
Tellurium hexafluoride

(CAS No: 7783-80-4)

Health-based Reassessment of Administrative
Occupational Exposure Limits

Committee on Updating of Occupational Exposure Limits,
a committee of the Health Council of the Netherlands

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1 Introduction

The present document contains the assessment of the health hazard of tellurium hexafluoride by the Committee on Updating of Occupational Exposure Limits, a committee of the Health Council of the Netherlands. The first draft of this document was prepared by MA Maclaine Pont, M.Sc. (Wageningen University, Wageningen, the Netherlands).

The evaluation of the toxicity of tellurium hexafluoride has been based on the review by the American Conference of Governmental Industrial Hygienists (ACG99). Where relevant, the original publications were reviewed and evaluated as will be indicated in the text. In addition, literature was retrieved from the databases Toxline, Medline, and Chemical Abstracts, covering the periods of 1981 to April 1999, 1966 to May 1999, and 1937 to April 1999, respectively, and using the following key words: tellurium fluoride and 7783-80-4. The final literature search was carried out in May 1999.

In September 2001, the President of the Health Council released a draft of the document for public review. The committee received no comments.

2 Identity

name	:	tellurium hexafluoride
synonyms	:	tellurium fluoride
molecular formula	:	F ₆ Te
molecular structure	:	-
CAS number	:	7783-80-4

3 Physical and chemical properties

molecular weight	:	241.61
melting point	:	-37.8°C
boiling point	:	-38.9°C (sublimation)
flash point	:	-
vapour pressure	:	at 20°C: >101 kPa
solubility in water	:	decomposes
log P _{octanol/water}	:	0.21 (estimated)
conversion factors (20°C, 101.3 kPa)	:	1 mg/m ³ = 0.01 ppm 1 ppm = 10.05 mg/m ³

Data from ACG99, Lid96, <http://esc.syrres.com>.

Tellurium hexafluoride is a colourless, non-combustible gas with a repulsive odour. Upon contact with water, it slowly hydrolyses into telluric acid, H₆TeO₆; it is more quickly hydrolysed by aqueous potassium hydroxide. Half-life times have not been found. It does not attack glass when pure. It corrodes mercury (Bud96)

4 Uses

No uses of tellurium hexafluoride have been found. It is a by-product of ore refining (ACG99).

5 Biotransformation and kinetics

The committee did not find data on the toxicokinetics of tellurium hexafluoride.

6 Effects and mechanism of action

Human data

Human exposure to TeF₆ has caused headache, chest pain, and dyspnoea. No quantitative data are available (ACG99). Two cases of acute poisoning by TeF₆ have been reported, resulting from the leakage of 50 grams into a small laboratory. The symptoms included metallic taste; anorexia; lassitude;

sleepiness; a rash; bluish-black patches on the skin of the fingers, neck, and face; and a sour garlic odour of the breath, sweat, and urine. There were apparently no significant pulmonary effects (report from 1975, ACG99). This suggests that Te effects might dominate the toxicology of TeF₆, rather than those of HF.

Animal data

In a series of inhalation experiments in which rats (male; n=2/group), rabbits (n=1/group), mice (male; n=4/group), and guinea pigs (n=1/group) were exposed to concentrations of 1 to 100 ppm (according to Kimmerle 10.9-1091 mg/m³) for 1 or 4 hours, exposure to 1 ppm TeF₆ (10.05 mg/m³) for 1 or 4 hours induced hyperpnoea and pulmonary oedema, but no mortality. Higher exposure concentrations of 5 to 100 ppm (54.5-1090 mg/m³) (exposure duration: 4 hours) were invariably fatal to all animals, lung oedema being the cause of death. Exposure to 5 ppm for 1 hour caused severe respiratory tract damage and mortality in all mice. Repeated 1-hour exposures at 1 ppm for 5 consecutive days resulted in no recognisable injury among the animals (Kim60).

ACGIH concludes from these data that tolerance against the acute effects of TeF₆ exposure can develop (ACG99).

The committee did not find any other experimental data on TeF₆.

7 Existing guidelines

The current administrative occupational exposure limit (MAC) for tellurium hexafluoride in the Netherlands is 0.2 mg/m³ (0.02 ppm), 8-hour TWA.

Existing occupational exposure limits for tellurium hexafluoride in some European countries and in the USA are summarised in the annex.

8 Assessment of health hazard

There is great lack of data after exposure to tellurium hexafluoride both in humans and in animals. It is expected that, once the compound has been absorbed in the body, it hydrolyses into fluoride and tellurium ion. The hexavalent tellurium is not stable; it can be reduced to lower valence states. The fluoride ion can induce irritation in the respiratory tract, kidney dysfunctioning, and bony fluorosis (DEC89). For hydrogen fluoride, an occupational exposure

limit of 1.0 mg F⁻/m³ (15-minute time-weighted average) has been established to prevent direct effects on the respiratory tract (DEC89). However, since human data suggest that Te effects might dominate the toxicology of TeF₆, the committee is of the opinion that the occupational exposure limit for fluoride cannot be used in setting a limit for tellurium hexafluoride.

The committee considers the toxicological database on tellurium hexafluoride too poor to justify recommendation of a health-based occupational exposure limit.

The committee concludes that there is insufficient information to comment on the level of the present MAC-value.

References

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Annex

Occupational exposure limits for tellurium hexafluoride in various countries.

country -organisation	occupational exposure limit ^a		time-weighted average	type of exposure limit	note ^b	reference ^c
	ppm	mg/m ³				
the Netherlands - Ministry of Social Affairs and Employment	0.02	0.2	8 h	administrative		SZW02
Germany - AGS	-	-				TRG00
- DFG MAK-Kommission	-	-				DFG02
Great Britain - HSE	-	-				HSE02
Sweden	-	-				Arb00b
Denmark	0.02	0.2	8 h		S	Arb00a
USA - ACGIH	0.02	-	8 h	TLV		ACG02b
- OSHA	0.02	0.2	8 h	PEL		ACG02a
- NIOSH	0.02	0.2	10 h	REL		ACG02a
European Union - SCOEL	-	-				CEC00

^a As tellurium.

^b S = skin notation; which means that skin absorption may contribute considerably to the body burden; sens = substance can cause sensitisation.

^c Reference to the most recent official publication of occupational exposure limits.