

# Mercury Hazards and Replacement

## 1. *Forms of Mercury*

Elemental or metallic mercury (Hg) is the only metal that is liquid at room temperature. Mercury is highly volatile at room temperature and it evaporates fast with a very high saturation vapor pressure (18 mg/m<sup>3</sup> at room temperature) and easily forms hazardous concentrations of mercury in air. Therefore, mercury is highly volatile at room temperature. The vapors are odorless, colorless, and tasteless.

Once absorbed or inhaled to human or wild life it stays in fat as an organomercury compounds which is a much more toxic form than a metallic mercury form.

## 2. *Potential health Effects*

### A. Short Term Exposure

#### Inhalation:

Mercury vapors are highly toxic via an inhalation route. Mercury causes severe respiratory tract damage. Symptoms include sore throat, coughing, pain, tightness in chest, breathing difficulties, headache, muscle weakness, liver changes, fever, and pneumonitis. Most inhaled mercury vapors are retained in lungs and quickly passes into bloodstream.

#### Ingestion:

Mercury may cause burning of mouth and pharynx, abdominal pain, vomiting, corrosive ulceration, and bloody diarrhea. Delayed death may occur from renal failure.

#### Skin or Eye Contact:

Causes irritation burns to skin or eyes. Symptoms include redness, pain, and blurred vision. It may cause serious and permanent eye damage.

### B. Long Term Exposure

Chronic exposure through any route can produce central nervous system damage. May cause muscle tremors, personality and behavior changes, memory loss, metallic taste, loosening of the teeth, digestive disorders, skin rashes, brain damage and kidney damage. Mercury can cause skin allergies and accumulate in the body, especially in fat. Mercury can pass through the placenta of pregnant females and may damage the developing fetus affecting fetal brain and nervous system development. No evidence as carcinogen has been shown.

### 3. Occupational Airborne Exposure Limits

OSHA Ceiling Limit: 0.1 mg/m<sup>3</sup>

ACGIH TLV: 0.025 mg/m<sup>3</sup>

### 4. Environmental Hazards

When Mercury spill or contamination ends up in a sanitary sewer plant and settles in sediments or water in ocean or lake, metallic mercury form will be converted to organic mercury forms such as methyl mercury chloride or dimethyl mercury through microbial actions in sediments or water.

Organomercury compounds are much more toxic than metallic forms and are easily soluble in lipid.

This organomercury will be bioamplified and concentrated in a food chain (concentration may be as much as 10,000 times higher than of water). Fish and shell fish containing bioamplified mercury may be consumed by human eventually.

- There are plausible link between methyl mercury in freshwater fish and man-made mercury.
- U.S. population ingests ten times methyl mercury through consumption of fish
- EPA estimates 1/3 fish/shellfish consumed affected by local mercury sources.

### 5. Mercury Thermometer Replacement

**Before you buy a mercury thermometer, consider an alternative non-mercury thermometer based on the following facts!!!**

- ✓ Mercury from broken thermometers presents a hazard for faculty, staff, and students in laboratory areas.
- ✓ Mercury also presents a hazard to the local environment, if broken thermometers in sinks eventually end at the sanitary sewer plant.
- ✓ Broken mercury thermometers create hazardous waste that is costly to clean up and costly dispose of.
- ✓ Non-mercury thermometers are available, and you can replace mercury thermometers high tech accurate alternative that are safe and less or non toxic.
- ✓ Non-mercury thermometers can be used in incubators, water bath, or other applications where mercury thermometers have been traditionally used.

- ✓ Most non-mercury thermometers are certified by the National Institute of Standard and Technology or the National Committee for Clinical laboratory Standards to meet accuracy requirements.

<b>Mercury Thermometers</b>	<b>Non-Mercury Thermometers</b>
Mercury is volatile at room temperature with vapors that are colorless, odorless, tasteless, and toxic. Each time a thermometer breaks, there is a potential for lab and clean-up personnel to be exposed to mercury	Non-mercury thermometers are less toxic and cause no hazardous exposure to mercury vapors.
0.5 grams of Mercury from one broken thermometer can detectably pollute 5 million gallons of Santa Monica Bay water.	Non mercury thermometers, when broken, pose no threat to environment because of no or much less toxicity.
Mercury thermometers eventually break generating hazardous waste from spill clean-up which are very expensive to dispose of.	Replacing mercury thermometers with non-mercury thermometers reduces clean-up costs from breaks and spills

Please dispose of your mercury thermometer through the Environmental Health and Safety, as you would other hazardous waste.

If you must use a mercury thermometer for your experiment, please purchase a Teflon coated and non-breakable thermometer.