



WORLD HEALTH ORGANIZATION
INTERNATIONAL AGENCY FOR RESEARCH ON CANCER

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans

Volume 11: Cadmium, Nickel, Some Epoxides, Miscellaneous Industrial Chemicals and General Considerations on Volatile Anaesthetics

Summary of Data Reported and Evaluation

Epoxides

Diepoxybutane
Diglycidyl resorcinol ether
Epichlorohydrin
3,4-Epoxy-6-methylcyclohexylmethyl-3,4-epoxy-6-methylcyclohexane carboxylate
cis-9,10-Epoxystearic acid
Glycidaldehyde
Glycidyl Oleate
Glycidyl Stearate
Triethylene glycol diglycidyl ether

Miscellaneous Industrial Chemicals

Benzyl chloride
 β -Butyrolactone
 γ -Butyrolactone
Dinitrosopentamethylenetetramine
1,4-Dioxane
Ethylene sulfide

Last updated: 13 April 1999

DIGLYCIDYL RESORCINOL ETHER

VOL.: 11 (1976) (p. 125)

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

Diglycidyl resorcinol ether was reported in a preliminary communication to be carcinogenic in mice by skin application and in rats by subcutaneous injection. No carcinogenic effect was observed in a further long-term skin application study in mice. No evaluation can be made.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluations: [Vol. 36 \(1985\)](#); [Vol. 71 \(1999\)](#)

For definition of Groups, see [Preamble Evaluation](#).

Last updated: 25 March 1998

3,4-EPOXY-6-METHYLCYCLOHEXYLMETHYL-3,4-EPOXY-6-METHYLCYCLOHEXANE CARBOXYLATE

VOL.: 11 (1976) (p. 147)

CAS No.: 141-37-7

Chem. Abstr. Name: 4-Methyl-7-oxabicyclo(4.1.0)heptane-3-carboxylic acid, 4-methyl-7-oxabicyclo(4.1.0)hept-3-yl methyl ester

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

3,4-Epoxy-6-methylcyclohexylmethyl-3,4-epoxy-6-methylcyclohexane carboxylate is carcinogenic in mice by skin application: it produced skin carcinomas.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: [Vol. 71 \(1999\)](#)

091-34epox6metcyl For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Chissonox 201
- α -Dicyclodiepoxy-carboxy-1-3,4-epoxy-6-methylcyclohexylmethyl)-ester-3,4-epoxy-6-methyl-cyclohexenecarboxylate
- EP 201
- Epoxide 201
- 3,4-Epoxy-6-methylcyclohexanecarboxylic acid, (3,4-epoxy-methylcyclohexylmethyl)ester
- 3,4-Epoxy-6-methylcyclohexylmethyl-3',4'-epoxy-6'-methylcyclohexane carboxylate
- 4,5-Epoxy-2-methylcyclohexylmethyl-4,5-epoxy-2-methylcyclohexane carboxylate
- 6-Methyl-3,4-epoxycyclohexylmethyl 6-methyl-3,4-epoxycyclohexane carboxylate
- (6-Methyl-3,4-epoxycyclohexyl)methyl 6-methyl-3,4-epoxycyclohexane carboxylate
- 4-Methyl-7-oxabicyclo(4.1.0)heptane-3-methanol-4-methyl-7-oxabicyclo(4.1.0)heptane-3-carboxylate
- Unox 201
- Unox Epoxide 201

cis-9,10-EPOXYSTEARIC ACID

VOL.: 11 (1976) (p. 153)

CAS No.: 2443-39-2

Chem. Abstr. Name: *cis*-3-Octyl-oxiraneoctanoic acid

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

cis-9,10-Epoxyoctadecanoic acid has been tested in mice by skin application and in mice and rats by subcutaneous injection. The limited amount of data do not indicate that the compound is carcinogenic.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: [Vol. 71 \(1999\)](#)

Synonyms

- *cis*-9,10-Epoxyoctadecanoic acid
- *cis*-9,10-Epoxy octadecanoate
- Epoxyoleic acid

Last updated: 13 April 1999

GLYCIDALDEHYDE

VOL.: 11 (1976) (p. 175)

CAS No.: 765-34-4

Chem. Abstr. Name: Oxirane-carboxaldehyde

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

Glycidaldehyde is carcinogenic in mice by skin application and by subcutaneous injection and in rats by subcutaneous injection. It produced malignant tumours at the site of application in both species.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: [Vol. 71 \(1999\)](#)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Epihydrinaldehyde
- Epihydrine aldehyde
- 2,3-Epoxypropanal
- 2,3-Epoxy-l-propanal
- 2,3-Epoxypropionaldehyde
- Glycidal
- Glycidyl aldehyde

GLYCIDYL OLEATE

VOL.: 11 (1976) (p. 183)

CAS No.: 5431-33-4

Chem. Abstr. Name: Oxiranylmethyl ester of 9-octadecenoic acid

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

Glycidyl oleate has been tested in a limited study in mice in which subcutaneous injection produced a low incidence of local sarcomas. This result is insufficient for evaluation.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 64: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- 2,3-Epoxy-1-propanol oleate
- 2,3-Epoxypropyl ester of oleic acid
- 2,3-Epoxypropyl oleate
- Glycidol oleate
- Glycidyl octadecenoate
- Oleic acid glycidyl ester

GLYCIDYL STEARATE

VOL.: 11 (1976) (p. 187)

CAS No.: 7460-84-6

Chem. Abstr. Name: Oxiranylmethyl ester of octadecanoic acid

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

Glycidyl stearate was tested in mice by subcutaneous injection; it produced no significant increase in the incidence of local tumours.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 64: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- 2,3-Epoxy-1-propanol stearate
- 2,3-Epoxypropyl ester of stearic acid
- 2,3-Epoxypropyl stearate
- Glycidol stearate
- Glycidyl octadecanoate
- Stearic acid glycidyl ester

TRIETHYLENE GLYCOL DIGLYCIDYL ETHER

VOL.: 11 (1976) (p. 209)

CAS No.: 1954-28-5

Chem. Abstr. Name: 2,2'-(2,5,8,11-Tetraoxa-1,12-dodecanediyl)bisoxirane

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

Triethylene glycol diglycidyl ether was carcinogenic in a limited study in mice by intraperitoneal injection: it increased the incidence of pulmonary tumours.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: [Vol. 71 \(1999\)](#)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- 1,2-Bis[2-(2,3-epoxypropoxy)ethoxy]ethane
- 1,2:15,16-Diepoxy-4,7,10,13-tetraoxahexadecane
- Epodyl
- Ethoglucid
- Etoglucide
- TDE

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BENZYL CHLORIDE

VOL.: 11 (1976) (p. 217)

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

Benzyl chloride was tested in mice by intraperitoneal injection and in rats by subcutaneous injection. It was carcinogenic in rats, in which it produced local sarcomas.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: [Vol. 71 \(1999\)](#)

Last updated: 25 March 1998

β -BUTYROLACTONE

VOL.: 11 (1976) (p. 225)

CAS No.: 3068-88-0

Chem. Abstr. Name: 4-Methyl-2-oxetanone

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

β -Butyrolactone is carcinogenic in mice by skin application and by subcutaneous injection and in rats by oral administration and by subcutaneous injection. It produced tumours at the site of administration in both species.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: [Vol. 71 \(1999\)](#)

Synonyms

- 3-Hydroxybutanoic acid, β -lactone
- 3-Hydroxybutyric acid lactone
- 3-Hydroxybutyric acid, β -lactone

Last updated: 13 April 1999

DINITROSOPENTAMETHYLENETETRAMINE

VOL.: 11 (1976) (p. 241)

CAS No.: 101-25-7

Chem. Abstr. Name: 3,7-Dinitroso-1,3,5,7-tetraazabicyclo(3.3.1)nonane

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

Dinitrosopentamethylenetetramine was tested in rats by oral administration and intraperitoneal injection. No carcinogenic effects were observed.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 63: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- Aceto DNPT 40
- ChKhZ 18
- Dinitrosopentamethenetetramine
- Dinitrosopentamethylenetetraamine
- Dinitroso pentamethylenetetramine
- Di-*N*-nitrosopentamethylene tetramine
- 3,4-Di-*N*-nitrosopentamethylenetetramine
- *N,N'*-Dinitrosopentamethylene tetramine
- *N,N'*-Dinitrosopentamethylenetetramine
- *N*¹,*N*^β-Dinitrosopentamethylenetetramine
- DNPT
- 1,5-Methylene-3,7-dinitroso-1,3,5,7-tetraazacyclooctane
- Mikrofor N
- Micropor
- NSC 73799
- Opex 80
- Unicel ND
- Unicel NDX
- Vulcacec B-40
- Vulcacec BN

ETHYLENE SULFIDE

VOL.: 11 (1976) (p. 257)

CAS No.: 420-12-2

Chem. Abstr. Name: Thiirane

5. Summary of Data Reported and Evaluation

5.1 Animal carcinogenicity data

Ethylene sulfide was carcinogenic in a limited study in rats by subcutaneous injection: it produced local sarcomas.

5.2 Human carcinogenicity data

No case reports or epidemiological studies were available to the Working Group.

Subsequent evaluation: Suppl. 7 (1987) (p. 63: **Group 3**)

For definition of Groups, see [Preamble Evaluation](#).

Synonyms

- 2,3-Dihydrothiirene
- Ethylene episulfide
- Ethylene episulfide
- Thiacyclopropane

Last updated: 25 March 1998