SIDS Initial Assessment Report

For

SIAM 18

Paris, France

1. Chemical Name: ETHYLENE GLYCOL PHENYL ETHER

2. CAS Number: 122-99-6

Tables

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GENERAL INFORMATION ON EXPOSURE

1.1 Production Volumes and Use Pattern

Ethylene glycol phenyl ether (EGPhE) is produced by one U.S. manufacturer at one production site. Annual production volume in 1999 in the U.S. was reported to be about 6.4 thousand metric tons (Chinn, 2000). Producers, if any, outside of the U.S. have not been identified. EGPhE is produced by reacting ethylene oxide with phenol in an alkaline medium using a continuous closed reactor column (Budavari, 1989). The product is purified by passing the crude reaction mixture through a continuous distillation column. The purified product is then transferred through a closed line to a storage tank. Most of the product is sold and transported in bulk (tank car or tank truck), and a portion of it is drummed for sales in smaller quantities.

EGPhE has the following reported uses: solvent for cellulose acetate, dyes, inks, resins, organic synthesis of plasticizers, germicides, and pharmaceuticals, and as a preservative for human anatomical specimens for dissection (Sax and Lewis, 1987). It is reportedly used as a fixative for perfumes, in organic synthesis, as a bactericide and insect repellent (Budavari, 1989). It has also reportedly been used as a fixative for cosmetics and soaps, a textile dye carrier, a chemical intermediate, a solvent for cleaners, and as a solvent for stamp pads, specialty inks and ball points (HSDB, 2003).

The Environmental Protection Agency (EPA) has provided the following reported uses of EGPhE in consumer products: various soaps (including shower/hand soaps), oven cleaner, heavy duty floor finish stripper, hair conditioner/gel, microemulsion sheen activator/moisturizer, hot oil treatment, interior latex primer-sealer, paint and varnish removers (EPA, 2003). Some of these uses may be the same as those identified above (e.g., fixative for soaps and solvent for cleaners). In a project for the Consumer Product Safety Commission (CPSC), The American Chemistry Council Ethylene and Propylene Glycol Ethers Panel has tabulated uses of various ethylene glycol ethers in consumer products. This unpublished tabulation provides the following information on EGPhE:

Table 1 Percentage of EGPhE Production Used For Consumer Products

Types of Consumer End Products	Consumer Products Vol (million lbs.)	Consumer Products % Production	Consumer Products Approx. Weight %	Percent Industrial/ Consumer Use
Paints/coatings	< 10	37.5%	5-15%	
Cleaners	< 5	19.0%	5-15%	37/63
Dyes	< 1	6.5%	5-15%	

No further details were provided about the uses reported by the EPA or in the above table.

According to the SPIN database, the following uses have been reported in 2002 for the EU Nordic countries: cleaning/washing agents, paints lacquers and varnishes, cutting fluids, non-agricultural pesticides and preservatives, reprographic agents, surface active agents, in cosmetics and softeners, adhesive/binding agents, surface treatment, welding and soldering agents, pharmaceuticals, colouring agents, corrosion inhibitors, lubricant and additives, stabilizers, solvent and “other”.

1.2 Environmental Exposure and Fate

Table 2 Summary of Environmental Fate Properties for EGPhE

Photodegradation OH radical rate constant	Predicted Environmental Distribution (Level III fugacity model)			
	Air (%)	Water (%)	Soil (%)	Sed. (%)
32.67 E-12 cm^3/molecule-sec $t_{1/2}$ = 3.9 hrs	0.68	46.2	53.0	0.0866

All values were estimated using EPIWIN

1.2.1 Sources of Environmental Exposure

There is limited opportunity for environmental release during U.S. manufacture, because of the use of closed systems employed for this purpose by the single U.S. manufacturer. The chemical is stored in closed tanks and transported in tank cars and tank trucks, and smaller amounts are transported in drums. Environmental release during transport is possible in the event of a spill or accident. Through the use of this substance as a solvent, as a chemical intermediate and for other multiple, dispersive applications in industrial and consumer products, EGPhE may be released into the aquatic environment through industrial wastewater effluents or into the atmosphere by volatilization. Environmental monitoring information is largely not available, but ethylene glycol phenyl ether was detected qualitatively in 1976 in effluents from sewage treatments and chemical manufacturing facilities (Shackelford and Keith, 1976). If the substance is released to the air it will degrade relatively rapidly by reaction with photochemically-produced hydroxyl radicals (estimated half-life of 3.9 hours). Because the substance is relatively soluble in water, physical removal from air via wet deposition may occur. If released to soil or water, ethylene glycol phenyl ether is expected to biodegrade readily.

1.2.2 Photodegradation

The hydroxyl radical induced photodegradation rate constant and half-life for EGPhE were estimated using the EPIWIN AOP (v.1.90) Program (Table 3). The hydroxyl radical-induced photodegradation rate constant of 3.2 E-11 cm^3/molecule-sec and predicted half-life of 3.9 hours indicate that the substance photodegrades readily in the atmosphere.

1.2.3 Stability in Water

Although no quantitative rate constant has been determined for water hydrolysis of EGPhE, it is well known that ether groups are generally stable to water under neutral conditions and ambient temperatures (Fieser and Fieser, 1960). The ether function is readily hydrolyzed only by heating in the presence of halogen acids, particularly hydrogen iodide. The EPIWIN/Hydrowin program is not able to calculate a rate constant for water hydrolysis for ether functions.

1.2.4 Transport between Environmental Compartments

Level III Fugacity modeling has been conducted for EGPhE using the EPIWIN Program (Table 3). Measured inputs to the EPIWIN program are a melting point of 14°C, a boiling point of 245.2°C, a water solubility of 28,900 mg/l and a vapor pressure of 0.00975 mm Hg. The Fugacity model predicts that the substance partitions preferentially to water and soil about equally, with limited partitioning to air and sediment. The mass percentages in each medium are given in Table 3. The

predicted half-lives in hours are: air = 7.858, water = 360, soil = 360, and sediment = 1440; with a Biowin ultimate estimate range of weeks.

1.2.5 Biodegradation

Results of an OECD Guideline 301 F "Ready Biodegradability: Manometric Respirometry Test" indicate that 90% of EGPhE degrades within 28 days (Goodwin, 1999). An additional study performed according to APHA guidelines shows 60% biodegradation of EGPhE after 20 days (Waggy, 1987). Three additional studies for which the reliability could not be verified also reported that EGPhE is biodegradable.

1.2.6 Bioaccumulation

A bioconcentration factor (BCF) of 0.3493 (log BCF = -0.457) estimated by EPIWIN BCF (v2.14) indicates that EGPhE has a low potential to bioaccumulate.

1.3 Human Exposure

1.3.1 Occupational Exposure

Occupational exposure to the ethylene glycol ethers occurs through inhalation of vapour and dermal contact (Parmeggiani, 1983). Inhalation exposure is limited by the substance's low vapour pressure (0.0053 hPa at 20°C). NIOSH has estimated that 96,814 workers are potentially exposed to ethylene glycol phenyl ether in the USA (NOES, 1983). Exposure is more likely to occur during processing and use as a solvent, since manufacture takes place in a closed system.

1.3.2 Consumer Exposure

The general population can be exposed through dermal contact and inhalation of vapour through ethylene glycol phenyl ether's use as a perfume fixative or solvent for inks, resins and cellulose acetate (Sax and Lewis, 1987). Table 2 above lists a number of reported uses of EGPhE in consumer products, and indicates that about 63% of total manufacturing volume goes into consumer products, and that such products may contain 5-15% by weight EGPhE. The most likely routes of exposure are dermal and inhalation, and the latter route is limited by the low vapour pressure of EGPhE.