

Triethylene glycol monobutyl ether; CASRN 143-22-6

Human health assessment information on a chemical substance is included in the IRIS database only after a comprehensive review of toxicity data, as outlined in the [IRIS assessment development process](#). Sections I (Health Hazard Assessments for Noncarcinogenic Effects) and II (Carcinogenicity Assessment for Lifetime Exposure) present the conclusions that were reached during the assessment development process. Supporting information and explanations of the methods used to derive the values given in IRIS are provided in the [guidance documents located on the IRIS website](#).

STATUS OF DATA FOR Triethylene glycol monobutyl ether

File First On-Line 09/01/1994

| Category (section) | Assessment Available? | Last Revised |
|---|------------------------|--------------|
| Oral RfD (I.A.) | not evaluated | |
| Inhalation RfC (I.B.) | qualitative discussion | 09/01/1994* |
| Carcinogenicity Assessment (II.) | not evaluated | |

*A comprehensive review of toxicological studies was completed 01/07/05 - please see section I.B for more information.

I. Chronic Health Hazard Assessments for Noncarcinogenic Effects

I.A. Reference Dose for Chronic Oral Exposure (RfD)

Substance Name — Triethylene glycol monobutyl ether
CASRN — 143-22-6

Not available at this time.

I.B. Reference Concentration for Chronic Inhalation Exposure (RfC)

Substance Name — Triethylene glycol monobutyl ether
CASRN — 143-22-6

The health effects data for triethylene glycol monobutyl ether (TGBE) were reviewed by the U.S. EPA RfD/RfC Work Group and determined to be inadequate for derivation of an inhalation RfC. The verification status of this chemical is currently NOT VERIFIABLE. For additional information on the health effects of this chemical, interested parties are referred to the U.S. EPA documentation listed below.

NOT VERIFIABLE status indicates that the U.S. EPA RfD/RfC Work Group deemed the database at the time of review to be insufficient to derive an inhalation RfC according to the Interim Methods for Development of Inhalation Reference Concentrations (U.S. EPA, 1990). This status does not preclude the use of information in cited references for assessment by others.

Derivation of an inhalation RfC for TGBE is not recommended at this time due to a complete lack of subchronic/chronic studies by any route of exposure in humans and laboratory animals. The lack of developmental toxicity data is a specific data gap because members of this class of compounds are known to be reproductive and developmental toxicants. A concentration-response assessment based on structure/activity relationships is not recommended at this time because of the lack of inhalation data for TGBE and the lack of evidence for toxicologic and pharmacokinetic similarities between TGBE and any other glycol ether, including diethylene and monoethylene glycol butyl ethers. Further, route-to-route extrapolation is not possible given the lack of TGBE pharmacokinetic data and the indication of potential for respiratory tract (portal-of-entry) effects via inhalation.

TGBE is a water soluble, clear crystalline compound with low volatility, 0.0025 mmHg at 25 C (Rowe and Wolf, 1982). There is no oral RfD assessment or drinking water health advisory for TGBE. It is used as a component of hydraulic brake fluid, as a solvent in paint stripping formulations, and as a dye carrier for textile dye processes. Commercial trade names for TGBE include Polysolv TB (Olin Corporation) and Butoxytriglycol (Union Carbide Corporation). No reliable acute inhalation toxicity data are available for TGBE. The oral and dermal LD50s in rats were determined to be 6.6 g/kg and 3.5 g/kg, respectively (Smyth and Carpenter, 1948; Rowe and Wolf, 1982).

The only repeat exposure study available for TGBE is a dermal penetration and irritation study by Leber et al. (1990). Leber et al. (1990) performed several tests of triethylene glycol monomethyl ether (TGME), triethylene glycol monoethyl ether (TGEE), and TGBE to determine the ability of these compounds to penetrate human skin and cause systemic toxicity from

repeated dermal exposure. In the first part of the experiment, human abdominal whole skin (dermis plus epidermis) samples were assessed *in vitro*. Skin samples were mounted in a glass diffusion apparatus that exposed 2.54 sq. cm of epidermal area for chemical absorption determinations. Samples were tested for integrity (tritiated water diffusion through the skin prior to exposure), diffusion of glycol ethers through the skin, and epidermal damage after chemical exposures (increase in tritiated water diffusion following exposure). The three compounds crossed human epidermis at molar rates 170-330 times slower than the corresponding monoethylene glycol ethers. The skin damage ratio for TGME, however, was comparable to that of ethylene glycol monomethyl ether, indicating that the diffusion barrier function of the skin was slightly diminished after 12 hours of exposure. In the second part of the experiment, a 21-day dermal study, 20 male and 20 female New Zealand White rabbits were divided into four groups (three chemicals and the controls). A 15-cm-wide shaved strip on the back of each test animal (5/sex/group) was exposed to 1.0 g/kg/day of neat TGME, TGEE, or TGBE and occluded with gauze bandaging. Each rabbit was dosed once daily, 5 days/week for 3 weeks. Evaluation of the rabbits included an assessment of dermal irritation (Draize method); hematology and clinical chemistry prior to study initiation; and, on day 21, pathologic examination of nearly 40 tissues (including testes) per animal. Slight local irritation (mild erythema/edema, fissuring, and desquamation) was the only effect observed, indicating the potential for direct (portal-of-entry) irritating effects. No systemic effects were observed.

Leber, A.P., R.C. Scott, M.C.E. Hodge, D. Johnson, and W.J. Krasavage. 1990. Triethylene glycol ethers: Evaluation of *in vitro* absorption through human epidermis, 21-day dermal toxicity in rabbits, and a developmental toxicity screen in rats. *J. Am. Coll. Toxicol.* 9(5): 507-515.

Rowe, V.K. and M.A. Wolf. 1982. In: *Patty's Industrial Hygiene and Toxicology*, 3rd rev. ed. Vol. 2C, p. 3914, 3969.

Smyth, H.F. and C.P. Carpenter. 1948. Further experience with the range finding test in the industrial toxicology laboratory. *J. Ind. Hyg. Toxicol.* 30(1): 63-68.

U.S. EPA. 1990. *Interim Methods for Development of Inhalation Reference Concentrations (Review Draft)*, Office of Research and Development, Washington, DC. EPA/600-8-90-066A.

Agency Work Group Review — 03/26/1992

A comprehensive review of toxicological studies published through 2004 indicated that there is insufficient health effects data to derive an RfC for Triethylene glycol monobutyl ether at this time. For more information, IRIS users may contact the IRIS Hotline at hotline.iris@epa.gov or (202)566-1676.

EPA Contacts:

Please contact the IRIS Hotline for all questions concerning this assessment or IRIS, in general, at (202)566-1676 (phone), (202)566-1749 (FAX) or hotline.iris@epa.gov (internet address).

II. Carcinogenicity Assessment for Lifetime Exposure

Substance Name — Triethylene glycol monobutyl ether
CASRN — 143-22-6

This substance/agent has not undergone a complete evaluation and determination under US EPA's IRIS program for evidence of human carcinogenic potential.

III. [reserved]

IV. [reserved]

V. [reserved]

VI. Bibliography

Substance Name — Triethylene glycol monobutyl ether
CASRN — 143-22-6

VI.A. Oral RfD References

None

VI.B. Inhalation RfC References

Leber, A.P., R.C. Scott, M.C.E. Hodge, D. Johnson, and W.J. Krasavage. 1990. Triethylene glycol ethers: Evaluation of in vitro absorption through human epidermis, 21-day dermal toxicity in rabbits, and a developmental toxicity screen in rats. *J. Am. Coll. Toxicol.* 9(5): 507-515.

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U.S. EPA. 1990. Interim Methods for Development of Inhalation Reference Concentrations (Review Draft), Office of Research and Development, Washington, DC. EPA/600-8-90-066A.

VI.C. Carcinogenicity Assessment References

None

VII. Revision History

Substance Name — Triethylene glycol monobutyl ether
CASRN — 143-22-6

| Date | Section | Description |
|------------|---------|--|
| 09/01/1994 | I.B. | Inhalation RfC discussion on-line |
| 12/03/2002 | I.B. | Screening-Level Literature Review Findings message has been added. |
| 03/03/2005 | I.B. | Screening-Level Literature Review Findings message has been removed and replaced by comprehensive literature review conclusions. |

VIII. Synonyms

Substance Name — Triethylene glycol monobutyl ether
CASRN — 143-22-6
Last Revised — 06/01/1992

- 143-22-6

- Ethanol, 2-(2-(2-butoxyethoxy)ethoxy)-
- TRIETHYLENE GLYCOL MONOBUTYL ETHER
- AI3-30236
- BUTOXYTRIETHYLENE GLYCOL
- Butoxytriglycol
- DOWANOL TBAT
- HSDB 5645
- TRIETHYLENE GLYCOL n-BUTYL ETHER
- TRIGLYCOL MONOBUTYL ETHER
- 2-(2-(2-BUTOXYETHOXY)ETHOXY)ETHANOL
- 3,6,9-Trioxatridecan-1-ol