FORMALDEHYDE SOLN. 37-41% W/V

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
FORMALDEHYDE SOLN 37-41% W/V

OTHER NAMES

C-H2-O, H-CHO, methanal, BFV, FA, "formaldehyde solution (37% 7% methanol)", Fannoform, "formaldehyde 50%", "formaldehyde 37%", formalin, dilute, "formaldehyde solution (50% 2% methanol)", "formalin 40", "formaldehyde solutions, dilute", "methyl aldehyde", "formaldehyde preservative", Morbicid, "methylene glycol", "formaldehyde 5%", Fyde, Formol, "methylene oxide", "formic aldehyde", Superlysoform, oxomethane, oxymethylene, Karsan, Lysoform, paraform, "polyoxymethylene glycol"

PROPER SHIPPING NAME
FORMALDEHYDE SOLUTION with not less than 25% formaldehyde
FORMALDEHYDE SOLUTION

PRODUCT USE
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.

SUPPLIER
Company: S D FINE- CHEM LIMITED
Address:
315- 317, T.V. INDUSTRIAL ESTATE,
248, WORLI,
MUMBAI- 400030.INDIA.
technical@sdfine.com
Telephone: 91- 22- 24959898
Telephone: 91- 22- 24959899
Fax: 91- 22- 24937232

HAZARD RATINGS

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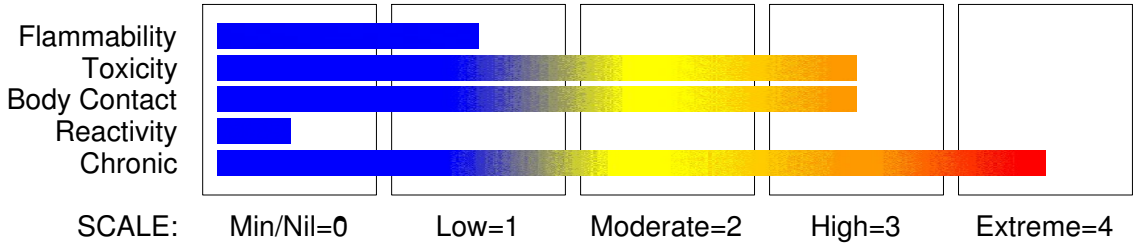

Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Aquatic Hazard Category 3
Acute Toxicity (Dermal) Category 3
Acute Toxicity (Inhalation) Category 2
Acute Toxicity (Oral) Category 2
Carcinogen Category 2
Flammable Liquid Category 4
Metal Corrosion Category 1
Organ Damage Category 2
Respiratory Sensitizer Category 1
Skin Corrosion/Irritation Category 1C
Skin Sensitizer Category 1

EMERGENCY OVERVIEW

HAZARD

DANGER
Determined using GHS criteria:
H227 H330 H300 H311 H334 H317 H351 H373 H290 H314 H402
Combustible Liquid
Fatal if inhaled
Fatal if swallowed
Toxic in contact with skin
May cause allergic or asthmatic symptoms or breathing difficulties if inhaled
May cause allergic skin reaction
Suspected of causing cancer
May cause damage to organs through prolonged or repeated exposure.
May be corrosive to metals
Causes severe skin burns and eye damage
Harmful to aquatic life

PRECAUTIONARY STATEMENTS

continued...

Prevention

Wash hands thoroughly after handling.
In case of inadequate ventilation wear respiratory protection.
Wear respiratory protection.
Do not eat, drink or smoke when using this product.
Avoid breathing dust/fume/gas/mist/vapours/spray.
Wash thoroughly after handling.
Wear protective gloves/clothing and eye/face protection.
Do not breathe dust or mist.
Wear protective gloves/clothing
Do not handle until all safety precautions have been read and understood.
Use personal protective equipment as required.
Obtain special instructions before use.
Use explosion-proof electrical/ventilating/lighting/equipment
Use only outdoors or in a well ventilated area.
Contaminated clothing should not be allowed out of the workplace.
Do not breathe dust/fume/gas/mist/vapours/spray.
Keep away from flames and hot surfaces.

Response

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
Keep container tightly closed.
If experiencing respiratory symptoms call a POISON CENTER or doctor/physician.
IF INHALED: If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing.
If exposed or concerned: Get medical attention advice.
If skin irritation or rash occurs, seek medical advice/attention.
Wash contaminated clothing before reuse.
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Specific treatment: refer to Label or MSDS.
Call a POISON CENTER or doctor/physician if you feel unwell.
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
Get medical advice/attention if you feel unwell.
If on skin or hair: remove/take off immediately all contaminated clothing. Rinse with water/shower.
Absorb spillage to prevent material damage.
IF ON SKIN: Gently wash with plenty of soap and water.
Immediately call a POISON CENTER or doctor/physician.
Wash/Decontaminate removed clothing before reuse.
Remove/Take off immediately all contaminated clothing

Storage

Store away from other materials
Store locked up.
Store in a corrosive resistant container with a resistant inliner.

Disposal

Dispose of contents and container in accordance with relevant legislation.

continued...

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
formaldehyde	50-00-0	37-50 *
methanol	67-56-1	2-7
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

Rinse mouth out with plenty of water.
For advice, contact a Poisons Information Centre or a doctor.
· 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.
· Immediately give a glass of water.

EYE

If this product comes in contact with the eyes:
· Immediately hold eyelids apart and flush the eye continuously with running water.
· Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
· Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
· Transport to hospital or doctor without delay.
· Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin 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 Centre.
· 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.

continued...

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 apnoea 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 couple capable of sensitising T-lymphocytes. Subsequent exposures cause a type IV hypersensitivity reaction (i.e allergic contact dermatitis). [Ellenhorn & Barceloux: Medical Toxicology].

Section 5 - FIRE FIGHTING MEASURES

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

FIRE FIGHTING
· Alert Fire Brigade 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 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.
Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD
· 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.

FIRE INCOMPATIBILITY
Avoid contamination with strong oxidising agents as ignition may result.

Personal Protective Equipment
Breathing apparatus.

continued...

Gas tight chemical resistant suit.
Limit exposure duration to 1 BA set 30 mins.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS
Clean up all spills immediately.
Wear protective clothing, impervious gloves and safety glasses.
Avoid breathing vapours and contact with skin and eyes.
Remove all ignition sources.
Wipe up and absorb small quantities with vermiculite or other absorbent material.
Place in suitable containers for disposal.

MAJOR SPILLS
Restrict access to area.
Clear area of personnel and move upwind.
Alert Fire Brigade 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 courses.

Shut off all possible sources of ignition and increase ventilation.
Stop leak if safe to do so.
Contain and absorb spill with sand, earth, inert material or vermiculite.
Collect residues and seal in labelled drums for disposal.
Neutralise spill residues with aqueous ammonia, or complex with sodium bisulfite solution.
If contamination of drains or waterways occurs, advise emergency services.
After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.

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 25 ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:
formaldehyde 10 ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:
formaldehyde 1 ppm

The threshold concentration below which most people will experience no appreciable risk of health effects:
formaldehyde 0.3 ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%

continued...

R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

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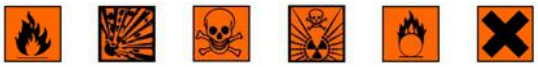
SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X	X	+	X	X	+

+: May be stored together
O: May be stored together with specific preventions
X: Must not be stored together

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

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

Avoid all personal contact, including inhalation.
Wear personal protective equipment when handling.
Use in a well-ventilated area.
until atmosphere has been checked.
Avoid smoking, naked lights, heat or ignition sources.
Vapour may travel a considerable distance to source of ignition.
Avoid contact with incompatible materials.
Avoid physical damage to containers.
Keep containers securely sealed when not in use.
When handling, DO NOT eat, drink or smoke.
Wash hands with soap and water after handling.
Work clothes should be laundered separately: NOT at home.
Use good occupational work practice. Observe manufacturer's storing and handling recommendations.
Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

Polyethylene or polypropylene container.
· Metal can or drum
· Packaging as recommended by manufacturer.
· Check all containers are clearly labelled and free from leaks.

STORAGE INCOMPATIBILITY

Avoid storage with oxidisers strong acids and alkalies.
Avoid contamination of water, foodstuffs, feed or seed.

STORAGE REQUIREMENTS

Store between 15 and 30 deg. C.
· Store in original containers.
· Keep containers securely sealed.

continued...

- No smoking, naked lights or ignition sources.
- 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.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

• methanol:	CAS:58456- 46- 5 CAS:67- 56- 1 CAS:19710- 56- 6 CAS:7263- 60- 7 CAS:6853- 31- 2 CAS:79825- 55- 1 CAS:253142- 14- 2 CAS:54841- 71- 3
• water:	CAS:7732- 18- 5 CAS:558440- 53- 2 CAS:558440- 22- 5

EMERGENCY EXPOSURE LIMITS

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

ODOUR SAFETY FACTOR (OSF)

OSF=0.36 (FORMALDEHYDE)
Exposed individuals are NOT reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.
Odour Safety Factor (OSF) is determined to fall into either Class C, D or E.
The Odour Safety Factor (OSF) is defined as:
OSF= Exposure Standard (TWA) ppm/ Odour 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	As " A" for 50- 90% of persons being distracted
C	1- 26	As " A" for less than 50% of persons being distracted
D	0.18- 1	10- 50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	As " D" for less than 10% of persons aware of being tested

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continued...

MATERIAL DATA

Odour Threshold Value: 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.

INGREDIENT DATA

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.

WATER:

No exposure limits set by NOHSC or ACGIH.

PERSONAL PROTECTION




EYE

· Chemical goggles.
· Full face shield may be required for supplementary but never for primary protection of eyes
· Contact lenses may pose a special hazard; soft contact lenses may absorb and

continued...

concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].
· Eyewash unit.

HANDS/FEET
· Barrier cream with polyethylene gloves or PVC gloves or Rubber gloves.
Rubber boots.

OTHER
Operators should be trained in procedures for safe use of this material.
Overalls and PVC apron.
Ensure there is ready access to an emergency shower.
* Preplacement and periodic medical examinations may be recommended for regular exposure to formalin. Examinations should give consideration to irritant effects on the skin, eyes, lungs, especially if the person has a history of allergies.

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

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

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.

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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	BAX- AUS	-
1000	50	-	BAX- AUS
5000	50	Airline *	-
5000	100	-	BAX- 2
10000	100	-	BAX- 3
	100+		Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
For further information consult
your
Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

Use in a well-ventilated area and Local exhaust ventilation may be required for safe working, i.e. to keep exposures below required standards, otherwise PPE is required.
Operators should be trained in correct use & maintenance of respirators.
If risk of inhalation or overexposure exists, wear SAA approved respirator or work in fume hood.
Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.
An approved self contained breathing apparatus (SCBA) may be required in some situations.
Provide adequate ventilation in warehouse or closed storage area. 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, vapours, degreasing etc., evaporating from tank (in still air).	0.25- 0.5 m/s (50- 100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5- 1 m/s (100- 200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1- 2.5 m/s (200- 500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5- 10 m/s (500- 2000 f/min.)

continued...

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable 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

APPEARANCE

Formaldehyde is a gas; however all references in this document are to the commercially available form of the material, i.e. a solution of the gas in water; which is a clear, water-white liquid with a suffocating pungent highly irritating odour. Mixes with water, alcohol, acetone.
Solution on standing may become cloudy if temperature is low; as at low temperatures a precipitate of trioxymethylene is formed.
The formaldehyde vaporizes readily from solution and is flammable in air.
Warming or heating solution increases formaldehyde generation.

PHYSICAL PROPERTIES

Liquid.
Mixes with water.
Corrosive.
Toxic or noxious vapours/gas.

Molecular Weight: Not applicable.	Boiling Range (°C): - 19.5 gas
Melting Range (°C): - 92 gas	Specific Gravity (water=1): 1.09- 1.14
Solubility in water (g/L): Miscible	pH (as supplied): Not applicable
pH (1% solution): Not available.	Vapour Pressure (kPa): > 100
Volatile Component (%vol): 100	Evaporation Rate: Not applicable
Relative Vapour Density (air=1): 1.1	Flash Point (°C): 69 water soln.
Lower Explosive Limit (%): 7	Upper Explosive Limit (%): 73
Autoignition Temp (°C): 430	Decomposition Temp (°C): Not available
State: Liquid	Viscosity: Not available

log Kow (Prager 1995): 0.35
log Kow (Sangster 1997): 0.35
log Kow: 0-0.35

continued...

log Kow: -0.82- -0.66

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

Presence of heat source and ignition source.
Presence of incompatible materials.

Section 11 - TOXICOLOGICAL INFORMATION

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.
Considered an unlikely route of entry in commercial/industrial environments.

EYE

The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.
When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation.
The material may produce severe irritation to the eye causing pronounced inflammation.
Repeated or prolonged exposure to irritants may produce conjunctivitis.

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.
if exposure is prolonged.
Sensitisation may result in allergic dermatitis responses including rash, itching, hives or swelling of extremities.
Toxic effects may result from skin absorption.
The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis.

Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.

INHALED

Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system in a substantial number of individuals following inhalation.
Respiratory sensitisation may result in allergic/asthma like responses; from coughing and

continued...

minor breathing difficulties to bronchitis with wheezing, gasping.
Sensitisation reactions may appear suddenly after repeated symptom free exposures.
Inhalation of vapour may aggravate a pre-existing respiratory condition such as asthma, bronchitis, emphysema.

CHRONIC HEALTH EFFECTS
On the basis, primarily, of animal experiments, concern has been expressed that the material may produce carcinogenic or mutagenic effects; in respect of the available information, however, there presently exists inadequate data for making a satisfactory assessment.
Limited evidence shows that inhalation of the material is capable of inducing a sensitisation reaction in a significant number of individuals at a greater frequency than would be expected from the response of a normal population.
Pulmonary sensitisation, resulting in hyperactive airway dysfunction and pulmonary allergy may be accompanied by fatigue, malaise and aching. Significant symptoms of exposure may persist for extended periods, even after exposure ceases. Symptoms can be activated by a variety of nonspecific environmental stimuli such as automobile exhaust, perfumes and passive smoking.
Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals.
Principal routes of exposure are usually by inhalation of vapour and skin contact/absorption.
Sensitisation may give severe responses to very low levels of exposure, in situations where exposure may occur.
Prolonged or repeated skin contact may cause drying with cracking, irritation and possible dermatitis following.
Minor but regular methanol exposures may effect 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].
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, the evidence for a possible involvement of formaldehyde is strongest for nasal and nasopharangeal 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.

TOXICITY AND IRRITATION

TOXICITY
Oral (woman) LDLo: 108 mg/kg
Oral (man) TDLo: 643 mg/kg
Oral (rat) LD50: 100 mg/kg
Inhalation (man) TCLo: 0.3 mg/m³
Inhalation (rat) LC50: 203 mg/m³
Dermal (rabbit) LD50: 270 mg/kg

IRRITATION
Skin (human): 0.15 mg/3d- I Mild
Skin (rabbit): 2 mg/24H SEVERE
Eye (human): 4 ppm/5m
Eye (rabbit): 0.75 mg/24H SEVERE

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

continued...

Tenth Annual Report on Carcinogens: Substance anticipated to be Carcinogen
[National Toxicology Program: U.S. Dep. of Health & Human Services 2002].

METHANOL:

TOXICITY	IRRITATION
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/m^3	
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 a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling the epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

WATER:
No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

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

continued...

Photooxidation half- life air - Low (hours): 7.13

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.
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
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.
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).
Refer to data for ingredients, which follows:

METHANOL:
DO NOT discharge into sewer or waterways.
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 if unstated: 0.76-1.12
COD: 1.05-1.50,99%
ThOD: 1.5
BCF: 0.2-10
Toxicity Fish: LC50(96): 11-15mg/L

continued...

Section 12 - ECOLOGICAL INFORMATION

TLm(48Hr): 8000mg/L (trout))
Toxicity Arthropoda: NOEL 10 g/L/48Hr (Daphnia)) [ICI]

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorised landfill.

WASTE DISPOSAL PROCEDURES
• Collect and package recoverable quantities of formaldehyde in labelled containers for recycling or incineration. Wear protective clothing, butyl rubber
gloves and eye protection when disposing of small quantities of formaldehyde.In a well ventilated area

SPILLAGE DISPOSAL
• Shut off all ignition sources. Wear a face shield, goggles, protective clothing and butyl rubber gloves. Cover the spill with a 1:1:1 mixture by weight
of sodium carbonate or calcium carbonate, bentonite and sand." Scoop the absorbed formaldehyde mixture

Section 14 - TRANSPORTATION INFORMATION

Labels Required: CORROSIVE
HAZCHEM: 2Z

UNDG:

Dangerous Goods Class:	8	Subrisk:	None
UN Number:	2209	Packing Group:	III

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

Air Transport IATA:

ICAO/IATA Class:	8	ICAO/IATA Subrisk:	None
UN/ID Number:	2209	Packing Group:	III
ERG Code:	8i		

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

continued...

Section 14 - TRANSPORTATION INFORMATION

Maritime Transport IMDG:

IMDG Class:	8	IMDG Subrisk:	None
UN Number:	2209	Packing Group:	III
EMS Number:	F- A, S- B		

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

Section 15 - REGULATORY INFORMATION

REGULATIONS

formaldehyde (CAS: 50-00-0) is found on the following regulatory lists;
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
International Agency for Research on Cancer (IARC) Carcinogens
International Council of Chemical Associations (ICCA) - High Production Volume List
OECD Representative List of High Production Volume (HPV) Chemicals
WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water

No data available for formaldehyde as CAS: 8013-13-6, CAS: 8006-07-3, CAS: 28349-70-4, CAS: 85458-16-8, CAS: 112068-71-0, CAS: 8005-38-7.

Section 16 - OTHER INFORMATION

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
formaldehyde	8013- 13- 6, 8006- 07- 3, 28349 - 70- 4, 85458- 16- 8, 112068- 71- 0, 8005- 38- 7, 50- 00- 0
methanol	58456- 46- 5, 67- 56- 1, 19710 - 56- 6, 7263- 60- 7, 6853- 31- 2, 79825- 55- 1, 253142- 14- 2, 54841- 71- 3
formic acid	64- 18- 6, 16499- 21- 1, 8006 - 93- 7, 82069- 14- 5
water	7732- 18- 5, 558440- 53- 2, 558440- 22- 5

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:

continued...

LOD: Limit of detection
Toxic endpoints have also been identified as:
D = Developmental; R = Reproductive; TC = Transplacental carcinogen
Jankovic J., Drake F.: A Screening Method for Occupational Reproductive
American Industrial Hygiene Association Journal 57: 641-649 (1996).

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