

Mercury Spill Cleanup Procedures

Introduction

Mercury is highly persistent in the environment and has been demonstrated to bioaccumulate in the food chain. Elemental mercury and mercury compounds are toxic and as such are considered to be hazardous wastes. The following sections will outline the toxic properties and hazards associated with mercury. Specific protocols for the cleanup of mercury spills in the laboratory are also included.

Toxicity of Mercury

Mercury may be present in several different forms in the laboratory. The various forms and their associated health risks are discussed below.

Elemental Mercury

At room temperature, elemental mercury is found in the form of a liquid metal. Exposure to elemental mercury may be via inhalation of mercury vapor, accidental ingestion, and absorption through dermal contact. Once absorbed, elemental mercury enters the bloodstream and is subsequently oxidized by the body. Mercury intoxication affects the central nervous system. Symptoms of exposure may include worsening tremors of the hands, insomnia, memory loss, irritability, depression and emotional instability. Metallic mercury should never be heated as fatal exposure to mercury vapours may occur at elevated temperatures.

Mercury Salts

Mercury salts such as mercuric nitrate and mercuric chloride are used in some analytical procedures. These salts are usually found in the form of solid powders. Routes of exposure to mercury salts include inhalation of dusts, absorption by skin, and accidental ingestion. Toxic effects resulting from exposure to mercury salts are similar to those observed for elemental mercury. Some mercury salts have been found to cause kidney damage.

Organomercury Compounds

Organomercury compounds may include various aryl and alkyl compounds. While it is unlikely that any organometallic mercury compounds will be utilized in the Provincial Laboratory, they have been included in this summary. Potential routes of exposure include inhalation of vapours, dermal absorption and accidental ingestion. While organomercury compounds in general attack the central nervous system, the toxicity of individual compounds can vary greatly. Dimethyl mercury is extremely toxic and is rapidly absorbed by skin. Dermal contact with even small quantities of dimethyl mercury can be fatal.

Regardless of the form of mercury that is being used, specific MSDS should be consulted for specific hazards and handling instructions.

Metallic Mercury Spill Kit – Location and Contents

The main metallic mercury spill kit for the laboratory is located within the acid storage room in the southeast corner of the medical laboratory. The spill kit contains:

- hand-powered vacuum apparatus
- mercury spill cleanup sponges
- mercury absorbent powder
- mercury indicator powder
- ziplock bags of various sizes
- rubber gloves

Metallic Mercury Spill Cleanup

While elemental mercury is relatively easy to work with under normal conditions, there are several factors that must be recognized:

- Mercury is very dense and large drops tend to shatter into numerous small droplets that are easily movable across long distances
- Droplets and vapours tend to accumulate in crevices and porous materials
- Mercury amalgamates with other metals and it may be impossible to decontaminate some materials

The following steps should be taken in the event of a mercury spill:

1. Alert co-workers that a spill has occurred. Post a sign advising of such a spill especially if the area is left temporarily unattended while obtaining the mercury spill kit.
2. Ensure that no one comes in contact with the spilled mercury to minimize exposure and prevent accidental spreading of the spill.
3. If the mercury spill is large (more than 1 mL or the amount contained in a typical thermometer), contact the laboratory safety officer for assistance. If an employee has been injured (for example, cut by a broken thermometer) or contaminated directly by the spill, the laboratory safety officer and the medical director must be notified immediately.
4. It is important that all spills and accidents involving mercury (or any other hazardous chemical for that matter) are attended to immediately. All other work becomes lower in priority.

5. Use appropriate protective clothing when handling mercury spills in order to keep mercury droplets from coming in contact with skin and personal clothing. Rubber gloves and disposable foot covers (for mercury spills on floors) should be worn. *Do not use thin disposable gloves as these can tear and allow mercury to lodge under fingernails. The mercury spill kit contains rubber gloves.*
6. Droplets of mercury may be aspirated directly into the hand-powered vacuum device found in the spill kit. The contents of the vacuum reservoir should be transferred to a ziplock bag which is then sealed and placed in the metallic mercury disposal container.
7. Alternatively, spilled mercury may be wiped up using the special sponges contained in the spill kit. The contaminated sponge is placed in a ziplock bag which is then sealed and placed in the metallic mercury disposal container.
8. If mercury droplets are spilled onto a surface that contains grit or other large particles, mercury absorbent material should be poured onto the spill. The absorbent material may be carefully swept up with the brush and dustpan found in the spill kit. All contaminated material is placed in a ziplock bag which is then sealed and placed in the metallic mercury disposal container.
9. If a thermometer is broken, the contaminated glass may be placed directly into a ziplock bag. If there are sharp edges present, it is advisable to place the sealed ziplock bag into a second ziplock bag or a sealed container. *Under no circumstances should anyone try to remove mercury from a broken thermometer.*
10. If there is any concern regarding the possibility of mercury contamination after the cleanup, the spill kit contains a mercury indicator powder. This powder is spread over the suspect area and allowed to sit for at least 72 hours. If a brown discoloration is observed, the area is contaminated by mercury and additional cleanup is required. The laboratory safety officer should be notified immediately.
11. Complete an occurrence report form detailing the nature of the spill and the corrective action taken.

Mercury Salt Spill Cleanup

1. If mercury salts are spilled, the solid powder may be carefully swept up and collected in a small container. Personnel performing the cleanup must wear protective equipment (gloves and goggles) to prevent contact with skin and eyes. If the mercury salt is a fine powder, a dust mask should be used to prevent inhalation of the powder. Alternatively, the salt may be mixed with wet sand and the entire mixture swept up and transferred to a container.
2. The site of the spillage should be thoroughly washed with soap and water once all of the spilled material has been swept up.

3. Spilled mercury salts may be stored in sealed containers (marked appropriately) within the laboratory. Spilled materials must ultimately be removed by a disposal company.
4. Complete an occurrence report form detailing the nature of the spill and the corrective action taken.

First Aid

The following steps should be taken in the event that an individual has been exposed to mercury or mercury compounds:

1. If mercury or mercury salts have come into contact with skin, the affected area should immediately be flushed with large volumes of water and washed thoroughly with soap. It is important that mercury and mercury compounds do not accumulate in crevices in skin or under fingernails. These areas should be scrubbed with a brush, soap and water. *Do not use mercury cleanup sponges or powders for personal decontamination.*
2. Contaminated clothing should be placed in a ziplock bag for disposal with other contaminated material.
3. If someone is injured as a result of a mercury spill (for example, cut by a broken thermometer) or has accidentally inhaled or ingested materials containing mercury, immediate medical attention must be sought. The laboratory safety officer and the medical director must be notified immediately.

Dr. Tom Thompson