PHENYL GLYCIDYL ETHER

Data were last evaluated in IARC (1989).

1. Exposure Data

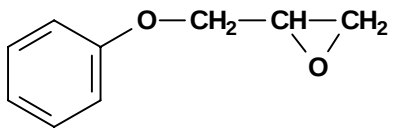
1.1 Chemical and physical data

1.1.1 *Nomenclature*

Chem. Abstr. Serv. Reg. No.: 122-60-1

Systematic name: (Phenoxymethyl)oxirane

1.1.2 *Structural and molecular formulae and relative molecular mass*



$C_9H_{10}O_2$ Relative molecular mass: 150.18

1.1.3 *Physical properties* (for details, see IARC, 1989)

(*a*) *Boiling-point*: 245°C

(*b*) *Melting-point*: 3.5°C

(*c*) *Conversion factor*: $mg/m^3 = 6.14 \times ppm$

1.2 Production, use and human exposure

Glycidyl ethers are basic components of epoxy resins which have been commercially available since the late 1940s. Bisphenol A diglycidyl ether and its oligomers are major components of epoxy resins. Other glycidyl ethers, including phenyl glycidyl ether, are frequently incorporated into epoxy resin systems as reactive modifiers. Epoxy resins based on bisphenol A diglycidyl ether are widely used in protective coatings, including paints, in reinforced plastic laminates and composites, in tooling, casting and moulding resins, in bonding materials and adhesives, and in floorings and aggregates. Occupational exposure to bisphenol A diglycidyl ether and phenyl glycidyl ether may occur during their production, during the production of epoxy products and during various uses of epoxy products, but data on exposure levels are sparse (IARC, 1989).

2. Studies of Cancer in Humans

No data were available to the Working Group.

3. Studies of Cancer in Experimental Animals

Pure phenyl glycidyl ether was tested for carcinogenicity by inhalation exposure in male and female rats of one strain, producing carcinomas of the nasal cavity in animals of each sex (IARC, 1989).

4. Other Data Relevant to an Evaluation of Carcinogenicity and its Mechanisms

4.1 Absorption, distribution, metabolism and excretion

4.1.1 *Humans*

No data were available to the Working Group.

4.1.2 *Experimental systems*

Percutaneous absorption of phenyl glycidyl ether is high in rats and rabbits. It binds to glutathione in the presence of liver microsomes from various avian species (IARC, 1989).

4.2 Toxic effects

4.2.1 *Humans*

Phenyl glycidyl ether has been recognized as a contact allergen using patch tests on exposed workers from various factories who developed dermatitis and dermatosis (IARC, 1989).

4.2.2 *Experimental systems*

Blood, urine and histopathological analysis of rats and beagle dogs exposed by inhalation to 6–73.5 mg/m^3 phenyl glycidyl ether for three months did not reveal any treatment-related effect. This compound caused skin irritation and corneal injury in rabbits and hair loss in rats. Its sensitizing potential in guinea-pigs is low (IARC, 1989).

4.3 Reproductive and developmental effects

4.3.1 *Humans*

No data were available to the Working Group.

4.3.2 *Experimental systems*

Prenatal toxicity was not induced in rats exposed by inhalation to phenyl glycidyl ether (IARC, 1989).

4.4 Genetic and related effects

4.4.1 *Humans*

No data were available to the Working Group.

4.4.2 *Experimental systems*

Phenyl glycidyl ether induced mutations in bacteria and transformation in mammalian cells *in vitro* (in a Syrian hamster embryo cell clonal assay and in an assay for the enhancement of viral transformation), but did not induce chromosomal aberrations in animal cells *in vitro* or either micronuclei or chromosomal aberrations *in vivo*. It did not induce dominant lethal effects in rats (IARC, 1989).

Thymidine and 2′-deoxyadenosine react with phenyl glycidyl ether *in vitro*. The main adducts are *N*-3-(2-hydroxy-3-phenoxypropyl)thymidine and *N*-1-(2-hydroxy-3-phenoxypropyl)-2′-deoxyadenosine, respectively. With longer reaction times, a small amount of dialkylated 2′-deoxyadenosine was also formed (Van den Eeckhout *et al.*, 1990).

5. Evaluation

No epidemiological data relevant to the carcinogenicity of phenyl glycidyl ether were available.

There is *sufficient evidence* in experimental animals for the carcinogenicity of phenyl glycidyl ether.

Overall evaluation

Phenyl glycidyl ether is *possibly carcinogenic to humans (Group 2B)*.

6. References

IARC (1989) *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, Vol. 47, *Some Organic Solvents, Resin Monomers and Related Compounds, Pigments and Occupational Exposures in Paint Manufacture and Painting*, Lyon, pp. 237–261

Van den Eeckhout, E., De Bruyn, A., Pepermans, H., Esmans, E.L., Vryens, I., Claereboudt, J., Claeys, M. & Sinsheimer, J.E. (1990) Adduct formation identification between phenyl glycidyl ether and 2′-deoxyadenosine and thymidine by chromatography, mass spectrometry and nuclear magnetic resonance spectroscopy. *J. Chromatogr.*, **504**, 113–128