

Inorganic mercury/ elemental mercury

Incident management

Key Points

Fire

- Non flammable and non combustible under normal conditions
- Reacts with nitric acid and hot concentrated sulphuric acid. May react explosively with ammonia and violently with metals
- Mercury is a liquid and when heated emits toxic fumes that are heavier than air
- In the event of a fire involving mercury, use fine water spray and liquid-tight protective clothing with breathing apparatus
- In the event of a fire involving liquid mercury, use gas tight protective suit with breathing apparatus

Health


- Mercury poisoning can occur from ingestion, inhalation or dermal absorption
- Very toxic
- Inhalation of mercury vapour causes cough, breathlessness, chest tightness and pulmonary tightness within a few hours of exposure
- Inhalation of elemental mercury globules may cause pneumonitis, haemoptysis and respiratory distress
- Gastrointestinal upset may occur within a few hours of exposure
- Mercury vapour exposure to the eyes can cause conjunctivitis and eyelid tremor


Environment

- Dangerous for the environment
- Inform Environment Agency of substantial release incidents

Hazard Identification

Standard (UK) Dangerous Goods Emergency Action Codes^(a)

UN		2809	Mercury, n.o.s.	
EAC		2X	Use fine water spray. Wear liquid-tight chemical protective clothing in combination with breathing apparatus. Spillages and decontamination run-off should be prevented from entering drains and watercourses.	
APP		-		
Hazards	Class	8	Corrosive substance	
	Sub risks	-		
HIN		80	Corrosive or slightly corrosive substance	

UN		2024	Mercury compound, liquid, n.o.s.	
EAC		2X	Use fine water spray. Wear liquid-tight chemical protective clothing in combination with breathing apparatus*. Spillages and decontamination run-off should be prevented from entering drains and watercourses.	
APP		B	Gas-tight chemical protective suit in combination with breathing apparatus**.	
Hazards	Class	6.1	Toxic substance	
	Sub risks	-		
HIN		66	Highly toxic substance	


UN – United Nations number; EAC – Emergency Action Code; APP – Additional Personal Protection; HIN - Hazard Identification Number


* Liquid-tight chemical protective clothing (BS 8428) in combination with self-contained open circuit positive pressure compressed air breathing apparatus (BS EN 137).

** Gas-tight chemical protective clothing (BS EN 943 part 2) in combination with self-contained open circuit positive pressure compressed air breathing apparatus (BS EN 137).

^a Dangerous Goods Emergency Action Code List, HM Fire Service Inspectorate, Publications Section, The Stationery Office, 2004.

Standard (UK) Dangerous Goods Emergency Action Codes^(a)

N		2024	Mercury compound, liquid, n.o.s.	
EAC		2X	Use fine water spray. Wear liquid-tight chemical protective clothing in combination with breathing apparatus*. Spillages and decontamination run-off should be prevented from entering drains and watercourses.	
APP		-		
Hazards	Class	6.1	Toxic substance	
	Sub risks	-		
HIN		60	Toxic or slightly toxic substance	



UN		2025	Mercury compound, solid, n.o.s.	
EAC		2X	Use fine water spray. Wear liquid-tight chemical protective clothing in combination with breathing apparatus*. Spillages and decontamination run-off should be prevented from entering drains and watercourses.	
APP		-		
Hazards	Class	6.1	Toxic substance	
	Sub risks	-		
HIN		66/60	Highly toxic substance / toxic or slightly toxic substance	

UN – United Nations number; EAC – Emergency Action Code; APP – Additional Personal Protection; HIN - Hazard Identification Number

* Liquid-tight chemical protective clothing (BS 8428) in combination with self-contained open circuit positive pressure compressed air breathing apparatus (BS EN 137).

^a Dangerous Goods Emergency Action Code List, HM Fire Service Inspectorate, Publications Section, The Stationery Office, 2004.



*Chemical Hazard Information and Packaging for Supply Classification^(a)**Mercury*

Classification	T	Toxic	
	N	Dangerous for the environment	
Risk phrases	R23	Toxic by inhalation	
	R33	Danger of cumulative effects	
	R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment	
Safety phrases	S(1/2)	Keep locked up and out of reach of children	
	S7	Keep container tightly closed	
	S45	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)	
	S60	This material and its container must be disposed of as hazardous waste	
	S61	Avoid release to the environment. Refer to special instructions/safety data sheet	

^a European Chemicals Bureau, Classification and Labelling, Annex I of Directive 67/548/EEC; <http://ecb.jrc.it/classification-labelling/> (accessed 2/2007).

Chemical Hazard Information and Packaging for Supply Classification^(a)

Inorganic Compounds of Mercury^(b)

Classification	T+	Very toxic	
	N	Dangerous for the environment	
Risk phrases	R26/27/28	Very toxic by inhalation, in contact with skin and if swallowed	
	R33	Danger of cumulative effects	
	R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment	
Safety phrases	S(1/2)	Keep locked up and out of reach of children	
	S13	Keep away from food, drink and animal feedstuffs	
	S28	After contact with skin, wash with plenty water	
	S45	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)	
	S60	This material and its container must be disposed of as hazardous waste	
	S61	Avoid release to the environment. Refer to special instructions/safety data sheet	

Specific concentration limits

Concentration	Classification
C ≥ 25 %	T+, N; R26/27/28-33-50/53
2.5 % ≤ C < 25 %	T+, N; R26/27/28-33-51/53
2 % ≤ C < 2.5 %	T+; R26/27/28-33-52/53
0.5 % ≤ C < 2 %	T; R23/24/25-33-52/53
0.25 % ≤ C < 0.5 %	Xn; R20/21/22-33-52/53
0.1 % ≤ C < 0.25 %	Xn; R20/21/22-33

^a European Chemicals Bureau, Classification and Labelling, Annex I of Directive 67/548/EEC; <http://ecb.jrc.it/classification-labelling/> (accessed 2/2007).

^b Inorganic compounds of mercury with the exception of dimercury dichloride, dimercury dicyanide oxide, phenylmercury nitrate, phenylmercury hydroxide, 2-methoxyethylemercury chloride, mercury dichloride and phenylmercury acetate

Physicochemical Properties

CAS number	7439-97-6
Atomic weight	201
Chemical symbol	Hg
Common synonyms	Quicksilver; Liquid silver; Hydragryum
State at room temperature	Liquid
Volatility	Vapour pressure = 0.002 mm at 25 °C
Specific gravity	13.5 at 25 °C (water = 1)
Flammability	Non combustible and non flammable
Lower explosive limit	Not applicable
Upper explosive limit	Not applicable
Water solubility	Slightly soluble in water. Insoluble in alcohol and ether
Reactivity	Reacts with nitric acid and hot concentrated sulphuric acid. May react explosively with ammonia, and violently with metals, chlorine, nitromethane, dry bromine and ethylene
Reaction or degradation products	Emits toxic fumes when heated to decomposition
Odour	Odourless

References^(a,b,c)

^a Mercury (HAZARDTEXT® Hazard Management). In: Klasco RK (Ed): TOMES® System. Thomson Micromedex, Greenwood Village, Colorado (accessed 02/2007).

^b The Merck Index (14th Edition). Entry 5898: Mercury, 2006.

^c The Dictionary of Substances and their Effects. Ed. S Gangolli. Second Edition, Volume 5, 1999.

Threshold Toxicity Values

EXPOSURE VIA INHALATION		
ppm	mg m⁻³	SIGNS AND SYMPTOMS
0.006	0.05	Non-specific symptoms
0.012 – 0.024	0.1 – 0.2	Tremor
0.12 – 4.83	1 – 40	Chest pains, haemoptysis, dyspnoea, cough, impairment of lung function, metallic taste and excessive salivation

References^(a,b)

^a Agency for Toxic Substances and Disease Registry. Toxicological Profile for Mercury, 1999.

^b International Programme on Chemical Safety, Environmental Health Criteria 1, Mercury, 1976.

Published Emergency Response Guidelines

Emergency Response Planning Guideline (ERPG) Values^(a)

	Listed value (ppm)	Calculated value (mg m ⁻³)
ERPG-1*	-	-
ERPG-2**	0.25	2.0
ERPG-3***	0.5	4.1

* Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hr without experiencing other than mild transient adverse health effects or perceiving a clearly defined, objectionable odour.

** Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hr without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.

*** Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hr without experiencing or developing life-threatening health effects.

Acute Exposure Guideline Levels (AEGs)

	mg m ⁻³				
	10 min	30 min	60 min	4 hr	8 hr
AEGL-1[†]	Data not available				
AEGL-2^{††}					
AEGL-3^{†††}					

[†] The level of the chemical in air at or above which the general population could experience notable discomfort.

^{††} The level of the chemical in air at or above which there may be irreversible or other serious long-lasting effects or impaired ability to escape.

^{†††} The level of the chemical in air at or above which the general population could experience life-threatening health effects or death.

^a American Industrial Hygiene Association (AIHA). Emergency Response Planning Guideline Values and Workplace Environmental Exposure Level Guides Handbook, Fairfax, VA, 2005.

Exposure Standards, Guidelines or Regulations

Occupational standards

WEL	LTEL(8 hour reference period): No guideline value specified
	STEL(15 min reference period): No guideline value specified

Public health guidelines

DRINKING WATER QUALITY GUIDELINE^(a)	1 µg L ⁻¹
AIR QUALITY GUIDELINE^(b)	1 µg m ⁻³
SOIL GUIDELINE VALUE AND HEALTH CRITERIA VALUES^(c,d)	Residential with plant uptake: 8 mg kg ⁻¹ dry weight soil
	Residential without plant uptake: 15 mg kg ⁻¹ dry weight soil
	Allotments: 8 mg kg ⁻¹ dry weight soil
	Commercial/industrial: 480 mg kg ⁻¹ dry weight soil
	Tolerable Daily Intake_{oral} 0.3 µg kg ⁻¹ bw day ⁻¹
	Mean Daily Intake_{oral} 25 µg day ⁻¹
	Tolerable Daily Intake_{inhalation} 0.3 µg kg ⁻¹ bw day ⁻¹

WEL – Workplace exposure limit; LTEL - Long-term exposure limit; STEL – Short-term exposure limit

^a Interim Guidance on the Water Supply (Water Quality) Regulations 2000 (England) and the Water Supply (Water Quality) Regulations 2001 (Wales). Drinking Water Inspectorate, September 2003.

^b Air Quality Guidelines for Europe. World Health Organization Regional Office for Europe, Copenhagen WHO Regional Publications, European Series, No. 91, Second Edition, 2000.

^c Department for Environment, Food and Rural Affairs (DEFRA). Soil Guideline Values for Inorganic Mercury Contamination, 2002.

^d Department for Environment, Food and Rural Affairs (DEFRA). Contaminants in Soil: Collation of Toxicological Data and Intake Values for Humans. Mercury. 2002.

Health Effects

Major route of exposure^(a)

- Toxic by ingestion, inhalation or dermal absorption.

Immediate signs or symptoms of acute exposure^(b-e)

- Ingestion of metallic mercury in a single acute dose is virtually non-toxic. Elemental mercury is poorly absorbed by the gut and ingestion is usually harmless unless aspiration occurs. Inorganic salts are highly corrosive. Features include burning of the mouth and throat, abdominal pain, nausea, vomiting followed by haematemesis, bloody diarrhoea, colitis and intestinal mucosal necrosis. Dehydration and circulatory collapse may occur as a result.
- Inhalation of mercury vapour causes cough, breathlessness, chest tightness and pulmonary irritation within a few hours of exposure. Inhalation of elemental mercury globules may cause pneumonitis, haemoptysis and respiratory distress.
- Ocular exposure of mercury vapour exposure can cause conjunctivitis and eyelid tremor.
- Dermal exposure is unlikely to have any effect because metallic mercury is only slowly absorbed through the skin. However, prolonged contact or topical use may cause grey or blue-black skin pigmentation, contact dermatitis, eczema, urticaria, cutaneous burns or exfoliation.

TOXBASE - <http://www.toxbase.org>

^a TOXBASE: Mercury and compounds, 2001.

^b TOXBASE: Mercury – ingestion, 2001.

^c TOXBASE: Mercury inhalation, 2001.

^d TOXBASE: Mercury (metallic) – skin contact, 2001.

^e TOXBASE: Mercury inorganic – features and management, 2001.

Decontamination and First Aid

Important Notes

- Ambulance staff, paramedics and emergency department staff treating chemically-contaminated casualties should be equipped with Department of Health approved, gas-tight (Respirex) decontamination suits based on EN466:1995, EN12941:1998 and prEN943-1:2001, where appropriate.
- Decontamination should be performed using local protocols in designated areas such as a decontamination cubicle with adequate ventilation.

Dermal exposure^(a,b)

- Remove patient from exposure.
- The patient should remove all clothing and personal effects.
- Double-bag soiled clothing and place in a sealed container clearly labelled as a biohazard.
- Gently blot away any adherent liquid from the patient.
- Wash hair and all contaminated skin with copious amounts of water (preferably warm) and soap for at least 10-15 minutes. Decontaminate open wounds first and avoid contamination of unexposed skin.
- Pay special attention to skin folds, axillae, ears, fingernails, genital areas and feet.
- Patients with major skin exposure may have inhaled a significant amount of vapour.

Ocular exposure^(c)

- Remove patient from exposure.
- Remove contact lenses if necessary and immediately irrigate the affected eye thoroughly with water or 0.9% saline for at least 10-15 minutes.
- Patients with corneal damage or those whose symptoms do not resolve rapidly should be referred for urgent ophthalmological assessment.

Inhalation^(d)

- Remove patient from source of exposure.
- Ensure a clear airway and adequate ventilation.
- Give oxygen to symptomatic patients.
- Monitor oxygen saturation.
- Apply other supportive measures as indicated by the patient's clinical condition.

Ingestion^(e)

- Usually no treatment is required if metallic or elemental mercury is ingested.

This document will be reviewed not later than 3 years or sooner if substantive evidence becomes available.

TOXBASE - <http://www.toxbase.org>

^a TOXBASE: Mercury and compounds, 2001.

^b TOXBASE: Mercury (metallic) – skin contact, 2001.

^c TOXBASE: Eye irritants, 2002.

^d TOXBASE: Mercury inhalation, 2001.

^e TOXBASE: Mercury - ingestion, 2001.