

Formaldehyde

sc-203049

Material Safety Data Sheet



The Power is Question

Hazard Alert Code
Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

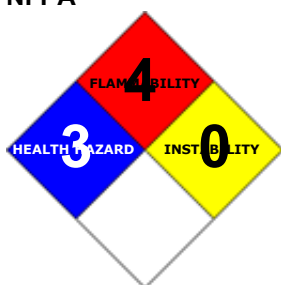
PRODUCT NAME

Formaldehyde

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

■ Reducing agent. Operators should be trained in procedures for safe use of this material. Used as disinfectant; germicide and fungicide for plants, vegetables; Manufacture of phenolic resins, artificial silk and cellulose esters, dyes, organic chemicals, glass mirrors, explosives; tanning and preserving hides. Also used for mordanting (improving fastness of dyes) on fabrics; preserving and coagulating rubber latex; in embalming fluids. In photography for hardening gelatin plates and papers, toning gelatin-chloride papers, chrome printing and developing. To prevent mildew and spelt in wheat and rot in oats; to render casein, albumin and gelatin insoluble; also as laboratory chemical. Used as disinfectant; germicide and fungicide for plants, vegetables. Manufacture of phenolic resins, artificial silk and cellulose esters, dyes, organic chemicals, glass mirrors, explosives; tanning and preserving hides. To improve the fastness of dyes on fabrics; mordanting and waterproofing fabrics; preserving and coagulating rubber latex; in embalming fluids. In photography for hardening gelatin plates, papers, printing, developing. To prevent mildew and spelt in wheat and rot in oats. To render casein, albumin and gelatin insoluble. Medicine Industrial best practice is to use in fully enclosed systems. Used as disinfectant; germicide and fungicide for plants, vegetables; Manufacture of amino and phenolic resins, artificial silk and cellulose esters, dyes, organic chemicals, glass mirrors.

SYNONYMS

BFV, "formaldehyde 37%", FA, "formaldehyde solution (37% 7% methanol)", Fannoform, "formaldehyde 50%", formalin, "formaldehyde solution (50% 2% methanol)", "formalin 40", "formaldehyde solutions, dilute", methanal, "formaldehyde preservative", "methyl aldehyde", "formalin preservative", "methylene glycol", "formaldehyde 5%", "methylene oxide", HCHO, Morbicide, "formic aldehyde", oxomethane, Formol, oxymethylene, Fyde, paraform, Lysoform, "polyoxymethylene glycol", Karsan, Superlysoform, "formalin, dilute"

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Causes burns.

Risk of serious damage to eyes.

May cause SENSITIZATION by skin contact.

Limited evidence of a carcinogenic effect.

Toxic by inhalation, in contact with skin and if swallowed.

Harmful: possible risk of irreversible effects through inhalation, in contact with skin and if swallowed.

Harmful to aquatic organisms.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.

■ The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

■ Ingestion of formaldehyde may cause immediate severe abdominal pain, with vomiting, nausea, diarrhoea, anuria, dizziness, followed by unconsciousness, convulsions and may result in death.

The methanol stabiliser in solutions is a cause of visual impairment and possible permanent blindness.

EYE

■ The material can produce chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.

■ If applied to the eyes, this material causes severe eye damage.

■ Irritation of the eyes may produce a heavy secretion of tears (lachrymation).

SKIN

■ Skin contact with the material may produce toxic effects; systemic effects may result following absorption.

■ The material can produce chemical burns following direct contact with the skin.

■ The material may cause moderate 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.

■ Minor regular skin contact with formaldehyde results in hardening of skin - tanning.

Formaldehyde is a sensitising agent capable of inducing contact dermatitis. Episodes of contact dermatitis have been observed amongst workers exposed to formaldehyde in hospitals, in the production of formaldehyde resins, textiles, shampoos and laminated furniture. Contact urticaria has also been reported as a result of dermal exposure.

■ 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

■ If inhaled, this material can irritate the throat and lungs of some persons.

■ Inhalation of vapors or aerosols (mists, fumes), generated by the material during the course of normal handling, may produce toxic effects.

■ Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.

■ Inhalation of vapour at relatively low concentrations may cause a tingling sensation in the nose and upper respiratory tract. Slightly higher concentrations may cause a burning sensation, headache. High vapour concentrations of formaldehyde are capable of causing chest constriction, bronchiopneumonia, dysphagia, oedema, spasms of the larynx and dyspnoea.

■ Minor but regular methanol exposures may affect the central nervous system, optic nerves and retinae. Symptoms may be delayed, with headache, fatigue, nausea, blurring of vision and double vision. Continued or severe exposures may cause damage to optic nerves, which may become severe with permanent visual impairment even blindness resulting.

WARNING: Methanol is only slowly eliminated from the body and should be regarded as a cumulative poison which cannot be made non-harmful [CCINFO].

CHRONIC HEALTH EFFECTS

■ There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.

■ Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.

There is sufficient evidence to suggest that this material directly causes cancer in humans.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.

When administered by inhalation, formaldehyde induced squamous cell carcinomas of the nasal cavity in rats of both sexes. Although excess occurrence of a number of cancers has been reported in humans, the evidence for a possible involvement of formaldehyde is strongest for nasal and nasopharyngeal cancer. The occurrence of these cancers showed an exposure-response gradient in more than one study, but the numbers of exposed cases were often small and some studies did not show excesses in humans. Formaldehyde exposure has been associated with cancers of the lung, nasopharynx and oropharynx and nasal passages.

Several investigations have concluded that specific respiratory sensitisation occurs based on positive bronchial provocation tests amongst formaldehyde-exposed workers. These studies have been criticised for methodological reasons. One large study however revealed that 5% of persons exposed to formaldehyde and had asthma-like symptoms met the study criteria for formaldehyde-induced asthma; this included a positive response on a bronchial provocation test with 2.5 mg/m³ formaldehyde. Although differential individual sensitivity has been established, the mechanism for this increased sensitivity is unknown.

There is limited evidence that formaldehyde has any adverse effect on reproduction or development in humans. An investigation of reproductive function in female workers exposed to formaldehyde in the garment industry, revealed an increased incidence of menstrual disorders, inflammatory disease of the reproductive tract, sterility, anaemia, and low birth weights amongst off-spring.

Long-term exposure to methanol vapor, at concentrations exceeding 3000 ppm, may produce cumulative effects characterized by gastrointestinal disturbances (nausea, vomiting), headache, ringing in the ears, insomnia, trembling, unsteady gait, vertigo, conjunctivitis and clouded or double vision. Liver and/or kidney injury may also result. Some individuals show severe eye damage following prolonged exposure to 800 ppm of the vapor.

HAZARD RATINGS

		Min	Max	
Flammability:	1			
Toxicity:	3			
Body Contact:	3			
Reactivity:	1			
Chronic:	4			

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



NAME	CAS RN	%
formaldehyde	50-00-0	37-54
methanol	67-56-1	1-7
formic acid	64-18-6	trace
water	7732-18-5	Balance

* Note: Formaldehyde gas is absorbed and stabilised in methanol and water at the point of manufacture.

Section 4 - FIRST AID MEASURES

SWALLOWED

- For advice, contact a Poisons Information Center or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- 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.
- Transport to hospital or doctor without delay.

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 Center 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 or hair contact occurs:
 - Immediately flush body and clothes with large amounts of water, using safety shower if available.
 - Quickly remove all contaminated clothing, including footwear.
 - Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
 - Transport to hospital, or doctor.

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

- For acute or short-term repeated exposures to formaldehyde:

INGESTION:

- Patients present early with severe corrosion of the gastro-intestinal tract and systemic effects.
- Inflammation and ulceration may progress to strictures.
- Severe acidosis results from rapid conversion of formaldehyde to formic acid. Coma, hypotension, renal failure and apnea complicate ingestion.
- Decontaminate by dilution with milk or water containing ammonium acetate; vomiting should be induced. Follow with gastric lavage using a weak ammonia solution (converts formaldehyde to relatively inert pentamethylenetetramine)
- Gastric lavage is warranted only in first 15 minutes following ingestion.

SKIN:

- Formaldehyde can combine with epidermal protein to produce a hapten-protein complex capable of sensitizing T-lymphocytes. Subsequent exposures cause a type IV hypersensitivity reaction (i.e. allergic contact dermatitis).

[Ellenhorn Barceloux: Medical Toxicology].

For acute and short term repeated exposures to methanol:

- Toxicity results from accumulation of formaldehyde/formic acid.

- Clinical signs are usually limited to CNS, eyes and GI tract. Severe metabolic acidosis may produce dyspnea and profound systemic effects which may become intractable. All symptomatic patients should have arterial pH measured. Evaluate airway, breathing and circulation.
- Stabilise obtunded patients by giving naloxone, glucose and thiamine.
- Decontaminate with ipecac or lavage for patients presenting 2 hours post-ingestion. Charcoal does not absorb well; the usefulness of cathartic is not established.
- Forced diuresis is not effective; hemodialysis is recommended where peak methanol levels exceed 50 mg/dL (this correlates with serum bicarbonate levels below 18 mEq/L)
- Ethanol, maintained at levels between 100 and 150 mg/dL, inhibits formation of toxic metabolites and may be indicated when peak methanol levels exceed 20 mg/dL. An intravenous solution of ethanol in D5W is optimal.
- Folate, as leucovorin, may increase the oxidative removal of formic acid. 4-methylpyrazole may be an effective adjunct in the treatment.
- Phenytoin may be preferable to diazepam for controlling seizure.

[Ellenhorn Barceloux: Medical Toxicology] BIOLOGICAL EXPOSURE INDEX - BEI

Determinant	Index	Sampling Time	Comment
1. Methanol in urine	15 mg/l	End of shift	B, NS
2. Formic acid in urine	80 mg/gm creatinine	Before the shift at end of workweek	B, NS

B: Background levels occur in specimens collected from subjects NOT exposed.

NS: Non-specific determinant - observed following exposure to other materials.

* Preplacement and periodic medical examinations are recommended for workers exposed to formalin. Examinations should give consideration to possible irritant effects on the skin, eyes, lungs, especially if the person has a history of allergies

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not available.
Upper Explosive Limit (%):	73
Specific Gravity (water=1):	1.09 - 1.14
Lower Explosive Limit (%):	7

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.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- 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.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

-
- Combustible.
- Slight fire hazard when exposed to heat or flame.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).
- May emit acrid smoke.
- Mists containing combustible materials may be explosive.

Combustion products include: carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.

May emit corrosive fumes.

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.

Full face- shield.

Gloves:

1.BUTYL 2.NEOPRENE/NATURAL

Respirator:

Type BEAX-P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

-
- Clean up all spills immediately.

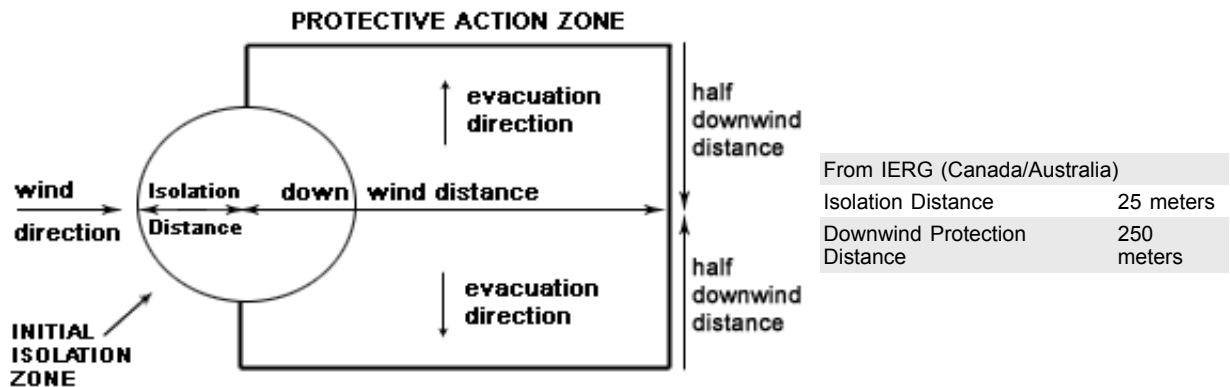
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labeled container for waste disposal.

MAJOR SPILLS

-
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by all means available, spillage from entering drains or water courses.
- Consider evacuation (or protect in place).
- 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.
- Contain or absorb spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

Neutralise spill with aqueous ammonia, or complex with sodium bisulphite. Wash residue with dilute ammonia to eliminate vapour.

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 132 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.

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:

formaldehyde solutions - non flammable	25ppm
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irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

formaldehyde solutions - non	
------------------------------	--

formaldehyde solutions - non
flammable 10ppm

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

formaldehyde solutions - non
flammable 1ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according exceed 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

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

-
- DO NOT allow clothing wet with material to stay in contact with skin
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with moisture.
- 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. Launder contaminated clothing before re-use.
- 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.

RECOMMENDED STORAGE METHODS

- Glass container.
- Lined metal can, Lined metal pail/drum
- Plastic pail
- Polyliner drum
- Packing as recommended by manufacturer.
- Check all containers are clearly labeled and free from leaks.

For low viscosity materials

- Drums and jerricans must be of the non-removable head type.
- 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) and solids (between 15 C deg. and 40 deg C.):

- Removable head packaging;
- Cans with friction closures and
- low pressure tubes and cartridges may be used.

- Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages 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.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- 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

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	formaldehyde solutions - non flammable (FORMALDEHYDE)	0.04							
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	formaldehyde solutions - non flammable (FORMALDEHYDE)	0.03							
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	formaldehyde solutions - non flammable (FORMALDEHYDE)	0.008							
Canada - Ontario Occupational Exposure Limits	formaldehyde solutions - non flammable (Formaldehyde)	1	1.5	2	3				
US NIOSH Recommended Exposure Limits (RELs)	formaldehyde solutions - non flammable (Formaldehyde)	0.016				0.1			
US ACGIH Threshold Limit Values (TLV)	formaldehyde solutions - non flammable (Formaldehyde)					0.3			TLV Basis: upper respiratory tract & eye irritation
US NIOSH Recommended Exposure Limits (RELs)	formaldehyde solutions - non flammable (Formalin (as formaldehyde))	0.016				0.1			
Canada - British Columbia Occupational Exposure Limits	formaldehyde solutions - non flammable (Formaldehyde)	0.3				1			A2, 1; S
Canada - Alberta Occupational Exposure Limits	formaldehyde solutions - non flammable (Formaldehyde)	0.75	0.9			1	1.3		
US - Idaho - Acceptable Maximum Peak Concentrations	formaldehyde solutions - non flammable (Formaldehyde (Z37.16-1967))	3				5			
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	formaldehyde solutions - non flammable (Rosin core solder pyrolysis products, as formaldehyde)		0.1						
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	formaldehyde solutions - non flammable (Formaldehyde; see 1910.1048)	3				5			
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	formaldehyde solutions - non flammable (Formaldehyde; see 1910.1048)		See Table Z-2 for						
US - California Permissible Exposure Limits for Chemical Contaminants	formaldehyde solutions - non flammable (Rosin core solder, pyrolysis products, as formaldehyde)		0.1						
US - California Permissible Exposure Limits for Chemical Contaminants	formaldehyde solutions - non flammable (Formaldehyde, see Section 5217)	0.75		2					
US - Alaska Limits for Air Contaminants	formaldehyde solutions - non flammable (Rosin core solder pyrolysis products, as formaldehyde)		0.1						
US - Michigan Exposure Limits for Air Contaminants	formaldehyde solutions - non flammable (Formaldehyde; see R325.51451 et seq.F)	0.75	0.9	2	2.5				
US - Oregon Permissible Exposure Limits (Z1)	formaldehyde solutions - non flammable (Rosin core solder pyrolysis products (as Formaldehyde))		0.1						*
US - Oregon Permissible Exposure	formaldehyde solutions - non flammable	0.75							(TWA (See

Limits (Z1)	non flammable (Formaldehyde)	0.75				1910.1048))
US - Hawaii Air Contaminant Limits	formaldehyde solutions - non flammable (Formaldehyde)	0.75				See 12- 202-37
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	formaldehyde solutions - non flammable (Rosin core solder pyrolysis products (as formaldehyde))	-	0.1	-	0.3	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	formaldehyde solutions - non flammable (Formaldehyde)	2	3	-	-	
US - Washington Permissible exposure limits of air contaminants	formaldehyde solutions - non flammable (Formaldehyde (see chapter 296-856 WAC))	0.75				2
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	formaldehyde solutions - non flammable (Formaldehyde)				0.3	SEN, T20
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	formaldehyde solutions - non flammable (Formaldehyde)				2	3
US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	formaldehyde solutions - non flammable (Formaldehyde: see 1910.1048)	0.75				2
US OSHA Permissible Exposure Levels (PELs) - Table Z1	formaldehyde solutions - non flammable (Formaldehyde; see 1910.1048)	0.75				2
US OSHA Permissible Exposure Levels (PELs) - Table Z2	formaldehyde solutions - non flammable (Formaldehyde; see 1910.1048)				2	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	formaldehyde solutions - non flammable (Formaldehyde; see 1910.1048)	0.75				2
Canada - Northwest Territories Occupational Exposure Limits (English)	formaldehyde solutions - non flammable (Formaldehyde)				2	2.4
Canada - Northwest Territories Occupational Exposure Limits (English)	formaldehyde solutions - non flammable (Rosin core solder pyrolysis products (as formaldehyde))				0.1	0.3
US - Oregon Permissible Exposure Limits (Z2)	formaldehyde solutions - non flammable (Formaldehyde (see 1910.1048))	0.75				
Canada - Prince Edward Island Occupational Exposure Limits	formaldehyde solutions - non flammable (Formaldehyde)				0.3	TLV Basis: upper respiratory tract & eye irritation
Canada - Nova Scotia Occupational Exposure Limits	formaldehyde solutions - non flammable (Formaldehyde)				0.3	TLV Basis: upper respiratory tract & eye irritation
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	formaldehyde (FORMALDEHYDE)	0.04				
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	formaldehyde (FORMALDEHYDE)	0.03				
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	formaldehyde (FORMALDEHYDE)	0.008				
Canada - Ontario Occupational Exposure Limits	formaldehyde (Formaldehyde)	1	1.5	2	3	
US NIOSH Recommended Exposure Limits (RELs)	formaldehyde (Formaldehyde)	0.016				0.1
US ACGIH Threshold Limit Values	formaldehyde				0.3	TLV Basis: upper respiratory

(TLV)	(Formaldehyde)	0.3				respiratory tract & eye irritation
US NIOSH Recommended Exposure Limits (RELs)	formaldehyde (Formalin (as formaldehyde))	0.016		0.1		
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US - California Permissible Exposure Limits for Chemical Contaminants	formaldehyde (Rosin core solder, pyrolysis products, as formaldehyde)		0.1			
US - California Permissible Exposure Limits for Chemical Contaminants	formaldehyde (Formaldehyde, see Section 5217)	0.75		2		
US - Alaska Limits for Air Contaminants	formaldehyde (Rosin core solder pyrolysis products, as formaldehyde)		0.1			
US - Michigan Exposure Limits for Air Contaminants	formaldehyde (Formaldehyde; see R325.51451 et seq.F)	0.75	0.9	2	2.5	
US - Oregon Permissible Exposure Limits (Z1)	formaldehyde (Rosin core solder pyrolysis products (as Formaldehyde))		0.1			*
US - Oregon Permissible Exposure Limits (Z1)	formaldehyde (Formaldehyde)	0.75				(TWA (See 1910.1048))
US - Hawaii Air Contaminant Limits	formaldehyde (Formaldehyde)	0.75				See 12-202-37
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	formaldehyde (Rosin core solder pyrolysis products (as formaldehyde))	-	0.1	-	0.3	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	formaldehyde (Formaldehyde)	2	3	-	-	
US - Washington Permissible exposure limits of air contaminants	formaldehyde (Formaldehyde (see chapter 296-856 WAC))	0.75		2		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	formaldehyde (Formaldehyde)			0.3		SEN, T20
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	formaldehyde (Formaldehyde)			2	3	
US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	formaldehyde (Formaldehyde: see 1910.1048)	0.75		2		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	formaldehyde (Formaldehyde; see 1910.1048)	0.75		2		
US OSHA Permissible Exposure Levels (PELs) - Table Z2	formaldehyde (Formaldehyde; see 1910.1048)			2		
US - Wyoming Toxic and	formaldehyde					

Hazardous Substances Table Z1 Limits for Air Contaminants	(Formaldehyde; see 1910.1048)	0.75	2				
Canada - Northwest Territories Occupational Exposure Limits (English)	formaldehyde (Formaldehyde)				2	2.4	
Canada - Northwest Territories Occupational Exposure Limits (English)	formaldehyde (Rosin core solder pyrolysis products (as formaldehyde))	0.1		0.3			
US - Oregon Permissible Exposure Limits (Z2)	formaldehyde (Formaldehyde (see 1910.1048))	0.75					
Canada - Prince Edward Island Occupational Exposure Limits	formaldehyde (Formaldehyde)				0.3		TLV Basis: upper respiratory tract & eye irritation
Canada - Nova Scotia Occupational Exposure Limits	formaldehyde (Formaldehyde)				0.3		TLV Basis: upper respiratory tract & eye irritation
Canada - British Columbia Occupational Exposure Limits	methanol (Methanol)	200		250			Skin
Canada - Ontario Occupational Exposure Limits	methanol (Methanol)	200	260	250	325		Skin
US - Minnesota Permissible Exposure Limits (PELs)	methanol (Methyl alcohol)	200	260	250	325		
US ACGIH Threshold Limit Values (TLV)	methanol (Methanol)	200		250			TLV Basis: headache; eye damage. BEI
US NIOSH Recommended Exposure Limits (RELs)	methanol (Methyl alcohol)	200	260	250	325		
Canada - Alberta Occupational Exposure Limits	methanol (Methanol (Methyl alcohol))	200	262	250	328		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	methanol (Methyl alcohol)	200	260	250	325		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	methanol (Methyl alcohol)	200	260				
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	methanol (Methyl alcohol)	200	260	250	310		
US - California Permissible Exposure Limits for Chemical Contaminants	methanol (Methyl alcohol; methanol)	200	260	250	325	1000	
US - Idaho - Limits for Air Contaminants	methanol (Methyl alcohol)	200	260				
US - Hawaii Air Contaminant Limits	methanol (Methyl alcohol (methanol))	200	260	250	325		
US - Alaska Limits for Air Contaminants	methanol (Methyl alcohol (Methanol))	200	260	250	310		
US - Michigan Exposure Limits for Air Contaminants	methanol (Methyl alcohol)	200	260	250	325		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	methanol (Methyl alcohol (methanol) - Skin)	200	260	250	310		
US - Washington Permissible exposure limits of air contaminants	methanol (Methanol (Methyl alcohol))	200		250			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	methanol (Methyl alcohol (methanol))	200		250			Skin
US - Oregon Permissible Exposure Limits (Z1)	methanol (Methyl alcohol (methanol))	200	260				
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	methanol (Methyl alcohol)	200	260				
Canada - Quebec Permissible Exposure Values for Airborne	methanol (Methyl alcohol)	200	262	250	328		

Contaminants (English)	alcohol)				
US OSHA Permissible Exposure Levels (PELs) - Table Z1	methanol (Methyl alcohol)	200	260		
Canada - Northwest Territories Occupational Exposure Limits (English)	methanol (Methyl alcohol (Methanol) - Skin)	200	262	250	328
Canada - Nova Scotia Occupational Exposure Limits	methanol (Methanol)	200		250	TLV Basis: headache; eye damage. BEI
Canada - Prince Edward Island Occupational Exposure Limits	methanol (Methanol)	200		250	TLV Basis: headache; eye damage. BEI

The following materials had no OELs on our records

- water: CAS:7732-18-5

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
formaldehyde solutions - non flammable		20
formaldehyde		20
methanol		6,000

MATERIAL DATA

FORMALDEHYDE SOLUTIONS - NON FLAMMABLE:

FORMALDEHYDE:

- Odour Threshold Value for formaldehyde: 0.98 ppm (recognition)

NOTE: Detector tubes for formaldehyde, measuring in excess of 0.2 ppm are available commercially.

Formaldehyde vapour exposure:

Primary irritation is dependent on duration of exposure and individual susceptibility.

The following are typical symptoms encountered at various exposure levels.

0.1 ppm - Lower level of mucous eye, nose and throat irritation

0.8 ppm - Typical threshold of perception

1-2 ppm - Typical threshold of irritation

2-3 ppm - Irritation of eyes, nose and throat

4-5 ppm - Increased irritation, tearing, headache, pungent odour

10-20 ppm - Profuse tearing, severe burning, coughing

50 ppm - Serious bronchial and alveolar damage

100 ppm - Formaldehyde induced chemical pneumonia and death

Despite the intent of the TLV Ceiling recommendation it is believed that 0.3 ppm will not protect that portion of the workforce (up to 20%) reported to be responsive to low ambient concentrations. Because of the dose-related carcinogenic activity for rat and mouse inhalation of formaldehyde, the report of macromolecular adducts in the upper and lower respiratory tracts of nonhuman primates following inhalation of formaldehyde, the human case reports of upper respiratory tract malignant melanoma associated with

formaldehyde inhalation and the suggestive epidemiologic data on human cancer risk, the TLV Committee recommends that workplace formaldehyde air concentrations be reduced to the lowest possible levels that can be achieved using engineering controls.

Odour Safety Factor(OSF)

OSF=0.36 (FORMALDEHYDE).

METHANOL:

- For methanol:

Odour Threshold Value: 4.2-5960 ppm (detection), 53.0-8940 ppm (recognition)

NOTE: Detector tubes for methanol, measuring in excess of 50 ppm, are commercially available.

Exposure at or below the recommended TLV-TWA is thought to substantially reduce the significant risk of headache, blurred vision and other ocular and systemic effects.

Odour Safety Factor (OSF)

OSF=2 (METHANOL).

WATER:

- No exposure limits set by NOHSC or ACGIH.

PERSONAL PROTECTION



Consult your EHS staff for recommendations

EYE

-
- Chemical goggles.
- Full face shield.
- 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 or safety gumboots, eg. Rubber.

- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

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

-
- Prior to each exit from an area containing confirmed human carcinogens, employees should be required to remove and leave protective clothing and equipment at the point of exit and at the last exit of the day, to place used clothing and equipment in impervious containers at the point of exit for purposes of decontamination or disposal. The contents of such impervious containers must be identified with suitable labels. For maintenance and decontamination activities, authorized employees entering the area should be provided with and required to wear clean, impervious garments, including gloves, boots and continuous-air supplied hood.
- Prior to removing protective garments the employee should undergo decontamination and be required to shower upon removal of the garments and hood.
- Employees working with confirmed human carcinogens should be provided with, and be required to wear, clean, full body protective clothing (smocks, coveralls, or long-sleeved shirt and pants), shoe covers and gloves prior to entering the regulated area.
- Employees engaged in handling operations involving carcinogens should be provided with, and required to wear and use half-face filter-type respirators with filters for dusts, mists and fumes, or air purifying canisters or cartridges. A respirator affording higher levels of protection may be substituted.
- Emergency deluge showers and eyewash fountains, supplied with potable water, should be located near, within sight of, and on the same level with locations where direct exposure is likely.
- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.

Personnel must be made aware of the hazards of handling formaldehyde solutions and trained to deal with emergency situations involving the material.

GLOVE SELECTION INDEX

- Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the computer-generated selection: formaldehyde solutions - non flammable

- Protective Material CPI *.

BUTYL	A
NEOPRENE/NATURAL	A
NITRILE	A
PE	A
PE/EVAL/PE	A
VITON	A
PVC	A
NEOPRENE	A
TEFLON	A
NATURAL+NEOPRENE	B
NATURAL RUBBER	B

- * CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

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	BEAX-1 P	-
1000	50	-	BEAX-1 P
5000	50	Airline*	-
5000	100	-	BEAX-2 P
10000	100	-	BEAX-3 P
	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

- Employees exposed to confirmed human carcinogens should be authorized to do so by the employer, and work in a regulated area.
- Work should be undertaken in an isolated system such as a "glove-box" . Employees should wash their hands and arms upon completion of the assigned task and before engaging in other activities not associated with the isolated system.
- Within regulated areas, the carcinogen should be stored in sealed containers, or enclosed in a closed system, including piping systems, with any sample ports or openings closed while the carcinogens are contained within.
- Open-vessel systems are prohibited.
- Each operation should be provided with continuous local exhaust ventilation so that air movement is always from ordinary work areas to the operation.
- Exhaust air should not be discharged to regulated areas, non-regulated areas or the external environment unless decontaminated. Clean make-up air should be introduced in sufficient volume to maintain correct operation of the local exhaust system.
- For maintenance and decontamination activities, authorized employees entering the area should be provided with and required to wear clean, impervious garments, including gloves, boots and continuous-air supplied hood. Prior to removing protective garments the employee should undergo decontamination and be required to shower upon removal of the garments and hood.
- Except for outdoor systems, regulated areas should be maintained under negative pressure (with respect to non-regulated areas).
- Local exhaust ventilation requires make-up air be supplied in equal volumes to replaced air.
- Laboratory hoods must be designed and maintained so as to draw air inward at an average linear face velocity of 150 feet/ min. with a minimum of 125 feet/ min. Design and construction of the fume hood requires that insertion of any portion of the employees body, other than hands and arms, be disallowed.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.

Mixes with water.

Corrosive.

Toxic or noxious vapors/ gas.

State	Liquid	Molecular Weight	Not applicable.
Melting Range (°F)	Not available.	Viscosity	Not Available
Boiling Range (°F)	212	Solubility in water (g/L)	Miscible
Flash Point (°F)	147.2- 185	pH (1% solution)	Not available.
Decomposition Temp (°F)	Not Applicable	pH (as supplied)	2.4 - 4.0
Autoignition Temp (°F)	806	Vapour Pressure (mmHG)	Not available.
Upper Explosive Limit (%)	73	Specific Gravity (water=1)	1.09 - 1.14
Lower Explosive Limit (%)	7	Relative Vapor Density (air=1)	1.04
Volatile Component (%vol)	>44	Evaporation Rate	Not available

APPEARANCE

Clear, water-white liquid with pungent odour. On standing, especially when cold, may become cloudy. On exposure to low temperatures a precipitate of trioxymethylene is formed. Mixes with water, alcohol, acetone. The formaldehyde vapourises readily from solution and is flammable in air. Odour threshold is approx. 1ppm.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

-
- Presence of heat source and ignition source
- Contact with alkaline material liberates heat
- Presence of incompatible materials.

- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

■

- Incidents involving interaction of active oxidants and reducing agents, either by design or accident, are usually very energetic and examples of so-called redox reactions.

Reacts with mild steel, galvanized steel / zinc producing hydrogen gas which may form an explosive mixture with air.

Formaldehyde:

- is a strong reducing agent
- may polymerise in air unless properly inhibited (usually with methanol up to 15%) and stored at controlled temperatures
- will polymerize with active organic material such as phenol
- reacts violently with strong oxidisers, hydrogen peroxide, potassium permanganate, acrylonitrile, caustics (sodium hydroxide, yielding formic acid and flammable hydrogen), magnesium carbonate, nitromethane, nitrogen oxides (especially at elevated temperatures), peroxyformic acid
- is incompatible with strong acids (hydrochloric acid forms carcinogenic bis(chloromethyl)ether*), amines, ammonia, aniline, bisulfides, gelatin, iodine, magnesite, phenol, some monomers, tannins, salts of copper, iron, silver.
- acid catalysis can produce impurities: methylal, methyl formate

Aqueous solutions of formaldehyde:

- slowly oxidise in air to produce formic acid
- attack carbon steel

Concentrated solutions containing formaldehyde are:

- unstable, both oxidising slowly to form formic acid and polymerising; in dilute aqueous solutions formaldehyde appears as monomeric hydrate (methylene glycol) - the more concentrated the solution the more polyoxymethylene glycol occurs as oligomers and polymers (methanol and amine-containing compounds inhibit polymer formation)
- readily subject to polymerisation, at room temperature, in the presence of air and moisture, to form paraformaldehyde (8-100 units of formaldehyde), a solid mixture of linear polyoxymethylene glycols containing 90-99% formaldehyde; a cyclic trimer, trioxane (CH₂O₃), may also form.

Flammable and/or toxic gases are generated by the combination of aldehydes with azo, diazo compounds, dithiocarbamates, nitrides, and strong reducing agents.

*The empirical equation may be used to determine the concentration of bis(chloromethyl)ether (BCME) formed by reaction with HCl:

$$\log(\text{BCME})\text{ppb} = -2.25 + 0.67 \log(\text{HCHO}) \text{ ppm} + 0.77 \log(\text{HCl})\text{ppm}$$

Assume values for formaldehyde, in air, of 1 ppm and for HCl of 5 ppm, resulting BCME concentration, in air, would be 0.02 ppb.

- Avoid strong bases.

Avoid reaction with oxidizing agents.

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

Section 11 - TOXICOLOGICAL INFORMATION

formaldehyde solutions - non flammable

TOXICITY AND IRRITATION

METHANOL:

FORMALDEHYDE:

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
- Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitization potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitizing substance which is widely distributed can be a more important allergen than one with stronger sensitizing potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

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 produce respiratory tract irritation, and result in damage to the lung including reduced lung function.

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.

TOXICITY

IRRITATION

FORMALDEHYDE:

Oral (woman) LDLo: 108 mg/kg

Skin (human): 0.15 mg/3d-I Mild

Oral (man) TDLo: 643 mg/kg

Skin (rabbit): 2 mg/24H SEVERE

Oral (rat) LD50: 100 mg/kg

Eye (human): 4 ppm/5m

Inhalation (man) TClO: 0.3 mg/m³

Eye (rabbit): 0.75 mg/24H SEVERE

Inhalation (rat) LC50: 203 mg/m³

Dermal (rabbit) LD50: 270 mg/kg

■ Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitization potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitizing substance which is widely distributed can be a more important allergen than one with stronger sensitizing potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

The material may produce severe irritation to the eye causing pronounced 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.

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.

WARNING: This substance has been classified by the IARC as Group 1: CARCINOGENIC TO HUMANS.

Tenth Annual Report on Carcinogens: Substance anticipated to be Carcinogen

[National Toxicology Program: U.S. Dep. of Health & Human Services 2002].

METHANOL:

Oral (human) LDLo: 143 mg/kg Skin (rabbit): 20 mg/24 h-Moderate

Oral (man) LDLo: 6422 mg/kg Eye (rabbit): 40 mg-Moderate

Oral (man) TDLo: 3429 mg/kg Eye (rabbit): 100 mg/24h-Moderate

Oral (rat) LD50: 5628 mg/kg

Inhalation (human) TCLo: 86000 mg/m³

Inhalation (human) TCLo: 300 ppm

Inhalation (rat) LC50: 64000 ppm/4h

Dermal (rabbit) LD50: 15800 mg/kg

■ 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.

CARCINOGEN

Formaldehyde	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	1
Formaldehyde	US EPA Carcinogens Listing	Carcinogenicity	B1
Formaldehyde	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	B1
Formaldehyde	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A2
FORMALDEHYDE	US Environmental Defense Scorecard Recognized Carcinogens	Reference(s)	P65
FORMALDEHYDE	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65
Formaldehyde	US Air Toxics Hot Spots TSD for Describing Available Cancer Potency Factors	IARC Class	2A
Formaldehyde	US NIOSH Recommended Exposure Limits (RELs) - Carcinogens	Carcinogen	Ca

SKIN

methanol	Canada - Ontario Occupational Exposure Limits - Skin	Notes	Skin
methanol	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	Skin
methanol	US NIOSH Recommended Exposure Limits (RELs) - Skin	Skin	Yes
methanol	Canada - Quebec Permissible Exposure Values for Airborne Contaminants - Skin (French)	Notes	Skin
methanol	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	X
methanol	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin	Skin Designation	X
methanol	US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X
methanol	US ACGIH Threshold Limit Values (TLV) - Skin	Skin Designation	Yes
methanol	Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
methanol	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	X

methanol	US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
methanol	ND	Skin Designation	X
methanol	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X
methanol	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	X
methanol	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S
methanol	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

FORMALDEHYDE:

METHANOL:

FORMALDEHYDE SOLUTIONS - NON FLAMMABLE:

■ DO NOT discharge into sewer or waterways.

FORMALDEHYDE:

FORMALDEHYDE SOLUTIONS - NON FLAMMABLE:

■ The material is classified as an ecotoxin* because the Fish LC50 (96 hours) is less than or equal to 0.1 mg/l

* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

■ For formaldehyde:

Environmental fate:

Formaldehyde is ubiquitous in the environment as a contaminant of smoke and as photochemical smog.

In the atmosphere, formaldehyde both photolyses and reacts with reactive free radicals (primarily hydroxyl radicals); half-lives in the sunlit tropospheres are 1.25 to 6 hours for photolysis, and 7.13-71.3 hours for reaction with hydroxyl radicals).

Reaction with nitrate radicals, insignificant during the day, may be an important removal process at night. Due to its solubility, formaldehyde will efficiently transfer to rain and surface water; one model predicts dry deposition and wet removal half-lives of 19 and 50 hours, respectively.

In water, formaldehyde will biodegrade to low concentrations within days; adsorption to sediment and volatilisation are not expected to be significant routes.

In soil, aqueous solutions of formaldehyde leach through the soil; at high concentrations adsorption to clay minerals may occur. Although biodegradable under both aerobic and anaerobic conditions the fate of formaldehyde in soil is unclear.

It does not bioconcentrate in the food chain.

Concentrated solutions containing formaldehyde are unstable, both oxidising slowly to form formic acid and polymerising. In the presence of air and moisture, polymerisation takes place readily in concentrated solutions at room temperature to form paraformaldehyde, a solid mixture of linear polyoxymethylene glycols containing 90-99% formaldehyde.

Drinking Water Standards:

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

pesticide: 0.1 ug/l (UK max.)

formaldehyde: 900 ug/l (WHO guideline)

Air Quality Standards:

<0.1 mg/m³ as a 30 min. average, indoor air, non-industrial buildings (WHO guideline).

■ Prevent, by any means available, spillage from entering drains or watercourses.

■ Harmful to aquatic organisms.

FORMALDEHYDE SOLUTIONS - NON FLAMMABLE:

FORMALDEHYDE:

■ Hazardous Air Pollutant:	Yes
■ Fish LC50 (96hr.) (mg/l):	96- 7200
■ Daphnia magna EC50 (48hr.) (mg/l):	2
■ Algae IC50 (72hr.) (mg/l):	0.39- 14
■ log Kow (Prager 1995):	0.35
■ log Kow (Sangster 1997):	0.35
■ log Pow (Verschueren 1983):	0
■ BOD5:	60%
■ BOD20:	1.228
■ COD:	100%
■ ThOD:	1.068
■ Half- life Soil - High (hours):	168
■ Half- life Soil - Low (hours):	24
■ Half- life Air - High (hours):	6
■ Half- life Air - Low (hours):	1.25
■ Half- life Surface water - High (hours):	168
■ Half- life Surface water - Low (hours):	24
■ Half- life Ground water - High (hours):	336
■ Half- life Ground water - Low (hours):	48
■ Aqueous biodegradation - Aerobic - High (hours):	168
■ Aqueous biodegradation - Aerobic - Low (hours):	24

■ Aqueous biodegradation - Anaerobic - High (hours):	672
■ Aqueous biodegradation - Anaerobic - Low (hours):	96
■ Aqueous biodegradation - Removal secondary treatment - High (hours):	99%
■ Aqueous biodegradation - Removal secondary treatment - Low (hours):	57%
■ Aqueous photolysis half- life - High (hours):	6
■ Aqueous photolysis half- life - Low (hours):	1.25
■ Photooxidation half- life water - High (hours):	1.90E+05
■ Photooxidation half- life water - Low (hours):	4813
■ Photooxidation half- life air - High (hours):	71.3
■ Photooxidation half- life air - Low (hours):	7.13

log Kow: 0-0.35

Half-life (hr) air: 19-50

Henry's atm m³ /mol: 3.27E-07

BOD 5 if unstated: 0-1.1,60%

COD: 1.06,100%

ThOD: 1.068

METHANOL:

■ For methanol:

log Kow : -0.82- -0.66

Half-life (hr) air : 427

Half-life (hr) H₂O surface water : 5.3-64

Henry's atm m³ /mol: 1.35E-04

BOD 5 0.76-1.12

COD : 1.05-1.50, 99%

ThOD : 1.5

BCF : 0.2-10

Environmental Fate

TERRESTRIAL FATE: An estimated Koc value of 1 indicates that methanol is expected to have very high mobility in soil. Volatilisation of methanol from moist soil surfaces is expected to be an important fate process given a Henry's Law constant of 4.55x10⁻⁶ atm-cu m/mole. The potential for volatilisation of methanol from dry soil surfaces may exist based upon a vapor pressure of 127 mm Hg. Biodegradation is expected to be an important fate process for methanol based on half-lives of 1 and 3.2 days measured in a sandy silt loam and sandy loam from Texas and Mississippi, respectively.

AQUATIC FATE: The estimated Koc indicates that methanol is not expected to adsorb to suspended solids and sediment. Volatilization from water surfaces is expected based upon a Henry's Law constant Using this Henry's Law constant estimated volatilisation half-lives for a model river and model lake are 3 and 35 days, respectively. A BCF of less than 10 measured in fish, suggests bioconcentration in aquatic organisms is low. Hydrolysis and photolysis in sunlit surface waters is not expected to be an important environmental fate process for methanol since this compound lacks functional groups that hydrolyse or absorb light under environmentally relevant conditions. Methanol has been shown to undergo rapid biodegradation in a variety of screening studies using sewage seed and activated sludge inoculum, which suggests that biodegradation will occur in aquatic environments.

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere and vapour pressure, methanol is expected to exist solely as a vapor in the ambient atmosphere. Vapour-phase methanol is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals(SRC); the half-life for this reaction in air is estimated to be 17 days, calculated from its rate constant of 9.4x10⁻¹³ cu cm/molecule-sec at 25 deg C

Ecotoxicity:

Fish LC50 (96 h) fathead minnow (*Pimephales promelus*) 29000 mg/l; rainbow trout (*Oncorhynchus mykiss*) 19000 mg/l; bluegill

(*Lepomis macrochirus*) 15400 mg/l

Fish LC50 (7 d): guppy 10860 mg/l (14 d): 11.5 mg/l (semistatic)

Daphnia pulex LC50 (18 h): 19500 mg/l

Brine shrimp (*Artemia salina*) LC50 24 h): 1101.46-1578.84 mg/l (static)

Brown shrimp (*Crangon crangon*) LC50 (96 h): 1340 mg/l (semistatic)

Mussel (*Mytilus edulis*) LC50 (96 h): 15900 mg/l

Marine bacterium (*Photobacterium phosphoreum*) LC50 (4 h): 7690 mg/l

Protozoa (*Tetrahymena pyriformis*) LC50 (48 h) 18756 mg/l.

WATER:

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
formaldehyde solutions	LOW	LOW	LOW	HIGH
non flammable				
formaldehyde	LOW	LOW	LOW	HIGH
methanol	LOW		LOW	HIGH
water	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

Corrosivity characteristic: use EPA hazardous waste number D002 (waste code C)

B. Component Waste Numbers

When formaldehyde solutions - non flammable 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 U122 (waste code T).

When formaldehyde 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 U122 (waste code T).

When methanol 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 U154 (waste code I).

When formic acid 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 U123 (waste code C,T).

Disposal Instructions

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

! Puncture containers to prevent re-use and bury at an authorized landfill.

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.
- Treat and neutralize at an approved treatment plant.
- Treatment should involve: Neutralization followed by: Burial in a licensed land-fill or Incineration in a licensed apparatus
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols:	None	Hazard class or Division:	8
Identification Numbers:	UN2209	PG:	III
Label Codes:	8	Special provisions:	IB3, T4, TP1
Packaging: Exceptions:	154	Packaging: Non-bulk:	203
Packaging: Exceptions:	154	Quantity limitations: Passenger aircraft/rail:	5 L
Quantity Limitations: Cargo aircraft only:	60 L	Vessel stowage: Location:	A
Vessel stowage: Other:	None		

Hazardous materials descriptions and proper shipping names:

Formaldehyde, solutions, with not less than 25 percent formaldehyde

Air Transport IATA:

ICAO/IATA Class:	8	ICAO/IATA Subrisk:	None
UN/ID Number:	2209	Packing Group:	III
Special provisions:	None		

Shipping Name: FORMALDEHYDE SOLUTION

Maritime Transport IMDG:

IMDG Class:	8	IMDG Subrisk:	None
UN Number:	2209	Packing Group:	III
EMS Number:	F-A,S-B	Special provisions:	None
Limited Quantities:	5 L		

Shipping Name: FORMALDEHYDE SOLUTION with not less than 25% formaldehyde

Section 15 - REGULATORY INFORMATION

formaldehyde solutions - non flammable (CAS: 50-00-0) 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 - 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 Priority Substances List (PSL1, PSL 2)", "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", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC

Monographs", "International Chemical Secretariat (ChemSec) REACH SIN* List (*Substitute It Now!) 1.0", "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 - Acceptable Maximum Peak Concentrations", "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 (Z1)", "US - Oregon Permissible Exposure Limits (Z2)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "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 - 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 Dangerous waste constituents list", "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 - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)", "US CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)", "US CERCLA Priority List of Hazardous Substances", "US Clean Air Act - Hazardous Air Pollutants", "US Cosmetic Ingredient Review (CIR) Cosmetic ingredients found safe, with qualifications", "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 (AEGs) - Interim", "US EPA Carcinogens Listing", "US EPA High Production Volume Program Chemical List", "US EPA Master Testing List - Index I Chemicals Listed", "US EPCRA Section 313 Chemical List", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use as Components of Coatings - Acrylate ester copolymer coating", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "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 NFPA 45 Fire Protection for Laboratories Using Chemicals - Flammability Characteristics of Common Compressed and Liquefied Gases", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Carcinogens Listing", "US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US OSHA Permissible Exposure Levels (PELs) - Table Z2", "US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide", "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 SARA Section 302 Extremely Hazardous Substances", "US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants", "US Toxic Substances Control Act (TSCA) - Inventory", "WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water" Regulations for ingredients

formaldehyde (CAS: 50-00-0,8005-38-7,8006-07-3,8013-13-6,112068-71-0) 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 - 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 Priority Substances List (PSL1, PSL 2)", "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", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "International Chemical Secretariat (ChemSec) REACH SIN* List (*Substitute It Now!) 1.0", "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 - Acceptable Maximum Peak Concentrations", "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 (Z1)", "US - Oregon Permissible Exposure Limits (Z2)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "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 - 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 Dangerous waste constituents list", "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 - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift", "US

ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)", "US CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)", "US CERCLA Priority List of Hazardous Substances", "US Clean Air Act - Hazardous Air Pollutants", "US Cosmetic Ingredient Review (CIR) Cosmetic ingredients found safe, with qualifications", "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 (AEGs) - Interim", "US EPA Carcinogens Listing", "US EPA High Production Volume Program Chemical List", "US EPA Master Testing List - Index I Chemicals Listed", "US EPCRA Section 313 Chemical List", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use as Components of Coatings - Acrylate ester copolymer coating", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "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 NFPA 45 Fire Protection for Laboratories Using Chemicals - Flammability Characteristics of Common Compressed and Liquefied Gases", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Carcinogens Listing", "US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US OSHA Permissible Exposure Levels (PELs) - Table Z2", "US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide", "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 SARA Section 302 Extremely Hazardous Substances", "US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants", "US Toxic Substances Control Act (TSCA) - Inventory", "USA: Chemical Facility Anti-Terrorism Standards - List Appendix A - 6CFR 27", "WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water"

methanol (CAS: 67-56-1) 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 - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Industrial Hazardous Substances", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant 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 Other Liquid Substances", "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 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 Permissible Exposure Limits (Z1)", "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 Discarded Chemical Products List - ""U"" Chemical Products", "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 CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)", "US Clean Air Act - Hazardous Air Pollutants", "US Cosmetic Ingredient Review (CIR) Cosmetic ingredients found safe, with qualifications", "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 DOT Coast Guard Bulk Hazardous Materials - List of Flammable and Combustible Bulk Liquid Cargoes", "US EPA Acute Exposure Guideline Levels (AEGs) - Interim", "US EPA High Production Volume Program Chemical List", "US EPCRA Section 313 Chemical List", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives", "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 NFPA 30A Typical Flammable and Combustible Liquids Found at Motor Fuel Dispensing Facilities", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US NIOSH Recommended Exposure Limits (RELs)", "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 RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards", "US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants", "US Toxic Substances Control Act (TSCA) - Inventory"

water (CAS: 7732-18-5) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "IMO IBC Code Chapter 18: List of products to which the Code does not apply", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Pennsylvania - Hazardous Substance List", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion", "US Toxic Substances Control Act (TSCA) - Inventory", "US TSCA Section 8 (a) Inventory Update Rule (IUR) - Partial Exemptions"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Cumulative effects may result following exposure*.
 - Possible respiratory sensitizer*.
 - Vapors potentially cause drowsiness and dizziness*.
- * (limited evidence).

Ingredients with multiple CAS Nos

Ingredient Name	CAS
formaldehyde	50-00-0, 8005-38-7, 8006-07-3, 8013-13-6, 112068-71-0

REPRODUCTIVE HEALTH GUIDELINES

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
methanol	262 mg/m3	NA	NA	NA	Yes

■ 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.

■ 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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