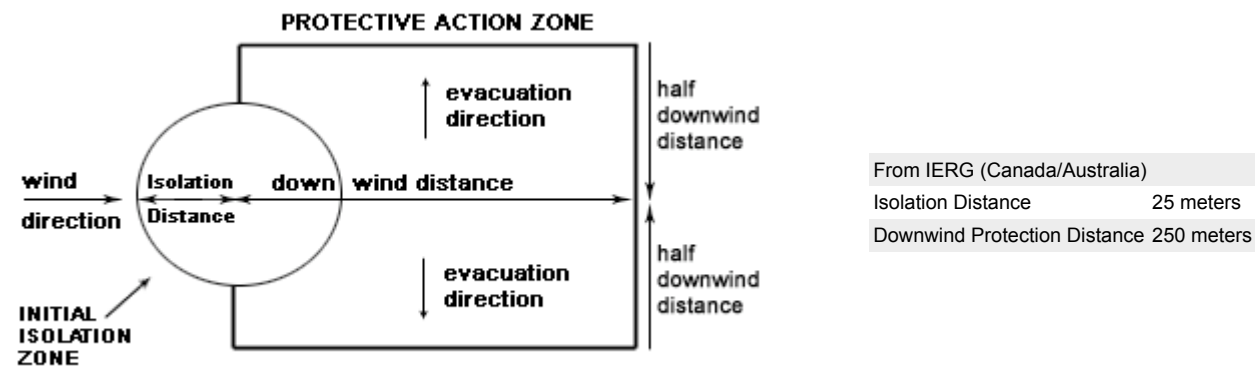
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb small quantities with vermiculite or other absorbent material.
- Wipe up.
- Collect residues in a flammable waste container.

### MAJOR SPILLS

•

- Clear area of personnel and move upwind.
- Alert Emergency Responders 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 course.
- 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 vapor.
- Contain spill with sand, earth or vermiculite.
- Use only spark-free shovels and explosion proof equipment.
- Collect recoverable product into labeled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

### PROTECTIVE ACTIONS FOR SPILL



### FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.

5 Guide 129 is taken from the US DOT emergency response guide book.

### ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

## Section 7 - HANDLING AND STORAGE

### PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure 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 generation of static electricity.
- DO NOT use plastic buckets.
- Earth all lines and equipment.
- Use spark-free tools when handling.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- 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.

### RECOMMENDED STORAGE METHODS

- Glass container.

Packing as supplied by manufacturer. Plastic containers may only be used if approved for flammable liquid. Check that containers are clearly labeled and free from leaks.

### STORAGE REQUIREMENTS

- Rotate all stock to prevent ageing. Use on FIFO (First In-First Out) basis.
- Store in original containers in approved flammable liquid storage area.
- DO NOT store in pits, depressions, basements or areas where vapors may be trapped.
- No smoking, naked lights, heat or ignition sources.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry, well-ventilated area.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X: Must not be stored together

O: May be stored together with specific precautions

+: May be stored together

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

## EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
Canada - British Columbia Occupational Exposure Limits	acetaldehyde (Acetaldehyde)					25			2B
Canada - Ontario Occupational Exposure Limits	acetaldehyde (Acetaldehyde)					25			
US - Minnesota Permissible Exposure Limits (PELs)	acetaldehyde (Acetaldehyde)	100	180	150	270				
Canada - Alberta Occupational Exposure Limits	acetaldehyde (Acetaldehyde)					25	45		
US ACGIH Threshold Limit Values (TLV)	acetaldehyde (Acetaldehyde)					25			TLV Basis: Eye & upper respiratory tract irritation
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	acetaldehyde (Acetaldehyde)	100	180	150	270				
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	acetaldehyde (Acetaldehyde)	200	360						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	acetaldehyde (Acetaldehyde)	100	180	150	270				
US - Idaho - Limits for Air Contaminants	acetaldehyde (Acetaldehyde)	200	360						
US - California Permissible Exposure Limits for Chemical Contaminants	acetaldehyde (Acetaldehyde)					25	45		
US - Hawaii Air Contaminant Limits	acetaldehyde (Acetaldehyde)	100	180	150	270				
US - Alaska Limits for Air Contaminants	acetaldehyde (Acetaldehyde)	100	180	150	270				
US - Michigan Exposure Limits for Air Contaminants	acetaldehyde (Acetaldehyde)	100	180	150	270				
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	acetaldehyde (Acetaldehyde)	100	180	150	270				
US - Washington Permissible exposure limits of air contaminants	acetaldehyde (Acetaldehyde)	100		150					
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	acetaldehyde (Acetaldehyde)					25			T20
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	acetaldehyde (Acetaldehyde)	200	360						
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	acetaldehyde (Acetaldehyde)					25	45		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	acetaldehyde (Acetaldehyde)	200	360						
Canada - Prince Edward Island Occupational Exposure Limits	acetaldehyde (Acetaldehyde)					25			TLV Basis: Eye & upper respiratory tract irritation
US - Oregon Permissible Exposure Limits (Z-1)	acetaldehyde (Acetaldehyde)	100	180						*
Canada - Northwest Territories Occupational Exposure Limits (English)	acetaldehyde (Acetaldehyde)	100	180	150	270				
Canada - Nova Scotia Occupational Exposure Limits	acetaldehyde (Acetaldehyde)					25			TLV Basis: Eye & upper respiratory tract irritation

The following materials had no OELs on our records

- paraldehyde: CAS:123-63-7

#### EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
acetaldehyde		2,000

#### ODOR SAFETY FACTOR (OSF)

OSF=4E2 (ACETALDEHYDE)

#### MATERIAL DATA

PARALDEHYDE:

- No exposure limits set by NOHSC or ACGIH.

Exposed individuals are reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odor Safety Factor (OSF) is determined to fall into either Class A or B.

The Odor Safety Factor (OSF) is defined as:

OSF= Exposure Standard (TWA) ppm/ Odor Threshold Value (OTV) ppm

Classification into classes follows:

Class	OSF	Description
A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV-TWA for example) is being reached, even when distracted by working activities
B	26-550	Idem for 50-90% of persons being distracted
C	1-26	Idem for less than 50% of persons being distracted
D	0.18-1	0-50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	Idem for less than 10% of persons aware of being tested

Amoore and Hautala \* have determined that it is only at an OSF value of 26 that 50% of distracted persons can detect the substance at the Exposure Standard value. In the case of alerted persons, an OSF of 26 means that 99% of them can detect the odor at the Exposure Standard value. It is ONLY for substances belonging to Class A and B that there is a reasonable chance of being warned in time, that the Exposure Standard is being exceeded. \* Journal Applied Toxicology: Vol 3, 1983, p272

NOTE: The use of the OSF may be inappropriate for mixtures where substances mask the odor of others.

OEL STEL (Russia): 5 mg/m3

ACETALDEHYDE:

- Odour Threshold Value for acetaldehyde: 0.067 ppm (detection)

NOTE: Detection tubes for acetaldehyde, measuring in excess of 5 ppm, are commercially available.

Exposure at or below the recommended TLV is thought to prevent excessive eye irritation and potential injury to the respiratory tract.

The US EPA has assigned an upper limit unit risk estimate of  $4 \times 10(\text{exp}-3)$  per ppm inhaled and a relative potency for tumour formation of 1/250 of that for formaldehyde. The US EPA also reported that for chronic exposure at 2 ppm with limited daily exposure at 10-40 ppm, the estimated risks of a tumourigenic response are  $10(\text{exp}-4)$  to  $10(\text{exp}-5)$ .

#### PERSONAL PROTECTION



Consult your EHS staff for recommendations

#### EYE

- Safety glasses with side shields; or as required,
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

#### HANDS/FEET

- Wear chemical protective gloves, eg. PVC.

Wear safety footwear.

#### OTHER

- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.

- Eyewash unit.
- Ensure there is ready access to a safety shower.

## 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	AX-1	-
1000	50	-	AX-1
5000	50	Airline*	-
5000	100	-	AX-2
10000	100	-	AX-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.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

## ENGINEERING CONTROLS

• No special equipment needed when handling small quantities.

General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in specific circumstances. If risk of overexposure exists, wear an approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapors, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Liquid.

State	Liquid	Molecular Weight	132.18
Melting Range (°F)	54.68	Viscosity	Not available
Boiling Range (°F)	256.1	Solubility in water (g/L)	Reacts
Flash Point (°F)	77	pH (1% solution)	Not available
Decomposition Temp (°F)	Not available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	458.6	Vapor Pressure (mmHg)	25.277 @ 20C.
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	0.99

Lower Explosive Limit (%)	1.3	Relative Vapor Density (air=1)	4.5
Volatile Component (%vol)	Not available	Evaporation Rate	Not available

## APPEARANCE

Colourless liquid with an agreeable odour; mixes with water, most organic solvents and volatile oils. Disagreeable taste. Decomposes on standing.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

- 
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

### STORAGE INCOMPATIBILITY

- Avoid reaction with oxidizing agents.
- Avoid strong acids.

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

## Section 11 - TOXICOLOGICAL INFORMATION

paraldehyde

### TOXICITY AND IRRITATION

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

TOXICITY	IRRITATION
Oral (rat) LD50: 1530 mg/kg	Skin (rabbit): 500 mg Open Mild
Inhalation (rat) LCLo: 2000 ppm/4h	Eye (rabbit): 5 mg SEVERE
Dermal (rabbit) LD50: 14000 mg/kg	

### CARCINOGEN

Acetaldehyde	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	2B
Acetaldehyde	ND	Carcinogenicity	B2
Acetaldehyde	ND	Carcinogen Category	B2
Acetaldehyde	ND	Carcinogen Category	A3
ACETALDEHYDE	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65
ACETALDEHYDE	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65
Acetaldehyde	US Air Toxics Hot Spots TSD for Describing Available Cancer Potency Factors	IARC Class	2B
Acetaldehyde	ND	Carcinogen	Ca

## Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

PARALDEHYDE:

• log Pow (Verschuereen 1983):	0.59/0.95
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log Kow: 0.59-0.95

Toxicity Fish: LC50(96)0.32mg/L

ACETALDEHYDE:

• Hazardous Air Pollutant:	Yes
• Fish LC50 (96hr.) (mg/l):	30.8
• log Kow (Prager 1995):	0.43, - 0.34
• log Kow (Sangster 1997):	0.45

• Acetaldehyde occurs in nature as an intermediate product in the respiration of higher plants and can be found in ripening fruit such as apples. It is also an intermediate product of fermentation of alcohol and in metabolism of sugars in the body. It may form in wine and other alcoholic beverages after exposure to air. Natural sources include forest fires, volcanoes, animal wastes, and insects. Acetaldehyde is a volatile component of cotton leaves and blossoms. Acetaldehyde occurs in oak and tobacco leaves and is a natural component of apples, broccoli, coffee, grapefruit, grapes, lemons, mushrooms, onions, oranges, peaches, pears, pineapples, raspberries, and strawberries. It has

been detected in the essential oils of alfalfa, rosemary, balm, clary sage, daffodil, bitter orange, camphor, angelica, fennel, mustard, and peppermint.

The Henry's Law constant for acetaldehyde,  $7.89 \times 10^{-5}$  atm.m<sup>3</sup>/mol at 25 C, and its high vapor pressure, 740 mm Hg @ 20 C., indicate that volatilisation of the chemical from surface soil or water to the atmosphere will be considerable.

#### Transformation/Persistence

- Air - In air (at 25 C.), acetaldehyde reacts with OH radicals, NO<sub>3</sub>, singlet oxygen, and NO<sub>2</sub> at the following rates:  $0.15 \times 10^{-10}$ ,  $0.12 \times 10^{-14}$ ,  $0.31 \times 10^{-12}$ , and  $0.20 \times 10^{-24}$  cm<sup>3</sup>/molecule-sec, respectively. The estimated half-life for the reaction of acetaldehyde with OH produced by UV light is 6.2 hours; the products of this reaction include peroxyacetyl nitrate (PAN), methyl nitrate, methyl nitrite, and nitric acid. Acetaldehyde absorbs UV light at wavelengths of 290 to 342 nm, indicating some potential for photolysis. The photolytic half-lives for acetaldehyde are about 34 hours in the summer and 296 hours in winter at 55 deg. N latitude. The estimated half-life for the reaction of acetaldehyde with ozone at 25 C, based on the rate constant of  $6 \times 10^{-21}$  cm<sup>3</sup>/molecule-sec, is 1910 days (5.2 years)
- Soil - Acetaldehyde will volatilize rapidly in near surface and surface soils [v.p. 740 mm Hg at 20 C. or leach into the ground, or undergo microbial degradation. Acetaldehyde is not expected to adsorb to soils, other than those containing montmorillonite clay.
- Water - If released to water, acetaldehyde will rapidly biodegrade or volatilise (for a typical river, the half-life is 9.3 hours). Laboratory tests demonstrate that acetaldehyde is easily biodegraded (1) by acclimated sludge and sewage with theoretical biological oxygen demand (BOD) values for several studies ranging from 28% in 24 hours to 100% in 5 hours; (2) by anaerobic treatment; and (3) in seawater (25% degradation in 1 hour, compared with no decline in concentration in sterile controls).
- Biota - The estimated, low KOW and bioconcentration values for acetaldehyde indicate that there is little potential for the bioaccumulation or bioconcentration of acetaldehyde in biota.

As a VOC, acetaldehyde can contribute to the formation of photochemical smog in the presence of other VOCs. Potential environmental degradation products of acetaldehyde such as PAN, methyl nitrate, and methyl nitrite are components of photochemical smog.

• DO NOT discharge into sewer or waterways.

log Kow: -0.4

BOD 5 if unstated: 1.27-1.3

ThOD: 1.82

Toxicity Fish: TLm(96)70mg/L

Toxicity invertebrate: cell mut. inhib. 57mg/L

Anaerobic effects: sig degrad

Degradation Biological: sig

processes Abiotic: photol

#### Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
paraldehyde	HIGH		HIGH	HIGH
acetaldehyde	LOW		LOW	HIGH

## Section 13 - DISPOSAL CONSIDERATIONS

### US EPA Waste Number & Descriptions

#### A. General Product Information

Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

#### B. Component Waste Numbers

When paraldehyde is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U182 (waste code T).

When acetaldehyde is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U001 (waste code I).

### Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

- 
- Consult manufacturer for recycling options and recycle where possible.
- Consult Waste Management Authority for disposal.
- Incinerate residue at an approved site.
- Recycle containers where possible, or dispose of in an authorized landfill.

## Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	None	Hazard class or Division:	3
Identification Numbers:	UN1264	PG:	III
Label Codes:	3	Special provisions:	B1, IB3, T2, TP1
Packaging: Exceptions:	150	Packaging: Non-bulk:	203

Packaging: Exceptions:	150	Quantity limitations: Passenger aircraft/rail:	60 L
Quantity Limitations: Cargo aircraft only:	220 L	Vessel stowage: Location:	A
Vessel stowage: Other:	None		
Hazardous materials descriptions and proper shipping names: Paraldehyde			
<b>Air Transport IATA:</b>			
ICAO/IATA Class:	3	ICAO/IATA Subrisk:	None
UN/ID Number:	1264	Packing Group:	III
Special provisions:	None		
Shipping Name: PARALDEHYDE			
<b>Maritime Transport IMDG:</b>			
IMDG Class:	3	IMDG Subrisk:	None
UN Number:	1264	Packing Group:	III
EMS Number:	F-E , S-D	Special provisions:	None
Limited Quantities:	5 L		
Shipping Name: PARALDEHYDE			

## Section 15 - REGULATORY INFORMATION

### paraldehyde (CAS: 123-63-7) is found on the following regulatory lists;

"Canada - Saskatchewan Industrial Hazardous Substances", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada National Pollutant Release Inventory (NPRI)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "US - Alabama Listing of Controlled Substances Schedule IV", "US - Arizona Controlled Substances Schedule IV", "US - Massachusetts Oil & Hazardous Material List", "US - New Jersey Right to Know Hazardous Substances", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Vermont Hazardous Constituents", "US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either", "US - Washington Dangerous waste constituents list", "US - Washington Discarded Chemical Products List - ""U"" Chemical Products", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US Drug Enforcement Administration (DEA) Controlled Substances Schedule IV", "US EPCRA Section 313 Chemical List", "US FDA Controlled Substances Schedule IV", "US Food Additive Database", "US Harmonized Tariff Schedule - Intermediate Chemicals for Dyes Appendix", "US List of Lists - Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act", "US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements", "US TSCA Section 5(a)(2) - Significant New Use Rules (SNURs)"

Regulations for ingredients

### acetaldehyde (CAS: 75-07-0) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Objectives", "Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Ontario Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Industrial Hazardous Substances", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Saskatchewan Occupational Health and Safety Regulations - Designated Chemical Substances", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada ARET (Accelerated Reduction / Elimination of Toxics) Substance List", "Canada Domestic Substances List (DSL)", "Canada Environmental Protection Act (CEPA) 1999 - Schedule 1 Toxic Substances List", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada National Pollutant Release Inventory (NPRI)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Alaska Limits for Air Contaminants", "US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)", "US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - California Proposition 65 - Carcinogens", "US - California Proposition 65 - No Significant Risk Levels (NSRLs) for Carcinogens", "US - California Toxic Air Contaminant List Category II", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Maine Chemicals of High Concern List", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Oregon Hazardous Materials", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either", "US - Vermont

Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Class A toxic air pollutants: Known and Probable Carcinogens", "US - Washington Discarded Chemical Products List - ""U"" Chemical Products", "US - Washington Permissible exposure limits of air contaminants", "US - Wyoming List of Highly Hazardous Chemicals, Toxics and Reactives", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)", "US Clean Air Act - Hazardous Air Pollutants", "US CWA (Clean Water Act) - List of Hazardous Substances", "US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances", "US Department of Homeland Security Chemical Facility Anti-Terrorism Standards - Chemicals of Interest", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Acute Exposure Guideline Levels (AEGLs) - Interim", "US EPA Carcinogens Listing", "US EPA High Production Volume Program Chemical List", "US EPCRA Section 313 Chemical List", "US Food Additive Database", "US List of Lists - Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act", "US National Toxicology Program (NTP) 11th Report Part B. Reasonably Anticipated to be a Human Carcinogen", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes", "US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 8 (a) - Preliminary Assessment Information Rules (PAIR) - Reporting List", "US TSCA Section 8 (d) - Health and Safety Data Reporting", "USA: Chemical Facility Anti-Terrorism Standards - List Appendix A - 6CFR 27"

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

- Inhalation may produce health damage\*.
  - May produce discomfort of the respiratory system\*.
  - May possibly be harmful to the fetus/ embryo\*.
  - Repeated exposure potentially causes skin dryness and cracking\*.
  - Vapors potentially cause drowsiness and dizziness\*.
- \*(limited evidence).

### 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
acetaldehyde	14.4 mg/m3	100	D	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 Health Risk: American Industrial Hygiene Association Journal 57: 641-649 (1996).

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• Classification of the mixture 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](http://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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