

# 4-Methyl-2-pentanol

sc-238901



The Power is Question

## Material Safety Data Sheet

Hazard Alert Code Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

### PRODUCT NAME

4-Methyl-2-pentanol

### 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

Solvent for dyestuffs, oils, gums, resins, waxes, nitrocellulose and ethylcellulose; organic synthesis, froth flotation/metal oil separation; brake fluids.

### SYNONYMS

C6-H14-O, (CH3)2CHCH2CH(CH3)OH, "methylisobutyl carbinol", "methyl isobutylcarbinol", isobutylmethylcarbinol, "methyl iso-butyl carbinol", isobutylmethylmethanol, "methyl amyl alcohol", 2-methyl-4-pentanol, 4-methylpentanol-2, 4-methyl-2-pentanol, "4-methyl pentan-2-ol", "2-pentanol, 4-methyl-", "4-pentanol, 2-methyl-", MAOH, MIBC, MIC, 3-MIC

## Section 2 - HAZARDS IDENTIFICATION

### CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability:	2	
Toxicity:	2	
Body Contact:	2	
Reactivity:	2	
Chronic:	2	

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4



### CANADIAN WHMIS SYMBOLS



## EMERGENCY OVERVIEW

### RISK

HARMFUL - May cause lung damage if swallowed.  
Irritating to eyes and respiratory system.  
Flammable.

### POTENTIAL HEALTH EFFECTS

### ACUTE HEALTH EFFECTS

#### SWALLOWED

- Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result. (ICSC13733).
- Accidental ingestion of the material may be damaging to the health of the individual.
- Ingestion of any amount of methyl isobutyl carbinol (MIBC) may result in respiratory tract irritation, nausea, vomiting, diarrhoea, cramping, central nervous system depression, ranging from mild headache to anaesthesia and coma. Delayed liver and kidney injury may occur; effects may include anuria, dysuria, haematuria; also evidence of liver damage, hepatic tenderness, jaundice, liver enlargement.
- Overexposure to non-ring alcohols causes nervous system symptoms. These include headache, muscle weakness and inco-ordination, giddiness, confusion, delirium and coma. Digestive symptoms may include nausea, vomiting and diarrhea. Aspiration is much more dangerous than ingestion because lung damage can occur and the substance is absorbed into the body. Alcohols with ring structures and secondary and tertiary alcohols cause more severe symptoms, as do heavier alcohols.
- Considered an unlikely route of entry in commercial/industrial environments. The liquid may produce gastrointestinal discomfort and may be harmful if swallowed. Ingestion may result in nausea, pain and vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

#### EYE

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

#### SKIN

- Repeated exposure may cause skin cracking, flaking or drying following normal handling and use.
- Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
- There is some evidence to suggest that the material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.
- Most liquid alcohols appear to act as primary skin irritants in humans. Significant percutaneous absorption occurs in rabbits but not apparently in man.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

#### INHALED

- The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
- Inhalation of vapors or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
- Aliphatic alcohols with more than 3-carbons cause headache, dizziness, drowsiness, muscle weakness and delirium, central depression, coma, seizures and behavioral changes. Secondary respiratory depression and failure, as well as low blood pressure and irregular heart rhythms, may follow. Nausea and vomiting are seen, and liver and kidney damage is possible as well following massive exposures. Symptoms are more acute the more carbons there are in the alcohol.

### CHRONIC HEALTH EFFECTS

- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
methyl isobutyl carbinol	108-11-2	> 97.7

## Section 4 - FIRST AID MEASURES

### SWALLOWED

- 
- 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.
- If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

## 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, without delay.

## NOTES TO PHYSICIAN

- Any material aspirated during vomiting may produce lung injury. Therefore emesis should not be induced mechanically or pharmacologically. Mechanical means should be used if it is considered necessary to evacuate the stomach contents; these include gastric lavage after endotracheal intubation. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.

To treat poisoning by the higher aliphatic alcohols:

- Gastric lavage with copious amounts of water.
- It may be beneficial to instill 60 ml of mineral oil into the stomach.
- Oxygen and artificial respiration as needed.
- Electrolyte balance: it may be useful to start 500 ml. M/6 sodium bicarbonate intravenously but maintain a cautious and conservative attitude toward electrolyte replacement unless shock or severe acidosis threatens.
- To protect the liver, maintain carbohydrate intake by intravenous infusions of glucose.
- Hemodialysis if coma is deep and persistent. [GOSSELIN, SMITH HODGE: Clinical Toxicology of Commercial Products, Ed 5]

## BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for shock.
- Monitor and treat, where necessary, for pulmonary edema.
- Anticipate and treat, where necessary, for seizures.
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.
- Give activated charcoal.

## ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolemia are present use lactated Ringers solution. Fluid overload might create complications.
- If the patient is hypoglycemic (decreased or loss of consciousness, tachycardia, pallor, dilated pupils, diaphoresis and/or dextrose strip or glucometer readings below 50 mg), give 50% dextrose.
- Hypotension with signs of hypovolemia requires the cautious administration of fluids. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary edema.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

## EMERGENCY DEPARTMENT

- Laboratory analysis of complete blood count, serum electrolytes, BUN, creatinine, glucose, urinalysis, baseline for serum aminotransferases (ALT and AST), calcium, phosphorus and magnesium, may assist in establishing a treatment regime. Other useful

- analyses include anion and osmolar gaps, arterial blood gases (ABGs), chest radiographs and electrocardiograph.
- Positive end-expiratory pressure (PEEP)-assisted ventilation may be required for acute parenchymal injury or adult respiratory distress syndrome.
  - Acidosis may respond to hyperventilation and bicarbonate therapy.
  - Hemodialysis might be considered in patients with severe intoxication.
  - Consult a toxicologist as necessary. BRONSTEIN, A.C. and CURRANCE, P.L. EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994

If swallowed: Lavage with cuffed tube if large quantity ingested. Give activated charcoal. Observe for several days for renal or hepatic injury. Aspiration: Enforce bed rest and observe carefully. Administer oxygen with slight positive pressure and antifoaming agent. Maintain airway and vital functions. Prophylactic antibiotics useful.

Inhalation: Administer oxygen with slight positive pressure and antifoaming agent. Avoid sympathomimetic amines. [Shell]

## Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	2.175 @ 20 deg.
Upper Explosive Limit (%):	5.5
Specific Gravity (water=1):	0.81
Lower Explosive Limit (%):	1.0

### EXTINGUISHING MEDIA

- 
- Alcohol stable foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

### 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.
- If safe, switch off electrical equipment until vapor fire hazard removed.
- Use water delivered as a fine spray to control 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 protected 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).

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), other pyrolysis products typical of burning organic material.

WARNING: Long standing in contact with air and light may result in the formation of potentially explosive peroxides.

### 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 A 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**

■ Chemical Class: alcohols and glycols

For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
<b>LAND SPILL - SMALL</b>				
cross-linked polymer - particulate	1	shovel	shovel	R, W, SS
cross-linked polymer - pillow	1	throw	pitchfork	R, DGC, RT
sorbent clay - particulate	2	shovel	shovel	R, I, P
wood fiber - pillow	3	throw	pitchfork	R, P, DGC, RT
treated wood fiber - pillow	3	throw	pitchfork	DGC, RT
foamed glass - pillow	4	throw	pitchfork	R, P, DGC, RT
<b>LAND SPILL - MEDIUM</b>				
cross-linked polymer - particulate	1	blower	skidloader	R, W, SS
polypropylene - particulate	2	blower	skidloader	W, SS, DGC
sorbent clay - particulate	2	blower	skidloader	R, I, W, P, DGC
polypropylene - mat	3	throw	skidloader	DGC, RT
expanded mineral - particulate	3	blower	skidloader	R, I, W, P, DGC
polyurethane - mat	4	throw	skidloader	DGC, RT

**Legend**

DGC: Not effective where ground cover is dense

R; Not reusable

I: Not incinerable

P: Effectiveness reduced when rainy

RT: Not effective where terrain is rugged

SS: Not for use within environmentally sensitive sites

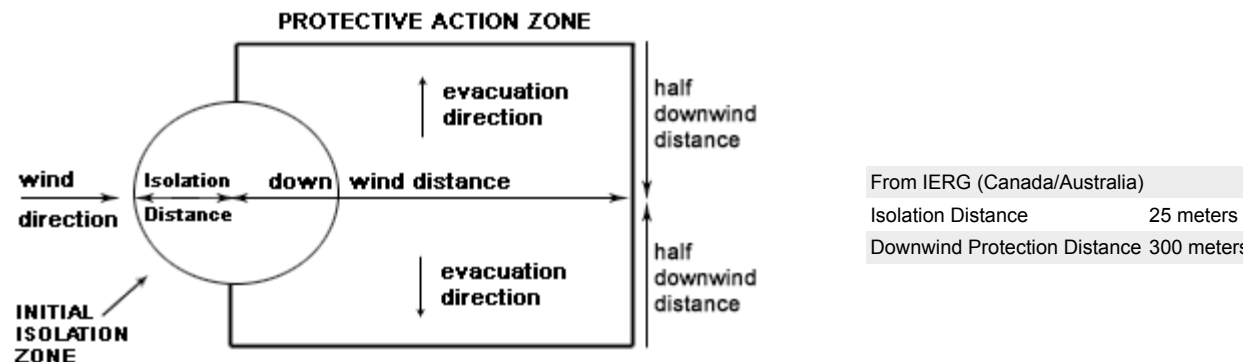
W: Effectiveness reduced when windy

Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;

R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988.

- 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.

6 IERG information is derived from CANUTEC - Transport Canada.

## 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

- - Containers, even those that have been emptied, may contain explosive vapors.
  - Do NOT cut, drill, grind, weld or perform similar operations on or near containers.
  - DO NOT allow clothing wet with material to stay in contact with skin
- The substance accumulates peroxides which may become hazardous only if it evaporates or is distilled or otherwise treated to concentrate the peroxides. The substance may concentrate around the container opening for example.
- Purchases of peroxidizable chemicals should be restricted to ensure that the chemical is used completely before it can become peroxidized.
- A responsible person should maintain an inventory of peroxidizable chemicals or annotate the general chemical inventory to indicate which chemicals are subject to peroxidation. An expiration date should be determined. The chemical should either be treated to remove peroxides or disposed of before this date.
  - The person or laboratory receiving the chemical should record a receipt date on the bottle. The individual opening the container should add an opening date.
  - Unopened containers received from the supplier should be safe to store for 18 months.
  - Opened containers should not be stored for more than 12 months.
  - 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

- Packing as supplied by manufacturer. Plastic containers may only be used if approved for flammable liquid. Check that containers are

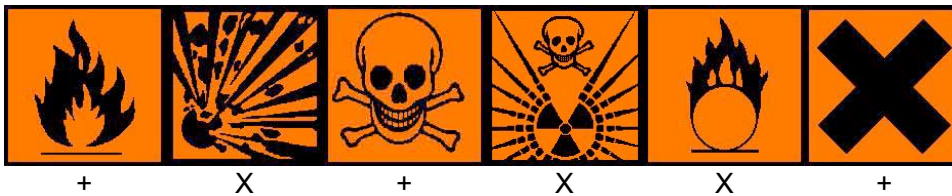
clearly labeled and free from leaks.

- For low viscosity materials (i): Drums and jerricans must be of the non-removable head type. (ii): Where a can is to be used as an inner package, the can must have a screwed enclosure.
- For materials with a viscosity of at least 2680 cSt. (23 deg. C)
- For manufactured product having a viscosity of at least 250 cSt. (23 deg. C)
- Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (23 deg. C) - (i): Removable head packaging; (ii): Cans with friction closures and (iii): low pressure tubes and cartridges may be used.
- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages
- In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.

### STORAGE REQUIREMENTS

- 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 preventions

+: May be stored together

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

#### ENDOELTABLE

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Notes
Canada - Alberta Occupational Exposure Limits	methyl isobutyl carbinol (Methyl amyl alcohol (Methyl isobutyl carbinol; 4-Methyl-2-pentanol))	25	104	40	167	
Canada - British Columbia Occupational Exposure Limits	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25		40		Skin
Canada - Ontario Occupational Exposure Limits	methyl isobutyl carbinol (4-Methyl-2-pentanol)	25	104	40	167	Skin
US OSHA Permissible Exposure Levels (PELs) - Table Z1	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100			
US ACGIH Threshold Limit Values (TLV)	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25		40		TLV Basis: upper respiratory tract & eye irritation; central nervous system impairment
US NIOSH Recommended Exposure Limits (RELs)	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100	40	165	[skin]
US - Minnesota Permissible Exposure Limits (PELs)	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100	40	165	
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100	40	165	
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100			

US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100	40	165	
US - California Permissible Exposure Limits for Chemical Contaminants	methyl isobutyl carbinol (Methyl isobutyl carbinol; 4-methyl-2-pentanol; methyl amyl alcohol)	25	100	40	165	
US - Idaho - Limits for Air Contaminants	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	methyl isobutyl carbinol (Methyl amyl alcohol)	25	104	40	167	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25		40		Skin
US - Hawaii Air Contaminant Limits	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100			
US - Alaska Limits for Air Contaminants	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100	40	165	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	methyl isobutyl carbinol (Methyl amyl alcohol, see Methyl isobutyl carbinol - Skin)	25	100	40	150	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	methyl isobutyl carbinol (Methyl isobutyl carbinol - Skin)	25	100	40	150	
US - Washington Permissible exposure limits of air contaminants	methyl isobutyl carbinol (Methyl amyl alcohol (Methyl isobutyl carbinol))	25		40		
US - Michigan Exposure Limits for Air Contaminants	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100	40	165	
Canada - Nova Scotia Occupational Exposure Limits	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25		40		TLV Basis: upper respiratory tract & eye irritation; central nervous system impairment
Canada - Prince Edward Island Occupational Exposure Limits	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25		40		TLV Basis: upper respiratory tract & eye irritation; central nervous system impairment
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100			
US - Oregon Permissible Exposure Limits (Z-1)	methyl isobutyl carbinol (Methyl isobutyl carbinol)	25	100			
Canada - Northwest Territories Occupational Exposure Limits (English)	methyl isobutyl carbinol (Methyl isobutyl carbinol - Skin)	25	105	40	167	
Canada - Northwest Territories Occupational Exposure Limits (English)	methyl isobutyl carbinol (Methyl amyl alcohol (Methyl isobutyl carbinol) - Skin)	25	105	40	167	

#### EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
methyl isobutyl carbinol		400

#### MATERIAL DATA

##### METHYL ISOBUTYL CARBINOL:

■ for methyl isobutyl carbinol (MIBC):

The TLV-TWA is thought to be protect against the significant risk of eye and irritation and systemic injury, and to provide a wide margin of safety against anaesthesia. Irritation of human eyes and mucous membranes begins after exposure to about 50 ppm for 15 minutes. Odour is not objectionable at this concentration. Exposure at more than 50 ppm produces nasal and throat irritation.

Odour Safety Factor(OSF)

OSF=3.6E2 (4-METHYL-2-PENTANOL; MIBC).

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.

## PERSONAL PROTECTION



Consult your EHS staff for recommendations

### EYE

- 
- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

### HANDS/FEET

- Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

### OTHER

- 
- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

### 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-1	-
1000	50	-	A-1
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.

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

■ For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant. 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.)

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.

Does not mix with water.

Floats on water.

State	Liquid	Molecular Weight	102.20
Melting Range (°F)	-130 freezing pt	Viscosity	4.07 cSt@40°C
Boiling Range (°F)	269.24	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	102.92 (TCC)	pH (1% solution)	Not available
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	640.4	Vapor Pressure (mmHg)	2.175 @ 20 deg.
Upper Explosive Limit (%)	5.5	Specific Gravity (water=1)	0.81
Lower Explosive Limit (%)	1.0	Relative Vapor Density (air=1)	3.52
Volatile Component (%vol)	100	Evaporation Rate	0.43 BuAc=1
Gas group	IIA		

METHYL ISOBUTYL CARBINOL

■ log Kow (Prager 1995):

1.43

### APPEARANCE

Clear flammable liquid with a faint aromatic odour. Slightly soluble in water (1.8% @ 20 deg. C). Mixes with most common organic solvents.

log Kow 1.43-1.6

Material	Value
■ log Kow (Prager 1995)	1.43

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

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

### STORAGE INCOMPATIBILITY

- Methyl isobutyl carbinol:
  - reacts violently with strong oxidisers, acetyl bromide, alkylaluminiums including triisobutyl aluminium, hydrogen trisulfide, chromium trioxide, alkaline earth metals (e.g. aluminium powder, sodium, potassium, zinc) forming highly flammable hydrogen gas, acetaldehyde (violent condensation reaction), diethyl aluminium bromide (ignition), ethylene oxide (possible explosion), nitrogen tetroxide, perchloric acid, permonosulfuric acid
  - mixtures with strong hydrogen peroxide plus concentrated (70%) sulfuric acid will explode
  - reacts with strong acids, strong caustics, amines, amides and inorganic hydroxides, alkali metals, barium perchlorate (forms heat-sensitive explosive alkyl hypochlorites), benzoyl peroxide, chlorine (forms heat-sensitive, explosive alkyl hypochlorites), chromic acid, dialkylzincs, dichlorine oxide, epoxides such as glycidol, hexamethylene diisocyanate (explosion when solvent is absent), hydrogen peroxide, hypochlorous acid (forms heat-sensitive, explosive alkyl hypochlorites), isocyanates, isopropyl chlorocarbonate, lithium aluminium hydride, lithium tetrahydroaluminate, nitrides, nitrogen dioxide, oxoacids, pentafluoroguanidine, phosphorus pentasulfide, reducing agents, tangerine oil, triethylaluminium, triisobutylaluminium
  - may generate electrostatic charge due to low conductivity
  - attacks plastics and coatings

Avoid storage with strong acids, acid chlorides, acid anhydrides, oxidizing agents.

Secondary alcohols and some branched primary alcohols may produce potentially explosive peroxides after exposure to light and/ or heat.

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

## Section 11 - TOXICOLOGICAL INFORMATION

### METHYL ISOBUTYL CARBINOL

#### TOXICITY AND IRRITATION

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

TOXICITY	IRRITATION
Oral (rat) LD50: 2590 mg/kg	Skin (rabbit): 10 mg/24h Open Mild
Inhalation (rat) LCLo: 2000 ppm/4h	Eye (rabbit): 20 mg Open SEVERE
Dermal (rabbit) LD50: 3560 mg/kg	

■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

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.

#### SKIN

methyl isobutyl carbinol	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	X
methyl isobutyl carbinol	US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants - Skin	Skin Designation	X
methyl isobutyl carbinol	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin	Skin Designation	X
methyl isobutyl carbinol	US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X

methyl isobutyl carbinol	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	X
methyl isobutyl carbinol	US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
methyl isobutyl carbinol	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X
methyl isobutyl carbinol	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

## Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

METHYL ISOBUTYL CARBINOL:

■ Fish LC50 (96hr.) (mg/l):	360 (24 HR)
■ BCF<100:	7.2
■ Water solubility (g/l):	1.64E+04
■ log Kow (Prager 1995):	1.43
■ DO NOT discharge into sewer or waterways.	
log Kow: 1.43-1.6	
Koc: 21-143	
Half-life (hr) air: 55.7	
Half-life (hr) H2O surface water: 23-247.2	
Henry's atm m <sup>3</sup> /mol: 4.45E-05	
BOD 5 if unstated: 2.12	
COD: 2.6	
BCF: 2.6-7.2	
Toxicity Fish: LC50 0.25mg/L	
Effects on algae and plankton: algae no effect	

### Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
methyl isobutyl carbinol	LOW		LOW	HIGH

### GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles

Name / Cas No / RTECS No	EHS	TRN	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3
Methyl amyl alcohol / CAS:108- 11- 2 / SA7350000			958	457	1	NI	1	R	1	NI	1	0	2	1	3	FED	3

Legend: EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships)  
 NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation,  
 B1=Acute aquatic toxicity LC/EC1C50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg),  
 C2=Acute mammalian dermal toxicity LD50 (mg/kg), C3=Acute mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion,  
 D2=Eye irritation & corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference  
 with coastal amenities, For column A2: R=Readily biodegradable, NR=Not readily biodegradable. For column D3: C=Carcinogen,  
 M=Mutagenic, R=Reprotoxic, S=Sensitising, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lung injury, N=Neurotoxic,  
 I=Immunotoxic. For column E1: NT=Not tainting (tested), T=Tainting test positive. For column E2: Fp=Persistent floater, F=Floater, S=Sinking  
 substances. The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard. (GESAMP/EHS Composite List  
 of Hazard Profiles - Hazard evaluation of substances transported by ships)

## Section 13 - DISPOSAL CONSIDERATIONS

### US EPA Waste Number & Descriptions

A. General Product Information

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

### Disposal Instructions

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

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction

- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

## Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	None	Hazard class or Division:	3
Identification Numbers:	UN2053	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		

### COMBUSTIBLE LIQUID

A flammable liquid with a flash point at or above 38 deg.C (100 deg.F) that does not meet the definition of any other hazard class may be reclassified as a combustible liquid. This provision does not apply to transportation by vessel or aircraft, except where other means of transportation is impracticable. An elevated temperature material that meets the definition of a Class 3 material because it is intentionally heated and offered for transportation or transported at or above its flash point may not be reclassified as a combustible liquid. Refer to 49 CFR 173.120(b)(2)

### Air Transport IATA:

ICAO/IATA Class:	3	ICAO/IATA Subrisk:	None
UN/ID Number:	2053	Packing Group:	III
Special provisions:	None		

Shipping Name: METHYL ISOBUTYL CARBINOL

### Maritime Transport IMDG:

IMDG Class:	3	IMDG Subrisk:	None
UN Number:	2053	Packing Group:	III
EMS Number:	F-E , S-D	Special provisions:	None

Limited Quantities: 5 L

Shipping Name: METHYL ISOBUTYL CARBINOL

## Section 15 - REGULATORY INFORMATION



### REGULATIONS

methyl isobutyl carbinol (CAS: 108-11-2) is found on the following regulatory lists;

"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 - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "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", "International Council of Chemical Associations (ICCA) - High Production Volume List", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Alaska Limits for Air Contaminants", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "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 Permissible Exposure Limits (Z-1)", "US - Pennsylvania - Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "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 Permissible exposure limits of air contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US DOT Coast Guard Bulk Hazardous Materials - List of Flammable and Combustible Bulk Liquid Cargoes", "US EPA High Production Volume Program Chemical List", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US Toxic Substances Control Act (TSCA) - Inventory"

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

- Potentially explosive peroxides may form on standing.\*.
- Inhalation, skin contact and/or ingestion may produce health damage\*.
- Cumulative effects may result following exposure\*.
- May produce skin discomfort\*.
- Repeated exposure potentially causes skin dryness and cracking\*.
- Vapors potentially cause drowsiness and dizziness\*.

\* (limited evidence).

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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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Issue Date: Jun-28-2010

Print Date: Sep-21-2010