Chemical Profiles

Mercury

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What are other names or identifying information for mercury?

CAS Registry No.: 7439-97-6
Other Names: Liquid silver; Mercury metal; Quick silver, Elemental mercury
Main Uses: Manufacture of other chemicals (chlorine, caustic soda); in electronic components.
Appearance: Silver - white free-flowing liquid.
Odour: Odourless

Canadian TDG: UN2809

What is the WHMIS classification?

According to the Commission des normes, de l'équité, de la santé et de la sécurité du travail (CNESST), mercury can be classified as:

Corrosive to metals - Category 1

Reproductive toxicity - Category 1B (Adverse effects on the development of the offspring)

Specific target organ toxicity – repeated exposure – Category 1

The signal word is danger.

The hazard statements are:

- May be corrosive to metals
- May damage fertility or the unborn child
- Causes damage to organs through prolonged or repeated exposure

Please note that this classification was retrieved from the CNESST site on January 28, 2025 and was established by CNESST personnel to the best of their knowledge based on data obtained from scientific literature and it incorporates the criteria contained in the *Hazardous Products Regulations* (SOR/2015-17). It does not replace the supplier's classification which can be found on its Safety Data Sheet.

Note: Sometimes suppliers may classify the same hazardous products differently. This variation may be due to different data availability and interpretation. In the case of mercury, some suppliers also classify it in the Acute Toxicity (Inhalation) hazard class (Category 1 or 2).

Acute Toxicity (category 1 or 2)

The signal word is danger.
The hazard statement is “Fatal if inhaled”.

What are the most important things to know about mercury in an emergency?

Emergency Overview: Silver - white free-flowing liquid. Odourless. Will not burn. Corrosive to some metals. VERY TOXIC. Fatal if inhaled. May cause damage to nervous system, kidneys. SUSPECT TERATOGEN/EMBRYOTOXIN. Suspected of damaging the unborn child, May elicit an allergic skin reaction in some people.

What are the potential health effects of mercury?

Main Routes of Exposure: Inhalation; skin contact; skin absorption; eye contact.

- **Inhalation:** VERY TOXIC. Can cause a flu-like illness 3-10 hours after exposure. Symptoms may include chest tightness, cough, headache, fever, muscle aches and runny nose. Symptoms usually disappear within 48 hours after exposure. Can cause lung injury. Symptoms may include coughing, shortness of breath, difficult breathing and tightness in the chest. Can cause life-threatening accumulation of fluid in the lungs (pulmonary edema). Can harm the nervous system. Symptoms include tremors (initially affecting the hands and sometimes spreading to other parts of the body), emotional instability (including irritability, excessive shyness, a loss of confidence and nervousness), sleeplessness, memory loss, muscle weakness, headaches, slow reflexes, and a loss of feeling or numbness. Can cause inflammation of the inside of the mouth (stomatitis), sometimes with a metallic taste, excessive salivation, and difficulty swallowing. Other digestive system effects include abdominal pains, nausea, vomiting, and diarrhea. Can harm the kidneys. Kidney function tests may show abnormal results.
- **Skin Contact:** Not irritating. However, an allergic skin reaction may develop with long term exposure. Can be absorbed through the skin. Can cause effects as described for inhalation.
- **Eye Contact:** Not irritating.

- **Ingestion:** Animal toxicity studies have not reported acute health effects from the ingestion of more than 2000 mg/kg body weight of elemental/metallic mercury. Human one-time unintentional ingestions of about 15 mL (204 g) are also reported not to cause long-term toxicity. However, chronic oral exposure to elemental mercury may damage the kidneys.
- **Effects of Long-Term (Chronic) Exposure:** VERY TOXIC. Can cause permanent damage to the nervous system. A classic sign of mercury toxicity is a fine tremor, usually of the fingers, hands or arms and occasionally the eyelids, lips, tongue, and whole body. Many occupational studies indicate that tremors become more pronounced with longer exposures to mercury. Tremors are thought to be a sensitive indicator for long-term low-level exposure to mercury vapour. Behaviour and personality changes such as irritability, excitation and shyness, psychotic reactions such as delirium and hallucinations, loss of appetite, tiredness, sleeplessness, short-term memory loss, and impaired nerve conduction have also been reported following long-term exposure. May harm the kidneys. Kidney function tests may show abnormal results. May cause an allergic skin reaction in some people. In sensitized people, contact with a very small amount of product can cause an allergic reaction. Symptoms include redness, rash, itching and swelling. This reaction can spread from the hands or arms to the face and body. Repeated exposure will make the reaction worse. Mercury may affect the heart producing increased blood pressure and/or heart rate.
- **Carcinogenicity:** Not known to cause cancer.
    - International Agency for Research on Cancer (IARC): Group 3 - Not classifiable as to its carcinogenicity to humans.
    - American Conference for Governmental Industrial Hygienists (ACGIH): A4 - Not classifiable as a human carcinogen.
- **Teratogenicity / Embryotoxicity:** DEVELOPMENTAL HAZARD. May harm the unborn child based on animal information. Has been associated with effects on behaviour.
- **Reproductive Toxicity:** Not known to be a reproductive hazard.
- **Mutagenicity:** Not known to be a mutagen.

What are first aid measures for mercury?

Inhalation: Take precautions to ensure your own safety before attempting rescue (e.g., wear appropriate protective equipment). Move the victim to fresh air. If breathing is difficult, trained personnel should administer emergency oxygen. DO NOT allow the victim to move about unnecessarily. Symptoms of pulmonary edema may be delayed. If breathing has stopped, trained personnel should begin artificial respiration (AR). If the heart has stopped, trained personnel should start cardiopulmonary resuscitation (CPR) or automated external defibrillation (AED). Avoid mouth-to-mouth contact by using mouth guards or shields. Get medical attention immediately. Treatment is urgently required. Transport to a hospital.

Skin Contact: Avoid direct contact. Wear chemical protective clothing if necessary. Quickly take off contaminated clothing, shoes, and leather goods (e.g., watchbands, belts). Quickly and gently blot or brush away excess chemical. Wash gently and thoroughly with gently flowing water and non-abrasive soap. Get medical attention if irritation continues. Thoroughly clean clothing, shoes, and leather goods before reuse or dispose of safely.

Eye Contact: Avoid direct contact. Wear chemical protective gloves if necessary. Quickly and gently blot or brush the chemical off the face. Immediately flush the contaminated eye(s) with gently flowing water, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Ingestion: Have the victim rinse mouth with water. Get medical attention immediately.

First Aid Comments: If exposed or concerned, see a medical professional for advice. Some of the first-aid procedures recommended here require advanced first-aid training. All first aid procedures should be periodically reviewed by a medical professional familiar with the chemical and its conditions of use in the workplace.

Note to Physicians: Some jurisdictions specifically regulate mercury and require a complete medical surveillance program. Specific information should be sought from the appropriate government agency in your jurisdiction.

What are fire hazards and extinguishing media for mercury?

Flammable Properties: Does not burn.

Suitable Extinguishing Media: Not combustible. Use extinguishing agent suitable for surrounding fire.

Specific Hazards Arising from the Chemical: Under fire conditions, very toxic mercury vapour and mercuric oxide will be released.

What are the stability and reactivity hazards of mercury?

- **Chemical Stability:** Normally stable.

- **Conditions to Avoid:** Heat. Open flames, sparks, static discharge, heat and other ignition sources. Metal surfaces.
- **Incompatible Materials:** Forms toxic chemicals on contact with: ammonia, oxidizing agents (e.g., peroxides), metals (e.g., aluminum), epoxides (e.g., ethylene oxide). Corrosive to: aluminum alloys.
- **Hazardous Decomposition Products:** None known.
- **Possibility of Hazardous Reactions:** None known.

What are unintentional release measures for mercury?

Personal Precautions: Keep unnecessary and unprotected personnel out of the spill area. Use personal protective equipment as required. Ventilate area.

Methods for Containment and Clean-up: Do not touch spilled material. Dike spilled product to prevent runoff. Stop or reduce leak if safe to do so. Small spills or leaks: use material or equipment specific for mercury. Large spills or leaks: contact emergency services and manufacturer or supplier for advice.

What handling and storage practices should be used when working with mercury?

Handling: Before handling, it is important that all engineering controls are operating and that protective equipment requirements and personal hygiene measures are being followed. Only trained personnel should work with this product. Immediately report leaks, spills or failures of the safety equipment (e.g., ventilation system). Avoid ALL unprotected contact with this product or with contaminated equipment or surfaces. Avoid generating vapours or mists. Avoid heating that will increase the amount of vapours. Prevent unintentional contact with incompatible chemicals. If the product is transferred to another container, ensure the new container is suitable for the product. Keep containers tightly closed when not in use or empty. Never reuse empty containers, even if they appear to be clean.

Storage: Store in an area that is: cool, dry, temperature-controlled, out of direct sunlight and away from heat and ignition sources, separate from incompatible materials. Avoid bulk storage indoors. Store in the original, labelled shipping container. Empty containers may contain hazardous residue. Store separately. Keep closed. Do not handle swollen drums. Get expert advice.

What is the American Conference of Governmental Industrial Hygienists (ACGIH®) recommended exposure limit for mercury?

ACGIH® TLV® - TWA (elemental and inorganic forms): 0.025 mg/m^3 A4 Skin BEI®

Exposure Guideline Comments: TLV® = Threshold Limit Value. TWA = Time-Weighted Average. A4 = Not classifiable as a human carcinogen. BEI® = Biological Exposure Index.

Adapted from: 2024 TLVs® and BEIs® - Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH)

NOTE: In many (but not all) Canadian jurisdictions, the exposure limits are similar to the ACGIH® TLVs®. Since legislation varies by jurisdiction, contact your local jurisdiction for exact details. A list is available in the OSH Answers on Canadian Governmental Departments Responsible for Health and Safety.

A list of which acts and regulations that cover exposure limits to chemical and biological agents is available on our website. Please note that while you can see the list of legislation for free, you will need a subscription to view the actual documentation.

What are the engineering controls for mercury?

Engineering Controls: Use a local exhaust ventilation and enclosure, if necessary, to control amount in the air. It may be necessary to use stringent control measures such as process enclosure to prevent product release into the workplace. Use a ventilation system separate from other exhaust ventilation systems. Filter the contaminated air before it is directly exhausted to the outside.

What Personal Protective Equipment (PPE) is needed when working with mercury?

Eye/Face Protection: Wear chemical safety goggles. A face shield (with safety goggles) may also be necessary.

Skin Protection: Wear chemical protective clothing e.g. gloves, aprons, boots. In some operations, it may be necessary to wear a chemical protective, full-body encapsulating suit and self-contained breathing apparatus (SCBA). Suitable materials include: butyl rubber, natural rubber, neoprene rubber, nitrile rubber, polyvinyl chloride (PVC), Viton®, Viton®/butyl rubber, Silver Shield® - PE/EVAL/PE, Saranex®, AlphaTec® 4000, Tychem® (5000, 6000, 6000 FR, 9000, Responder® CSM, 10000, 10000 FR). Recommendations are NOT valid for very thin natural rubber, neoprene rubber, nitrile rubber, and PVC gloves (0.3 mm or less).

Respiratory Protection:

Up to 1 mg/m^3: (APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against mercury compounds (except (organo) alkyls)*; or Any supplied-air respirator.Up to 2.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode; Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern* (canister).Up to 5 mg/m^3: (APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern*; Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern*; Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode; Any powered, air-purifying respirator with a tight-fitting facepiece and cartridge(s) providing protection against the compound of concern (canister); Any self-contained breathing apparatus with a full facepiece; Any supplied-air respirator with a full facepiece. Up to 10 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode. * End of service life indicator (ESLI) required.

APF = Assigned Protection Factor

Recommendations apply only to National Institute for Occupational Safety and Health (NIOSH) approved respirators. Refer to the NIOSH Pocket Guide to Chemical Hazards for more information.

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