Environmental Aspects Report

MPDIOL Glycol

(2-Methyl-1,3-Propanediol)
Toxicology & Regulatory Overview

Description

MPDIOL glycol is a low molecular weight glycol. It does not contain nor is it manufactured using chlorine compounds, ozone depleting substances or heavy metals. It is water soluble at normal room temperature. It has low volatility and a flash point of 260°F. These features suggest that the product should not persist in the environment, and it should pose little if any physical or toxicological hazards. *MPDIOL* glycol has been subjected to extensive testing as summarized below and has been observed to be of low toxicity and inherently biodegradable.

This information sheet contains the following:

- An overview of the results of specific toxicity studies
- A status with regard to key regulatory approvals
- A summary of physical and chemical properties

For additional guidance on proper storage and handling, please read the material safety data sheet (MSDS) or call (888) 777-0232 and ask for technical service on *MPDIOL* glycol.

Acute Toxicity

MPDIOL glycol is of low toxicity as determined by oral and dermal routes of exposure. It has low skin and eye irritation potential and is not a dermal sensitizer. Specific test results are listed below:

Acute Oral Toxicity Test (rat) - LD_{50}>5000 mg/kg bwt. No deaths occurred.

Acute Dermal Toxicity Test (rabbit) - LD_{50}>2000 mg/kg bwt. No treatment-related deaths occurred.

Acute Inhalation Toxicity Test (rat) – LC_{50}>5.1 mg/L (aerosol). No deaths occurred.

Skin Irritation (rabbit) - No evidence of erythema/eschar or edema.

Eye Irritation (rabbit) - No evidence of conjunctival redness or chemosis, or corneal or irideal effects in exposed rabbit eyes, washed or unwashed, except one washed eye had slight corneal irritation which cleared by day 2.

Dermal Sensitization (guinea pig maximization) - Mild redness of the skin observed in 3 of 20 guinea pigs tested with 50 percent *MPDIOL* glycol. Results indicate minimal irritation or possibly weak sensitization.

Studies in humans confirm that *MPDIOL* glycol has low potential to cause irritation or sensitization following topical application.

Genotoxicity & Repeated Dose Toxicity

MPDIOL glycol showed no evidence for either target organ, bioaccumulation, reproductive or developmental effects even at repeated, high-level oral exposures. No evidence of genotoxic potential.

Repeated Dose Toxicity
MPDIOL glycol has been evaluated for repeated exposure toxicity in a 90-day oral gavage study conducted in rats administered dosages of 300 to 1000 mg/kg bwt/day. This study investigated clinical, hematological, biochemical and gross and microscopic structural end points. There was no evidence of any adverse effects associated with *MPDIOL* glycol found in this study.

Genotoxicity
Three in vitro genotoxicity studies have been conducted with *MPDIOL* glycol. *MPDIOL* glycol was not mutagenic, both with and without metabolic activation, in either the Ames test or in a gene mutation test using cultured V79 Chinese hamster cells and was not clastogenic in a chromosomal aberration test using cultured human lymphocytes.

Reproduction/Development
The effects of *MPDIOL* glycol on reproduction and development have been tested in two developmental toxicity studies conducted in the rat and rabbit and in a reproductive toxicity study conducted in rats over two years. During the studies, *MPDIOL* glycol was administered to parental animals at dose levels up to 1000 mg/kg body weight/day. No treatment-related embryol fetotoxic, teratogenic or reproductive performance effects were observed.

Aquatic Toxicity

MPDIOL glycol has demonstrated low aquatic toxicity in the tests described below:

Algal Growth Inhibition Test
In a static test, an exponentially growing culture of *Scenedesmus subspicatus* was exposed to different concentrations of *MPDIOL* glycol for 72 hours. Nominal concentrations tested in the final study ranged between 100 and 1000 mg/l. Under the conditions of this study, *MPDIOL* glycol did not inhibit total cell growth or reduce growth rate of this fresh water algae species significantly at concentrations up to and including 1000 mg/l. Hence, both nominal 72-hour EC_{50} for growth inhibition and the nominal EC_{50} for growth rate reduction were greater than 1000 mg/l.

Acute Toxicity in Daphnia magna
Daphnia magna were exposed for 48 hours to a concentration of 1000 mg/l. No immobilization of *D. magna* was observed after either 24 or 48 hours of exposure. Hence, under the conditions of this study, the 48h-EC_{50} for immobilization of *D. magna* was greater than 1000 mg/l.

Acute Toxicity in the Carp
MPDIOL glycol was tested in a limit test in which fish were exposed for 96 hours in a static system to a maximum nominal concentration of 1000 mg/l. No mortality of fish or any other effects were observed at the 1000 mg/l limit concentration or in the control. Therefore, the 96h-LC_{50} for carp exposed to *MPDIOL* glycol was greater than 1000 mg/l.

Microbial Inhibition
The inhibitory effect of *MPDIOL* glycol on aerobic waste-water bacteria of activated sludge was investigated in a respiration test. *MPDIOL* glycol did not inhibit the respiration rate at nominal concentrations up to and including 100 mg/l. Under the conditions of this test, *MPDIOL* glycol was not toxic to aerobic waste-water bacteria and the EC_{50} was greater than 100 mg/l.

Terrestrial Toxicity

The acute toxicity of *MPDIOL* glycol towards terrestrial plants was evaluated in a series of studies which assessed emergence and dry shoot weight for seeds germinated in soil containing up to 1000 mg of *MPDIOL* glycol/kg soil. Stunting (due to delayed emergence), leaf curling, reduced stand, leaf necrosis and non-emergence were among the effects observed at higher exposure concentrations with lettuce being the most sensitive species. The lettuce seedling emergence and growth EC_{50} values were 92.6 and 29.0 mg/kg dry soil, respectively. The oat seedling emergence

and growth EC_{50} values were both greater than 1000 mg/kg dry soil. The radish seedling emergence and growth EC_{50} were greater than 1000 and 730 mg/kg dry soil, respectively.

Environmental Fate

MPDIOL glycol is inherently biodegradable. The ultimate biodegradation products of *MPDIOL* glycol are carbon dioxide and water since it contains only carbon, hydrogen and oxygen. *MPDIOL* glycol was tested for its ready biodegradability in the modified Sturm test at nominal concentrations of 10 and 20 mg/l. The relative degradation values calculated from the measurements performed during the test period revealed significant degradation at 10 mg/l (54 percent) but no significant
biodegradation at 20 mg/l (6 percent). Since at least 60 percent biodegradation was not reached within 10 days after 10 percent biodegradation was achieved, *MPDIOL* glycol has been characterized as inherently biodegradable. MPDiol glycol did not meet the requirements of readily biodegradable in this Sturm test.

National Chemical Inventories

As different countries develop regulations for chemical inventories, Lyondell Chemical Company seeks their recognition and approval for marketing *MPDIOL* glycol throughout international markets. *MPDIOL* glycol is listed on the US TSCA, Canadian DSL, Australian, Korean, Japanese, Philippine and Chinese inventories. The identification numbers on the Korean and Japanese inventories are KE-24869 and (2)-3203, respectively.

With respect to the European Union, *MPDIOL* glycol is not listed on EINECS. However, Lyondell Chemical Company has notified *MPDIOL* glycol in the EU and it is listed on ELINCS. The ELINCS number is 412-350-5. Should you require additional information regarding the inventory status of *MPDIOL* glycol, or polymers in which *MPDIOL* glycol is incorporated as a monomer, please contact Lyondell Chemical Company.

In addition, *MPDIOL* glycol has been added to the list of approved reactants for manufacture of polyester polymers under the US EPA polymer exemption (40 CFR 723.250 (e)(3).

FDA Clearances

The Food & Drug Administration recognizes *MPDIOL* glycol (2-methyl-1,3-propanediol) as a butylene glycol isomer that has clearance for use in food contact applications under:

- 21 CFR 175.105 Adhesives,
- 21 CFR 175.300(b)(3)(ii) and (vii) Resinous and polymeric coatings,
- 21 CFR 176.170 Paper and paperboard…Aqueous & fatty foods,
- 21 CFR 176.180 Paper and paperboard…Dry foods,

Specific limitations or conditions of use may apply. Please contact Lyondell Chemical Company for more information to assist you in determining clearance for a specific application.

Regulatory Status

The INCI name for *MPDIOL* glycol is ‘methyl propanediol.’

MPDIOL glycol is **NOT** listed under any of the following regulatory sections:

Clean Air Act
Section 111, Potential Human Health Hazards
Section 112, Hazardous Air Pollutants (HAPs)

Comprehensive Environmental Response, Compensation & Liability Act (CERCLA; "Superfund")
Section 101 (14), Hazardous Substances
Section 102, Reportable Quantities

Resource Conservation and Recover Act (RCRA)
Section 3001, Hazardous Waste Listing

Superfund Amendments & Authorization Act (SARA), Title III
Section 302, Extremely Hazardous Substances
Section 313, Toxic Chemicals

California Safe Drinking Water & Toxic Enforcement Act (Prop 65)
Chemicals "Known to the State" to Cause Cancer or Reproductive Toxicity

SUMMARY OF PHYSICAL & CHEMICAL PROPERTIES	
Freezing Point, °C	<-54°. Increased viscosity to -54°C with no clear change to solid.
Boiling Point	212°C @760 mm Hg (414°F)
Water Solubility	Complete at room temperature.
Partition Coefficient	O/W 0.24 @ 20° C
Flash Point	127°C (260°F) Closed Cup
Autoignition Temperature	380°C (716°F)
Fat Solubility	9.4 g/kg
Molecular Weight (g/mole)	90.1
Viscosity (cps @ 25°C)	168
Specific Gravity	1.015
Density	1.01 g/cm^3 @ 20° C
Vapor Pressure (mm Hg @20°C)	<0.1
Surface Tension	72.2 mN/m @ 20° C
Refractive Index	1.445

North American Regional Office l Houston, Texas, USA l Tel: +1 713 309 7200 or toll-free within USA +1 888 777 0232
European Regional Office l Rotterdam, The Netherlands l Tel: +31 10 275 5500
Asia Pacific Regional Office l Hong Kong, China l Tel: +852 2882 2668

www.lyondellbasell.com

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