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SECONDARY VALUES FOR PROPYLENE GLYCOL (CAS # 57-55-6)

A search was conducted for information on the chemical properties and toxicity of propylene glycol (to human health and to fish and aquatic life) using the following databases and search engines: ECOTOX (toxicity to fish and aquatic life), IRIS (Integrated Risk Information System; toxicity to human health), and CHEMFATE (environmental fate).

FISH AND AQUATIC LIFE

To derive an acute toxicity criterion for aquatic life, acute toxicity test results are required for at least one species in each of eight different families. Specific requirements and the data available to meet these requirements are found in Table 1. Following a search for information on the toxicity of propylene glycol to fish and other aquatic life, it was determined that data are available to meet only two out of the eight requirements; but because there are data for a daphnid species, it is possible to calculate a secondary acute value for propylene glycol.

Cold Water

To calculate a secondary acute value (SAV), the lowest genus mean acute value (GMAV) in the database is divided by the secondary acute factor (SAF; an adjustment factor corresponding to the number of satisfied requirements).

SAF for two out of eight requirements met = 13.0

Lowest GMAV = **4,825,927** (*Ceriodaphnia dubia*)

$$\begin{aligned}\text{SAV} &= \text{GMAV}/\text{SAF} \\ &= 4,825,927 / 13 \\ &= \mathbf{371,225 \mu\text{g/L} (371 \text{ mg/L})}\end{aligned}$$

There are currently no chronic data for propylene glycol. Therefore, a secondary chronic value may be calculated only by using default acute-chronic ratios.

SACR = Geometric mean of 18, 18, and 18 = 18

$$\begin{aligned}\text{SCV} &= \text{SAV}/\text{SACR} \\ &= 371,225 / 18 \\ &= \mathbf{20,624 \mu\text{g/L} (21 \text{ mg/L})}\end{aligned}$$

Warm Water Sport Fish, Warm Water Forage Fish, Limited Forage Fish, Limited Aquatic Life

Because the lowest GMAV in the cold water database is for *Ceriodaphnia dubia*, an invertebrate, and because this species will not drop out for any of the other use classifications, secondary values for warm water sport fish, warm water forage fish, limited forage fish and limited aquatic life waters will be the same as for cold waters.

Table 1. Requirements for calculation of an acute toxicity criterion for protection of aquatic life for propylene glycol, and corresponding acute toxicity data.

Species Name	Common Name	Duration/ Endpoint	Value µg/L	Reference # ^a	Source
1. At least one salmonid fish in the family Salmonidae, in the class Osteichthyes.					
2. At least one non-salmonid fish from another family in the class Osteichthyes, preferably a commercially or recreationally important warmwater species.					
3. At least one planktonic crustacean (e.g., cladoceran, copepod).					
<i>Daphnia magna</i>	water flea	48-h/EC50	43,500,000	1	MSDS
<i>Daphnia magna</i>	water flea	48-h/EC50	>10,000,000	2	ECOTOX
Species Mean Acute Value (SMAV) = 20,856,653					
<i>Ceriodaphnia dubia</i>	water flea	48-h/LC50	18,340,000	3	ECOTOX
<i>Ceriodaphnia dubia</i>	water flea	48-h/LC50	1,020,000	3	ECOTOX
<i>Ceriodaphnia dubia</i>	water flea	48-h/LC50	15,052,000	4	ECOTOX
<i>Ceriodaphnia dubia</i>	water flea	48-h/LC50	4,919,000	4	ECOTOX
<i>Ceriodaphnia dubia</i>	water flea	48-h/LC50	5,122,000	4	ECOTOX
<i>Ceriodaphnia dubia</i>	water flea	48-h/LC50	13,020,000	3	ECOTOX
<i>Ceriodaphnia dubia</i>	water flea	48-h/LC50	660,000	3	ECOTOX
SMAV = 4,825,927					
4. At least one benthic crustacean (e.g., ostracod, isopod, amphipod, crayfish).					
5. At least one insect (e.g., mayfly, dragonfly, damselfly, stonefly, caddisfly, mosquito, midge).					
6. At least one fish or amphibian from a family in the phylum Chordata not already represented in one of the other subdivisions.					
<i>Pimephales promelas</i>	fathead minnow	96-h/LC50	51,400,000	1	MSDS
<i>Pimephales promelas</i>	fathead minnow	96-h/LC50	>62,000,000	3	ECOTOX
<i>Pimephales promelas</i>	fathead minnow	96-h/LC50	55,770,000	3	ECOTOX

<i>Pimephales promelas</i>	fathead minnow	96-h/LC50	710,000	3	ECOTOX
<i>Pimephales promelas</i>	fathead minnow	96-h/LC50	34,060,000	4	ECOTOX
<i>Pimephales promelas</i>	fathead minnow	96-h/LC50	52,930,000	3	ECOTOX
<i>Pimephales promelas</i>	fathead minnow	96-h/LC50	600,000	3	ECOTOX

SMAV = 14,526,427

7. At least one organism from a family in a phylum other than Arthropoda or Chordata (e.g., Rotifera, Annelida, Mollusca).
8. At least one organism from a family in any order of insect or any other phylum not already represented in subdivisions 1 through 7.

¹MSDS Sheet. Concentrate ARCOPLUS ADF. Lyondell Chemical Company. MSDS No. BE9000. Variant U.S.A.-EN. Version No. 1.7. Validation Date 10/07/2005.

²Kuhn, R., M. Pattard, K.D. Pernak, and A. Winter. 1989. Results of the harmful effects of selected water pollutants (anilines, phenols, aliphatic compounds) to *Daphnia magna*. Water Res. 23(4):495-499.

³Pillard, D.A. 1995. Comparative toxicity of formulated glycol deicers and pure ethylene and propylene glycol to *Ceriodaphnia dubia* and *Pimephales promelas*. Environmental Toxicology and Chemistry 14(2):311-315.

⁴Cornell, J.S. D.A. Pillard, and M.T. Hernandez. 2000. Comparative measures of the toxicity of component chemicals in aircraft deicing fluid. Environmental Toxicology and Chemistry 19(6):1465-1472.

HUMAN HEALTH

To calculate a criteria or secondary value for the protection of human health, it is first necessary to determine if the substance has been shown to be carcinogenic (which will result in the calculation of a human cancer criteria or secondary value) or not (which will result in the calculation of a human threshold criteria or secondary value). The carcinogenicity of propylene glycol has not been assessed by EPA. Because neither an oral reference dose nor an oral slope factor is available, neither human threshold nor human cancer secondary values can be calculated for propylene glycol at this time.