

Dipropylene glycol monomethyl ether

sc-255118

Material Safety Data Sheet

Hazard Alert Code
Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

dipropylene glycol monomethyl ether

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY

ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS

C7-H16-O3, CH3CH(OH)CH2OCH2CH(OCH3)CH3, 1-(2-methoxyisopropoxy)-2-propanol, (2-methoxymethylethoxy)-propanol, 2-(2-methoxypropoxy)propanol, "5-methyl-4, 7-dioxa-2-heptanol", "1(or 3)-(2-methoxymethylethoxy)propanol", "1(or 2)-(2-methoxy propoxy)propanol", "DPGME, 1-(2-methoxy-2-methylethoxy)-2-propanol, methoxypropoxypropanol, "methoxy propoxy propanol", "1, 4-dimethyl-3, 6-dioxa-1-heptanol", "dipropylene glycol mono methyl ether", "PPG-2 methyl ether", "glycol ether DPM", "propanol, (2-methoxymethylethoxy)", "Dowanol 50B", "Propasol Solvent DM", "Ucar Solvent 2LM", "Trintsol MFDG", "Arcosolve DPM", "Methyl Diproxitol", "Alternate CAS RN: 112388-78-0CAS RN: 12002-35-6CAS RN: 104512-57-4CAS RN:", "83730-60-3CAS RN: 112-28-7 [3-(3-methoxypropoxy)propyl alcohol]CAS RN:", "30234-32-7 (alpha isomer)CAS RN: 13429-07-7CAS RN: 13588-28-8CAS RN:", 55956-21-3

Section 2 – HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability:	1	
Toxicity:	2	
Body Contact:	2	
Reactivity:	2	
Chronic:	2	

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



CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Irritating to respiratory system.
Vapours may cause drowsiness and dizziness.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- Accidental ingestion of the material may be damaging to the health of the individual.
- Central nervous system (CNS) depression may include general 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.
- Dipropylene monomethyl ether (DPME) produces marked central nervous system depression in rats. Lethal doses produced respiratory failure within 48 hours.

EYE

- Limited evidence or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals.

Prolonged eye contact may cause inflammation characterized by a temporary redness of the conjunctiva (similar to windburn).

- When one drop of undiluted dipropylene glycol monomethyl ether (DPME) was placed in a rabbits eyes on each of five consecutive days, a mild transitory irritation of the conjunctival membranes occurred.

Fluorescein staining revealed no corneal damage.

SKIN

- Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.

There is some evidence to suggest that the material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time.

Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.

- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.

Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

- Continuous contact with DPME of the skin of numerous rabbits for 90 days caused only slight scaliness.

Patch tests on human volunteers produced no evidence of primary irritation or sensitisation.

INHALED

- The material can cause respiratory irritation in some persons.

The body's response to such irritation can cause further lung damage.

- 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 hazard is increased at higher temperatures.
- Not normally a hazard due to non-volatile nature of product.
- In fog-laden atmospheres rats exposed to dipropylene glycol monomethyl ether DPME, for 7 hours, exhibited a mild narcosis from which they rapidly recovered.

Controlled human exposures to vapour produced CNS impairment at 1000 ppm in one subject.

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

CHRONIC HEALTH EFFECTS

- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.

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

Rats, rabbits, guinea pigs and monkeys exposed to DPME, 7 hr/day, 5 days a week for periods of 6–8 months to saturated atmospheres (300 ppm), exhibited little effect. Narcotic effects were produced in rats. This concentration of vapour is objectionable to human beings.

Some glycol esters and their ethers cause wasting of the testicles, reproductive changes, infertility and changes to kidney function. Shorter chain compounds are more dangerous.

Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
dipropylene glycol monomethyl ether	34590–94–8	100

Section 4 – FIRST AID MEASURES

SWALLOWED



- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

EYE

■ If this product comes in contact with the eyes:

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

SKIN

■ If skin contact occurs:

- Immediately remove all contaminated clothing, including footwear
- Flush skin and hair with running water (and soap if available).

INHALED



- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN

■ Treat symptomatically.

Section 5 – FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	0.398 @20C
Upper Explosive Limit (%):	10.4
Specific Gravity (water=1):	0.95 @ 20C
Lower Explosive Limit (%):	1.4

EXTINGUISHING MEDIA



- Water spray or fog.
- Foam.

FIRE FIGHTING



- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS



- Combustible.
- Slight fire hazard when exposed to heat or flame.

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

May emit poisonous fumes.

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:

Safety Glasses.

Chemical goggles.

Gloves:

Respirator:

Type A-P Filter of sufficient capacity

Section 6 – ACCIDENTAL RELEASE MEASURES

MINOR SPILLS



- Remove all ignition sources.
- Clean up all spills immediately.

MAJOR SPILLS

■ Moderate hazard.

- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.

Section 7 – HANDLING AND STORAGE

PROCEDURE FOR HANDLING



- DO NOT allow clothing wet with material to stay in contact with skin

The tendency of many ethers to form explosive peroxides is well documented. Ethers lacking non-methyl hydrogen atoms adjacent to the ether link are thought to be relatively safe

- DO NOT concentrate by evaporation, or evaporate extracts to dryness, as residues may contain explosive peroxides with DETONATION potential.
- Any static discharge is also a source of hazard.
- Before any distillation process remove trace peroxides by shaking with excess 5% aqueous ferrous sulfate solution or by percolation through a column of activated alumina.
- Distillation results in uninhibited ether distillate with considerably increased hazard because of risk of peroxide formation on storage.
- Add inhibitor to any distillate as required.
- When solvents have been freed from peroxides by percolation through columns of activated alumina, the absorbed peroxides must promptly be desorbed by treatment with polar solvents such as methanol or water, which should then be disposed of safely.

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.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.

RECOMMENDED STORAGE METHODS



- Metal can or drum
- Packing as recommended by manufacturer.

STORAGE REQUIREMENTS



- Store in original containers.
- Keep containers securely sealed.
- 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

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes

Canada – Alberta Occupational Exposure Limits	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether [(2-Methoxymethylethoxy)propanol, DPGME])	100	606	150	909	
Canada – British Columbia Occupational Exposure Limits	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100		150		Skin
US NIOSH Recommended Exposure Limits (RELs)	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600	150	900	[skin]
US OSHA Permissible Exposure Levels (PELs) – Table Z1	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600			
US ACGIH Threshold Limit Values (TLV)	dipropylene glycol monomethyl ether ((2-methoxymethylethoxy)propanol [DPGME])	100		150		TLV Basis: eye & upper respiratory tract irritation; central nervous system impairment
US – Minnesota Permissible Exposure Limits (PELs)	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600	150	900	
US – Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600			
US – Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600	150	900	
US – Tennessee Occupational Exposure Limits – Limits For Air Contaminants	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600	150	900	
US – California Permissible Exposure Limits for Chemical Contaminants	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600	150	900	
US – Idaho – Limits for Air Contaminants	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600			

Canada – Quebec Permissible Exposure Values for Airborne Contaminants (English)	dipropylene glycol monomethyl ether (Dipropylene glycol monomethyl ether)	100	606	150	909	
US – Hawaii Air Contaminant Limits	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600	150	900	
US – Alaska Limits for Air Contaminants	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600	150	900	
Canada – Saskatchewan Occupational Health and Safety Regulations – Contamination Limits	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether (DPGME))	100		150		Skin
Canada – Yukon Permissible Concentrations for Airborne Contaminant Substances	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether – Skin)	100	600	150	900	
US – Washington Permissible exposure limits of air contaminants	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100		150		
US – Michigan Exposure Limits for Air Contaminants	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600	150	900	
Canada – Prince Edward Island Occupational Exposure Limits	dipropylene glycol monomethyl ether ((2-methoxymethylethoxy)propanol [DPGME])	100		150		TLV Basis: eye & upper respiratory tract irritation; central nervous system impairment
US – Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600			
Canada – Nova Scotia Occupational Exposure Limits	dipropylene glycol monomethyl ether ((2-methoxymethylethoxy)propanol [DPGME])	100		150		TLV Basis: eye & upper respiratory tract irritation; central nervous system impairment
US – Oregon Permissible Exposure Limits (Z-1)	dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether)	100	600			

Canada – Northwest Territories Occupational Exposure Limits (English)
 dipropylene glycol monomethyl ether (Dipropylene glycol methyl ether) 100 606 150 909

PERSONAL PROTECTION



RESPIRATOR

Type A-P Filter of sufficient capacity
 Consult your EHS staff for recommendations

EYE

- Safety glasses with side shields.
- Chemical goggles.

HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.

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

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

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

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

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

OTHER

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

ENGINEERING CONTROLS

■ General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in special circumstances.

Section 9 – PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.
 Mixes with water.

State	Liquid	Molecular Weight	148.23
Melting Range (°F)	-112	Viscosity	Not Available
Boiling Range (°F)	356	Solubility in water (g/L)	Miscible
Flash Point (°F)	167 TCC	pH (1% solution)	4.5–7.0 (5%)
Decomposition Temp (°F)	Not available.	pH (as supplied)	Not applicable
Autoignition Temp (°F)	401	Vapor Pressure (mmHg)	0.398 @20C
Upper Explosive Limit (%)	10.4	Specific Gravity (water=1)	0.95 @ 20C

Lower Explosive Limit (%)	1.4	Relative Vapor Density (air=1)	5.14
Volatile Component (%vol)	100	Evaporation Rate	0.03 (BuAc=1)
VOC(regulatory)	lb/gall	VOC(actual)	lb/gall

APPEARANCE

■ Note that all of the monopropylene glycol ethers may exist in two isomeric forms, alpha or beta. The alpha form, which is thermodynamically favored during synthesis, consists of a secondary alcohol configuration. The beta form consists of a primary alcohol. The two isomeric forms are shown above. The di- and tripropylene glycol ethers may form up to 4 and 8 isomeric forms, respectively. Even so, all isomers exhibit either the "alpha" or "beta" configuration, existing as secondary or primary alcohols, respectively. The distribution of isomeric forms for the di- and tripropylene glycols, as with the mono-PGEs, also results in predominantly the alpha form (i.e., a secondary alcohol). It should be noted that only the alpha isomer and isomeric mixtures (consisting predominantly of the alpha isomer) are produced commercially; the purified beta isomer is not produced at this time. Clear combustible liquid with a mild pleasant odour; mixes with water. Mixes with most common organic solvents. Four stereoisomers occur with the composition of technical grades depending on the production process. The four individual isomers are not separated nor produced as individual chemicals for commercial use

Environmental fate Log octanol-water partition coefficients (log Kow's) range from 0.309 for TPM to 1.523 for DPnB. Calculated BCFs range from 1.47 for DPnB to 3.16 for DPMA and TPM, indicating low bioaccumulation. Henry's Law Constants, which indicate propensity to partition from water to air, are low for all category members, ranging from 5.7×10^{-9} atm-m³/mole for TPM to 2.7×10^{-9} atm-m³/mole for PnB. Fugacity modeling indicates that most propylene glycol ethers are likely to partition roughly equally into the soil and water compartments in the environment with small to negligible amounts remaining in other environmental compartments (air, sediment, and aquatic biota). Propylene glycol ethers are unlikely to persist in the environment. Once in air, the half-life of the category members due to direct reactions with photochemically generated hydroxyl radicals, range from 2.0 hours for TPM to 4.6 hours for PnB. In water, most members of this family are "readily biodegradable" under aerobic conditions. (DPMA degraded within 28 days (and within the specified 10-day window) but only using pre-adapted or "acclimated" inoculum.). In soil, biodegradation is rapid for PM and PMA. Ether groups are generally stable to hydrolysis in water under neutral conditions and ambient temperatures. OECD guideline studies indicate ready biodegradability for several glycol ethers although higher molecular weight species seem to biodegrade at a slower rate. No glycol ethers that have been tested demonstrate marked resistance to biodegradative processes. Upon release to the atmosphere by evaporation, high boiling glycol ethers are estimated to undergo photodegradation (atmospheric half lives = 2.4–2.5 hr). When released to water, glycol ethers undergo biodegradation (typically 47–92% after 8–21 days) and have a low potential for bioaccumulation (log Kow ranges from -1.73 to +0.51).

Material	Value
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Section 10 – CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

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- Presence of incompatible materials.
- Product is considered stable.

STORAGE INCOMPATIBILITY

■ Dipropylene glycol monomethyl ether:

- may form unstable peroxides on contact with air
- reacts violently with strong oxidisers, permanganates, peroxides, ammonium persulfate, bromine dioxide, sulfuric acid, nitric acid, perchloric acid and other strong acids
- is incompatible with acid halides, aliphatic amines, alkalis, boranes, isocyanates
- attacks some plastics, rubber and coatings
- Glycol ethers may form peroxides under certain conditions; the potential for peroxide formation is enhanced when these substances are used in processes such as distillation where they are concentrated or even evaporated to near-dryness or dryness; storage under a nitrogen atmosphere is recommended to minimise the possible formation of highly reactive peroxides
- Nitrogen blanketing is recommended if transported in containers at temperatures within 15 deg C of the flash-point and at or above the flash-point – large containers may first need to be purged and inerted with nitrogen prior to loading
- 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- glycol ethers will corrode scratched aluminium surfaces.
- May discolour in mild steel/ copper; lined containers, glass or stainless steel is preferred
- Glycols and their ethers undergo violent decomposition in contact with 70% perchloric acid. This seems likely to involve formation of the glycol perchlorate esters (after scission of ethers) which are explosive, those of ethylene glycol and 3-chloro-1,2-propanediol being more powerful than glyceryl nitrate, and the former so sensitive that it explodes on addition of water. Investigation of the hazards associated with use of 2-butoxyethanol for alloy electropolishing showed that mixtures with 50–95% of acid at 20 deg C, or 40–90% at 75 C, were explosive and initiatable by sparks. Sparking caused mixtures with 40–50% of acid to become explosive, but 30% solutions appeared safe under static conditions of temperature and concentration.

Avoid reaction with oxidizing agents.

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

Section 11 – TOXICOLOGICAL INFORMATION

dipropylene glycol monomethyl ether

TOXICITY AND IRRITATION

DIPROPYLENE GLYCOL MONOMETHYL ETHER:

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

TOXICITY	IRRITATION
Oral (rat) LD50: 5135 mg/kg	Eye (human): 8 mg – Mild
Dermal (Rabbit) LD50: 9500 mg/kg	Skin (rabbit): 238 mg – Mild
	Eye (rabbit): 500 mg/24hr – Mild
	Skin (rabbit): 500 mg (open)-Mild

■ 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 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.

for propylene glycol ethers (PGEs):

Typical propylene glycol ethers include propylene glycol n-butyl ether (PnB); dipropylene glycol n-butyl ether (DPnB); dipropylene glycol methyl ether acetate (DPMA); tripropylene glycol methyl ether (TPM).

Testing of a wide variety of propylene glycol ethers Testing of a wide variety of propylene glycol ethers has shown that propylene glycol-based ethers are less toxic than some ethers of the ethylene series. The common toxicities associated with the lower molecular weight homologues of the ethylene series, such as adverse effects on reproductive organs, the developing embryo and fetus, blood (haemolytic effects), or thymus, are not seen with the commercial-grade propylene glycol ethers. In the ethylene series, metabolism of the terminal hydroxyl group produces an alkoxyacetic acid. The reproductive and developmental toxicities of the lower molecular weight homologues in the ethylene series are due specifically to the formation of methoxyacetic and ethoxyacetic acids.

Longer chain length homologues in the ethylene series are not associated with the reproductive toxicity but can cause haemolysis in sensitive species, also through formation of an alkoxyacetic acid. The predominant alpha isomer of all the PGEs (thermodynamically favored during manufacture of PGEs) is a secondary alcohol incapable of forming an alkoxypropionic acid. In contrast beta-isomers are able to form the alkoxypropionic acids and these are linked to teratogenic effects (and possibly haemolytic effects).

This alpha isomer comprises greater than 95% of the isomeric mixture in the commercial product.

Because the alpha isomer cannot form an alkoxypropionic acid, this is the most likely reason for the lack of toxicity shown by the PGEs as distinct from the lower molecular weight ethylene glycol ethers. More importantly, however, very extensive empirical test data show that this class of commercial-grade glycol ether presents a low toxicity hazard. PGEs, whether mono, di- or tripropylene glycol-based (and no matter what the alcohol group), show a very similar pattern of low to non-detectable toxicity of any type at doses or exposure levels greatly exceeding those showing pronounced effects from the ethylene series. One of the primary metabolites of the propylene glycol ethers is propylene glycol, which is of low toxicity and completely metabolised in the body.

As a class, the propylene glycol ethers are rapidly absorbed and distributed throughout the body when introduced by inhalation or oral exposure. Dermal absorption is somewhat slower but subsequent distribution is rapid. Most excretion for PGEs is via the urine and expired air. A small portion is excreted in the faeces.

As a group PGEs exhibits low acute toxicity by the oral, dermal, and inhalation routes. Rat oral LD50s range from >3,000 mg/kg (PnB) to >5,000 mg/kg (DPMA). Dermal LD50s are all > 2,000 mg/kg (PnB, & DPnB; where no deaths occurred), and ranging up to >15,000 mg/kg (TPM). Inhalation LC50 values were higher than 5,000 mg/m³ for DPMA (4-hour exposure), and TPM (1-hour exposure). For DPnB the 4-hour LC50 is >2,040 mg/m³. For PnB, the 4-hour LC50 was >651 ppm (>3,412 mg/m³), representing the highest practically attainable vapor level. No deaths occurred at these concentrations. PnB and TPM are moderately irritating to eyes while the remaining category members are only slightly irritating to nonirritating. PnB is moderately irritating to skin while the remaining category members are slightly to non-irritating

None are skin sensitisers.

In repeated dose studies ranging in duration from 2 to 13 weeks, few adverse effects were found even at high exposure levels and effects that did occur were mild in nature. By the oral route of administration, NOAELs of 350 mg/kg-d (PnB – 13 wk) and 450 mg/kg-d (DPnB – 13 wk) were observed for liver and kidney weight increases (without accompanying histopathology). LOAELs for these two chemicals were 1000 mg/kg-d (highest dose tested).

Dermal repeated-dose toxicity tests have been performed for many PGEs. For PnB, no effects were seen in a 13-wk study at doses as high as 1,000 mg/kg-d. A dose of 273 mg/kg-d constituted a LOAEL (increased organ weights without histopathology) in a 13-week dermal study for DPnB. For TPM, increased kidney weights (no histopathology) and transiently decreased body weights were found at a dose of 2,895 mg/kg-d in a 90-day study in rabbits. By inhalation, no effects were observed in 2-week studies in rats at the highest tested concentrations of 3244 mg/m³ (600 ppm) for PnB and 2,010 mg/m³ (260 ppm) for DPnB. TPM caused increased liver weights without histopathology by inhalation in a 2-week study at a LOAEL of 360 mg/m³ (43 ppm). In this study, the highest tested TPM concentration, 1010 mg/m³ (120 ppm), also caused increased liver weights without accompanying histopathology. Although no repeated-dose

studies are available for the oral route for TPM, or for any route for DPMA, it is anticipated that these chemicals would behave similarly to other category members.

One and two-generation reproductive toxicity testing has been conducted in mice, rats, and rabbits via the oral or inhalation routes of exposure on PM and PMA. In an inhalation rat study using PM, the NOAEL for parental toxicity is 300 ppm (1106 mg/m³) with decreases in body and organ weights occurring at the LOAEL of 1000 ppm (3686 mg/m³). For offspring toxicity the NOAEL is 1000 ppm (3686 mg/m³), with decreased body weights occurring at 3000 ppm (11058 mg/m³). For PMA, the NOAEL for parental and offspring toxicity is 1000 mg/kg/d. in a two generation gavage study in rats. No adverse effects were found on reproductive organs, fertility rates, or other indices commonly monitored in such studies. In addition, there is no evidence from histopathological data from repeated-dose studies for the category members that would indicate that these chemicals would pose a reproductive hazard to human health.

In developmental toxicity studies many PGEs have been tested by various routes of exposure and in various species at significant exposure levels and show no frank developmental effects. Due to the rapid hydrolysis of DPMA to DPM, DPMA would not be expected to show teratogenic effects. At high doses where maternal toxicity occurs (e.g., significant body weight loss), an increased incidence of some anomalies such as delayed skeletal ossification or increased 13th ribs, have been reported. Commercially available PGEs showed no teratogenicity.

The weight of the evidence indicates that propylene glycol ethers are not likely to be genotoxic. In vitro, negative results have been seen in a number of assays for PnB, DPnB, DPMA and TPM. Positive results were only seen in 3 out of 5 chromosome aberration assays in mammalian cells with DPnB. However, negative results were seen in a mouse micronucleus assay with DPnB and PM. Thus, there is no evidence to suggest these PGEs would be genotoxic in vivo. In a 2-year bioassay on PM, there were no statistically significant increases in tumors in rats and mice.

The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

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

	US – Rhode Island Hazardous Substance List	IARC	
VPVB_(VERY~	US – Maine Chemicals of High Concern List	Carcinogen	CA Prop 65; IARC; NTP 11th ROC
SKIN			
dipropylene glycol monomethyl ether	US – Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants – Skin	Skin Designation	X
dipropylene glycol monomethyl ether	US – Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants – Skin	Skin Designation	X
dipropylene glycol monomethyl ether	US – Washington Permissible exposure limits of air contaminants – Skin	Skin	X
dipropylene glycol monomethyl ether	US – Tennessee Occupational Exposure Limits – Limits For Air Contaminants – Skin	Skin Designation	X
dipropylene glycol monomethyl ether	US – Minnesota Permissible Exposure Limits (PELs) – Skin	Skin Designation	X
dipropylene glycol monomethyl ether	US – Hawaii Air Contaminant Limits – Skin Designation	Skin Designation	X
dipropylene glycol monomethyl ether	US OSHA Permissible Exposure Levels (PELs) – Skin	Skin Designation	X
dipropylene glycol monomethyl ether	Canada – Alberta Occupational Exposure Limits – Skin	Substance Interaction	1

Section 12 – ECOLOGICAL INFORMATION

No data

Ecotoxicity			
Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation
dipropylene glycol monomethyl ether	HIGH		LOW
			Mobility
			HIGH

Section 13 – DISPOSAL CONSIDERATIONS

Disposal Instructions

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

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

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

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

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means.

Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.

Section 14 – TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 – REGULATORY INFORMATION

dipropylene glycol monomethyl ether (CAS: 34590–94–8, 12002–25–4, 112388–78–0, 104512–57–4, 83730–60–3, 112–28–7, 13429–07–7, 20324–32–7, 13588–28–8, 55956–21–3) is found on the following regulatory lists; "Canada – Alberta Occupational Exposure Limits", "Canada – British Columbia Occupational Exposure Limits", "Canada – Northwest Territories Occupational Exposure Limits (English)", "Canada – Nova Scotia Occupational Exposure Limits", "Canada – Prince Edward Island Occupational Exposure Limits", "Canada – Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada – Saskatchewan Occupational Health and Safety Regulations – Contamination Limits", "Canada – Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88–64)", "Canada Toxicological Index Service – Workplace Hazardous Materials Information System – WHMIS (English)", "IMO MARPOL 73/78 (Annex II) – List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) – High Production Volume List", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US – Alaska Limits for Air Contaminants", "US – California 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 Permissible Exposure Limits for Chemical Contaminants", "US – Connecticut Hazardous Air Pollutants", "US – Hawaii Air Contaminant Limits", "US – Idaho – Limits for Air Contaminants", "US – Michigan Exposure Limits for Air Contaminants", "US – Minnesota Hazardous Substance List", "US – Minnesota Permissible Exposure Limits (PELs)", "US – New Jersey Right to Know Hazardous Substances", "US – Oregon Permissible Exposure Limits (Z-1)", "US – Pennsylvania – Hazardous Substance List", "US – Rhode Island Hazardous Substance List", "US – Tennessee Occupational Exposure Limits – Limits For Air Contaminants", "US – Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US – Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US – Washington Permissible exposure limits of air contaminants", "US – Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US DOT Coast Guard Bulk Hazardous Materials – List of Flammable and Combustible Bulk Liquid Cargoes", "US EPA High Production Volume Program Chemical List", "US EPA Master Testing List – Index I Chemicals Listed", "US FDA Indirect Food Additives: Adhesives and Components of Coatings – Substances for Use Only as Components of Adhesives – Adhesives", "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 Toxic Substances Control Act (TSCA) – Inventory", "US TSCA Section 12(b) – List of Chemical Substances Subject to Export Notification Requirements", "US TSCA Section 4/12 (b) – Sunset Date/Status", "US TSCA Section 8 (a) – Preliminary Assessment Information Rules (PAIR) – Reporting List", "US TSCA Section 8 (d) – Health and Safety Data Reporting"

Section 16 – OTHER INFORMATION

ND Substance	CAS	Suggested codes
dipropylene glycol monomethyl ether	34590-94-8	R52/53
dipropylene glycol monomethyl ether	12002-25-4	R52/53
dipropylene glycol monomethyl ether	112388-78-0	R52/53
dipropylene glycol monomethyl ether	104512-57-4	R52/53
dipropylene glycol monomethyl ether	83730-60-3	R52/53
dipropylene glycol monomethyl ether	112-28-7	R52/53
dipropylene glycol monomethyl ether	13429-07-7	Xn; R22
dipropylene glycol monomethyl ether	20324-32-7	Xn; R22
dipropylene glycol monomethyl ether	13588-28-8	R52/53
dipropylene glycol monomethyl ether	55956-21-3	R52/53
Ingredients with multiple CAS Nos		
Ingredient Name	CAS	
dipropylene glycol monomethyl ether	34590–94–8, 12002–25–4, 112388–78–0, 104512–57–4, 83730–60–3, 112–28–7, 13429–07–7, 20324–32–7, 13588–28–8, 55956–21–3	

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additional technical information please call our toxicology department on +800 CHEMCALL.

■ Classification of the preparation 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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