

2-METHOXYETHANOL

GHS Safety Data Sheet

Version No:6

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

2-METHOXYETHANOL

OTHER NAMES

C3-H8-O2, "ethylene glycol methyl ether", "ethylene glycol monomethyl ether", "2-methoxy ethanol", "2-methoxy ethanol", "glycol ether EM", "glycolmethyl ether", "glycol monomethyl ether", "monomethyl ether of ethylene glycol", methoxyhydroxyethane, "methyl cellosolve", "methyl ethoxol", "methyl glycol", "methyl oxitol",,

PROPER SHIPPING NAME

ETHYLENE GLYCOL MONOMETHYL ETHER

PRODUCT USE

Obsolescent, replaced in many uses by less hazardous propylene glycol ethers
 Solvent for nitrocellulose, cellulose acetate, alcohol-soluble dyes, natural and synthetic resins, lacquers, enamels, varnishes, perfume fixative, wood stains, sealing moisture-proof cellophane, jet fuel deicing additive.
 Component of mixed lacquer thinners.

SUPPLIER

Company: S D FINE- CHEM LIMITED

Address:

315- 317, T.V. INDUSTRIAL ESTATE,

248, WORLI,

MUMBAI- 400030.INDIA.

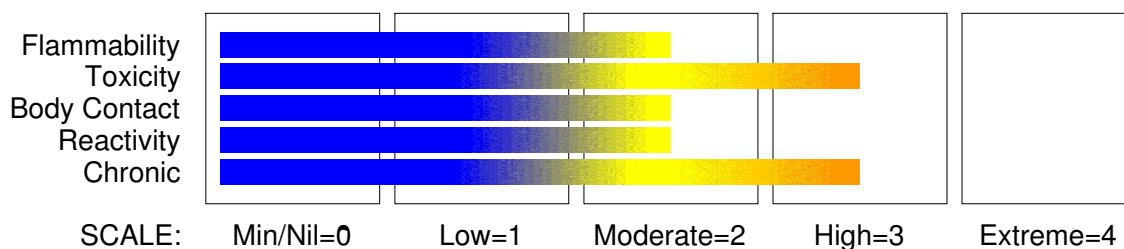
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Telephone: 91- 22- 24959898

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HAZARD RATINGS



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Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Toxicity (Dermal) Category 4
Acute Toxicity (Inhalation) Category 4
Acute Toxicity (Oral) Category 4
Eye Irritation Category 2B
Flammable Liquid Category 3
Reproductive Toxicity Category 1B
Respiratory Irritation Category 3
Skin Corrosion/Irritation Category 3



EMERGENCY OVERVIEW

HAZARD

DANGER

Determined by using GHS criteria:

H335 H226 H332 H312 H302 H316 H320 H360 H360

May cause respiratory irritation

Flammable liquid and vapour

Harmful if inhaled

Harmful in contact with skin

Harmful if swallowed

Causes mild skin irritation

Causes eye irritation

May damage fertility

May damage the unborn child

PRECAUTIONARY STATEMENTS

Prevention

Wash hands thoroughly after handling.

Ground/bond container and receiving equipment.

Do not eat, drink or smoke when using this product.

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

Wear protective gloves/clothing

Use only outdoors or in a well ventilated area.

Obtain special instructions before use.

Avoid breathing dust/fume/gas/mist/vapours/spray.

Keep container tightly closed.

Wear protective gloves and eye/face protection.

Keep away from heat/sparks/open flame - No smoking.

Use personal protective equipment as required.

Take precautionary measures against static discharge

Use only non-sparking tools.

Use explosion-proof electrical/ventilating/lighting/equipment

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Section 2 - HAZARDS IDENTIFICATION

Response

If skin irritation occurs, seek medical advice/attention.
IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
If eye irritation persists, get medical advice/attention.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Wash contaminated clothing before reuse.
Specific treatment: refer to Label or MSDS.
If on skin or hair: remove/take off immediately all contaminated clothing. Rinse with water/shower.
If exposed or concerned: Get medical attention advice.
IF ON SKIN: Gently wash with plenty of soap and water.
Call a POISON CENTER or doctor/physician if you feel unwell.

Storage

Store locked up.

Disposal

Dispose of contents and container in accordance with relevant legislation.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
2- methoxyethanol	109-86-4	> 99

Section 4 - FIRST AID MEASURES

SWALLOWED

- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
 - For advice, contact a Poisons Information Centre or a doctor.
 - Urgent hospital treatment is likely to be needed.
 - In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
 - If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
 - If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.
 - Where medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:
 - INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- NOTE: Wear a protective glove when inducing vomiting by mechanical means.

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.

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Section 4 - FIRST AID MEASURES

SKIN

If skin contact occurs:

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

INHALED

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

NOTES TO PHYSICIAN

Followed acute or short term repeated exposures to ethylene glycol monoalkyl ethers and their acetates:

- Hepatic metabolism produces ethylene glycol as a metabolite.
- Clinical presentation, following severe intoxication, resembles that of ethylene glycol exposures.
- Monitoring the urinary excretion of the alkoxyacetic acid metabolites may be a useful indication of exposure.

[Ellenhorn and Barceloux: Medical Toxicology].

For acute or short term repeated exposures to ethylene glycol:

- Early treatment of ingestion is important. Ensure emesis is satisfactory.
- Test and correct for metabolic acidosis and hypocalcaemia.
- Apply sustained diuresis when possible with hypertonic mannitol.
- Evaluate renal status and begin haemodialysis if indicated. [I.L.O]
- Rapid absorption is an indication that emesis or lavage is effective only in the first few hours. Cathartics and charcoal are generally not effective.
- Correct acidosis, fluid/electrolyte balance and respiratory depression in the usual manner. Systemic acidosis (below 7.2) can be treated with intravenous sodium bicarbonate solution.
- Ethanol therapy prolongs the half-life of ethylene glycol and reduces the formation of toxic metabolites.
- Pyridoxine and thiamine are cofactors for ethylene glycol metabolism and should be given (50 to 100 mg respectively) intramuscularly, four times per day for 2 days.
- Magnesium is also a cofactor and should be replenished. The status of 4-methylpyrazole, in the treatment regime, is still uncertain. For clearance of the material and its metabolites, haemodialysis is much superior to peritoneal dialysis.

[Ellenhorn and Barceloux: Medical Toxicology]

It has been suggested that there is a need for establishing a new biological exposure limit before a workshift that is clearly below 100 mmol ethoxy-acetic acids per mole creatinine in morning urine of people occupationally exposed to ethylene glycol ethers. This arises from the finding that an increase in urinary stones may be associated with such exposures.

Laitinen J., et al: Occupational & Environmental Medicine 1996; 53, 595-600.

The urinary metabolite, methoxyacetic acid appears to be the predominant principle of 2-methoxyethanol-related toxicity.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Water spray or fog.
- Foam.

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Section 5 - FIRE FIGHTING MEASURES

- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- If safe, switch off electrical equipment until vapour fire hazard removed.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.

FIRE/EXPLOSION HAZARD

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

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

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

FIRE INCOMPATIBILITY

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

Personal Protective Equipment

Breathing apparatus.
Chemical splash suit.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

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

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- No smoking, naked lights or ignition sources.

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Section 6 - ACCIDENTAL RELEASE MEASURES

- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse / absorb vapour.
- Contain spill with sand, earth or vermiculite.
- Use only spark-free shovels and explosion proof equipment.
- Collect recoverable product into labelled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

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:

2-methoxyethanol 1700 ppm

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

2-methoxyethanol 5 ppm

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

2-methoxyethanol 5 ppm

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

2-methoxyethanol 5 ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	$\geq 0.1\%$	Toxic (T)	$\geq 3.0\%$
R50	$\geq 0.25\%$	Corrosive (C)	$\geq 5.0\%$
R51	$\geq 2.5\%$		
else	$\geq 10\%$		

where percentage is percentage of ingredient found in the mixture

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+: May be stored together

O: May be stored together with specific precautions

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

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 overexposure occurs.

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Section 7 - HANDLING AND STORAGE

- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- Avoid smoking, naked lights or ignition sources.
- Avoid generation of static electricity.
- DO NOT use plastic buckets.
- Earth all lines and equipment.
- Use spark-free tools when handling.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

The substance accumulates peroxides which may become hazardous only if it evaporates or is distilled or otherwise treated to concentrate the peroxides. The substance may concentrate around the container opening for example.

Purchases of peroxidisable chemicals should be restricted to ensure that the chemical is used completely before it can become peroxidised.

- A responsible person should maintain an inventory of peroxidisable chemicals or annotate the general chemical inventory to indicate which chemicals are subject to peroxidation. An expiration date should be determined. The chemical should either be treated to remove peroxides or disposed of before this date.
- The person or laboratory receiving the chemical should record a receipt date on the bottle. The individual opening the container should add an opening date.
- Unopened containers received from the supplier should be safe to store for 18 months.
- Opened containers should not be stored for more than 12 months.

SUITABLE CONTAINER

- Packing as supplied by manufacturer.
- Plastic containers may only be used if approved for flammable liquid.
- Check that containers are clearly labelled and free from leaks.
- For low viscosity materials (i) : Drums and jerry cans must be of the non-removable head type. (ii) : Where a can is to be used as an inner package, the can must have a screwed enclosure.
- For materials with a viscosity of at least 2680 cSt. (23 deg. C)
- For manufactured product having a viscosity of at least 250 cSt. (23 deg. C)
- Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (25 deg. C)
 - (i) : Removable head packaging;
 - (ii) : Cans with friction closures and
 - (iii) : low pressure tubes and cartridges may be used.
- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages
- In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

STORAGE INCOMPATIBILITY

Glycol ethers may form peroxides under certain conditions. In the presence of strong bases or the salts of strong bases, at elevated temperatures, the potential exists for runaway reactions. Contact with aluminium should be avoided. Release of hydrogen gas may result.

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Section 7 - HANDLING AND STORAGE

Avoid reaction with oxidising agents.

STORAGE REQUIREMENTS

Rotate all stock to prevent ageing. Use on FIFO (First In-First Out) basis.

- Store in original containers in approved flammable liquid storage area.
- DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
- No smoking, naked lights, heat or ignition sources.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry, well-ventilated area.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- 2- methoxyethanol: CAS:109- 86- 4

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
2- methoxyethanol		200

ODOUR SAFETY FACTOR (OSF)

OSF=2.2 (2-METHOXYETHANOL)

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

MATERIAL DATA

Odour Threshold Value: 0.096-61 ppm (detection), 0.22-90 ppm (recognition)

THE TLV-TWA is thought to be protective against testicular toxicity and bone marrow depression found, in humans, after relatively low levels of

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

exposure. This limit is also thought to be protective against central nervous system toxicity provided skin absorption is prevented. This limit is also thought to provide protection of male and female workers from potential adverse effects on reproduction and to reduce the risk of developmental toxicity in the off-spring of pregnant women. The relatively low vapour pressure of 2-methoxyethanol and the rapid percutaneous absorption suggest limited contribution of pulmonary uptake to the total body burden of the material and its toxic metabolites.

NIOSH calculated and established a REL-TWA of 0.1 ppm (0.3 mg/m³) based on a NOAEL (no-observed-adverse-effect-limit) in pregnant rodents and rabbits assuming 100% retention of inhaled material and a 100-fold uncertainty factor. The NIOSH REL was designed to protect the worker for up to a 10-hour workshift and a 40-hour workweek over a working life-time.

PERSONAL PROTECTION



EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and 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].

HANDS/FEET

- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber.

OTHER

- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.

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: 2-methoxyethanol

Protective Material CPI *.

BUTYL	A
PVC	A

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

NEOPRENE	B
NAT+NEOPR+NITRILE	C
NATURAL+NEOPRENE	C
NITRILE	C
PVA	C
NATURAL RUBBER	C
SARANEX- 23	C

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

* - Continuous Flow

** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

For further information consult your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

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

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:
solvent, vapours, degreasing etc., evaporating from tank (in still air).
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)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts,

Air Speed:
0.25- 0.5 m/s (50- 100 f/min.)

0.5- 1 m/s (100- 200 f/min.)

1- 2.5 m/s (200- 500 f/min.)

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gas discharge (active generation into zone of rapid air motion)

Within each range the appropriate value depends on:

Lower end of the range

1: Room air currents minimal or favourable to capture

2: Contaminants of low toxicity or of nuisance value only.

3: Intermittent, low production.

4: Large hood or large air mass in motion

Upper end of the range

1: Disturbing room air currents

2: Contaminants of high toxicity

3: High production, heavy use

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

Colourless flammable liquid with a mild agreeable odour; soluble in water.

PHYSICAL PROPERTIES

Liquid.

Mixes with water.

Toxic or noxious vapours/gas.

Molecular Weight: 76.09

Melting Range (°C): - 85.1

Solubility in water (g/L): Miscible

pH (1% solution): Not available

Volatile Component (%vol): 100

Relative Vapour Density (air=1): 2.6

Lower Explosive Limit (%): 1.8

Autoignition Temp (°C): 285

State: Liquid

Boiling Range (°C): 124.4

Specific Gravity (water=1): 0.97

pH (as supplied): Not applicable

Vapour Pressure (kPa): 1.29 @ 20 C.

Evaporation Rate: Slow

Flash Point (°C): 39 46(open)

Upper Explosive Limit (%): 14

Decomposition Temp (°C): Not Available

Viscosity: Not Available

log Kow (Sangster 1997):

- 0.77

log Kow: -0.77

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

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

continued...

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Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

Central nervous system (CNS) depression may include nonspecific discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.

EYE

Limited evidence or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.

SKIN

Skin contact with the material may be harmful; systemic effects may result following absorption.

The material may produce mild skin irritation; limited evidence or practical experience suggests, that the material either:

- produces mild inflammation of the skin in a substantial number of individuals following direct contact, and/or
- produces significant, but mild, inflammation when applied to the healthy intact skin of animals (for up to four hours), such inflammation being present twenty-four hours or more after the end of the exposure period.

Skin irritation may also be present after prolonged or repeated exposure; this may result in a form of contact dermatitis (non allergic). The dermatitis is often characterised by skin redness (erythema) and swelling (oedema) which may progress to blistering (vesiculation), scaling and thickening of the epidermis. At the microscopic level there may be intercellular oedema of the spongy layer of the skin (spongiosis) and intracellular oedema of the epidermis.

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.

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 epidermis. Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis.

INHALED

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

Limited evidence or practical experience suggests that the material may produce irritation of the respiratory system, in a significant number of individuals, following inhalation. In contrast to most organs, the lung is able to respond to a chemical insult by first removing or neutralising the irritant and then repairing the damage. The repair process, which initially evolved to protect mammalian lungs from foreign matter and antigens, may however, produce further lung damage resulting in the impairment of gas

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Section 11 - TOXICOLOGICAL INFORMATION

exchange, the primary function of the lungs. Respiratory tract irritation often results in an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system.

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

Acute effects from inhalation of high vapour concentrations may be chest and nasal irritation with coughing, sneezing, headache and even nausea.

CHRONIC HEALTH EFFECTS

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

There is sufficient evidence to provide a strong presumption that human exposure to the material may result in impaired fertility on the basis of: - clear evidence in animal studies of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects but which is not a secondary non-specific consequence of other toxic effects.

There is sufficient evidence to provide a strong presumption that human exposure to the material may result in developmental toxicity, generally on the basis of:

- clear results in appropriate animal studies where effects have been observed in the absence of marked maternal toxicity, or at around the same dose levels as other toxic effects but which are not secondary non-specific consequences of the other toxic effects.

Exposure to the material may cause concerns for human fertility, on the basis that similar materials provide some evidence of impaired fertility in the absence of toxic effects, or evidence of impaired fertility occurring at around the same dose levels as other toxic effects, but which are not a secondary non-specific consequence of other toxic effects.

Studies with some ethylene glycol ethers and their esters indicate reproductive changes, testicular atrophy, infertility and kidney function changes. The metabolic acetic acid derivatives of the glycol ethers, not the ether itself, have been found to be the proximal reproductive toxin in animals. The potency of these metabolites decrease significantly as the chain length of the ether increases. Consequently glycol ethers with longer substituents (e.g diethylene glycols, triethylene glycols) have not generally been associated with reproductive effects. One of the most sensitive indicators of toxic effects observed from many of the glycol ethers is an increase in the erythrocytic osmotic fragility in rats. This appears to be related to the development of haemoglobinuria (blood in the urine) at higher exposure levels or as a result of chronic exposure. Ethylene glycol ethers and acetates are mainly metabolised to alkoxyacetic acids but there is also a minor pathway through ethylene glycol to oxalic acid. The main pathway of ethylene glycol ethers is associated with significant clinical or experimental health effects, but the minor pathway is also interesting because formation of urinary stones depends principally upon urinary concentration of oxalate and calcium. In one study (1) the tendency to form urinary stones was 2.4 times higher amongst silk-screen printers exposed to ethylene glycol ethers, than among office workers. (1) Laitinen J., et al: Occupational Environmental Medicine 1996, 53 595-600.

2-Methoxyethanol produces its toxic effects on various proliferating tissues. In particular the haemopoietic and lymphatic organs (blood-cell forming organs), the seminiferous epithelium in the testes and embryonic and foetal tissue in utero. Testes damage, congenital malformations and haematological effects are some of the effects of exposure. Higher doses produce degenerative changes in the kidneys and liver.

Systemic effects such as anaemia, liver and kidney degeneration and central nervous system depression have been reported in animals after exposure to this product. Chronic industrial experience at relatively high concentrations (50-100 ppm) in workplace air (with substantial but unknown skin contact) is thought to produce pancytopenia, headache, dizziness, lethargy, weakness, hyperreflexia, disorientation (in some cases this has been diagnosed as schizophrenia or mental retardation), unequal pupil size, and visual and/ or auditory disturbances. Bone marrow

continued...

2-METHOXYETHANOL

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Section 11 - TOXICOLOGICAL INFORMATION

depression, granulocytopenia and macrocytic anaemia have also been reported. Shipyard workers engaged in brush applications of glycol ether paints with exposure to 2-methoxyethanol at concentrations up to 5.7 ppm (mean 0.83 ppm) and concomitant exposure to 2-ethoxyethanol at up to 22 ppm, showed oligospermia (reduced sperm count) and azoospermia (and absence of sperm).

Foetal damage has been reported in several species of animals as well as effects on the testes which lead to reduced sperm count.

Two boys born of the same mother exposed during pregnancy to the acetate for 1 to 4 hours/day during cleaning and wiping duties showed congenital hypospadias (urethra opening to underside of the penis), chordea (downward bowing of the penis), micropenis and bifid scrotum. It was concluded that the malformations were a consequence of the exposure.

TOXICITY AND IRRITATION

TOXICITY

Oral (human) LDLo: 3380 mg/kg

Oral (rat) LD50: 2460 mg/kg

Inhalation (human) TCLO: 25 ppm

Inhalation (rat) LC50: 1500 ppm/7 hr

Dermal (rabbit) LD50: 1280 mg/kg

Oral (guinea) pig: LD50 2950 mg/kg

Exposure to the material for prolonged periods may cause physical defects in the developing embryo (teratogenesis).

There have been no specific human studies, but the consistency of the animal experiments emphasizes that human exposure should be dramatically reduced.

IRRITATION

Skin (rabbit): 483 mg/24 hr - Mild

Eye (rabbit): 500 mg/24 hr - Mild

Eye (rabbit): 97 mg - Irritant

Section 12 - ECOLOGICAL INFORMATION

Hazardous Air Pollutant:	Yes
Fish LC50 (96hr.) (mg/l):	10000- 1552
Algae IC50 (72hr.) (mg/l):	100
BOD5:	0.12
COD:	1.69
log Kow (Sangster 1997):	- 0.77
Half- life Soil - High (hours):	672
Half- life Soil - Low (hours):	168
Half- life Air - High (hours):	57
Half- life Air - Low (hours):	5.7
Half- life Surface water - High (hours):	672
Half- life Surface water - Low (hours):	168
Half- life Ground water - High (hours):	1344
Half- life Ground water - Low (hours):	336
Aqueous biodegradation - Aerobic - High (hours):	672
Aqueous biodegradation - Aerobic - Low (hours):	168
Aqueous biodegradation - Anaerobic - High (hours):	2688
Aqueous biodegradation - Anaerobic - Low (hours):	672
Aqueous biodegradation - Removal secondary treatment - High (hours):	65%
Photooxidation half- life water - High (hours):	4.70E+05
Photooxidation half- life water - Low (hours):	7400
Photooxidation half- life air - High (hours):	57
Photooxidation half- life air - Low (hours):	5.7

DO NOT discharge into sewer or waterways.

log Kow: -0.77

Half-life (hr) air: 17.54

Half-life (hr) H2O surface water: 2.8

Henry's atm m³ /mol: 2.90E-03

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Section 12 - ECOLOGICAL INFORMATION

BOD 5 if unstated: 0.12
COD: 1.69

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible.
 - Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
 - Dispose of by: Burial in a licenced land-fill or Incineration in a licenced apparatus (after admixture with suitable combustible material).
 - Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
 - Containers may still present a chemical hazard/ danger when empty.
 - Return to supplier for reuse/ recycling if possible.
- Otherwise:
- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
 - Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

Section 14 - TRANSPORTATION INFORMATION



Labels Required: FLAMMABLE LIQUID
HAZCHEM: 2[Y]

UNDG:

Dangerous Goods Class:	3	Subrisk:	None
UN Number:	1188	Packing Group:	III
Shipping Name:ETHYLENE GLYCOL MONOMETHYL ETHER			

Air Transport IATA:

ICAO/IATA Class:	3	ICAO/IATA Subrisk:	None
UN/ID Number:	1188	Packing Group:	III
ERG Code:	3L		
Shipping name:ETHYLENE GLYCOL MONOMETHYL ETHER			

Maritime Transport IMDG:

IMDG Class:	3	IMDG Subrisk:	None
UN Number:	1188	Packing Group:	III
EMS Number:	F- E, S- D		
Shipping name:ETHYLENE GLYCOL MONOMETHYL ETHER			

continued...

2-METHOXYETHANOL

Section 15 - REGULATORY INFORMATION

REGULATIONS

2-methoxyethanol (CAS: 109-86-4) is found on the following regulatory lists;
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
International Council of Chemical Associations (ICCA) - High Production Volume List
OECD Representative List of High Production Volume (HPV) Chemicals

Section 16 - OTHER INFORMATION

REPRODUCTIVE HEALTH GUIDELINES

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

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
2- methoxyethanol	0.3 mg/m3	100	D	NA	-

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

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

TLV believed to be adequate to protect reproductive health:

LOD: Limit of detection

Toxic endpoints have also been identified as:

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

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

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

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