

Working with Mercury Guideline

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Responsible Executive: Director, Health, Safety & Environment

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جامعة الملك عبد الله
للعلوم والتقنية
King Abdullah University of
Science and Technology



1 Introduction

This document offers a short and concise overview of Mercury. Understanding the following content is a crucial prerequisite in understanding basic safety fundamentals such as 1) hazard awareness, 2) engineering controls, 3) work practices, 4) PPE and 5) emergency response for working with Mercury.

2 Scope

The guideline applies to lab personnel, and it has been developed to assist them in the preparation of lab specific SOPs.

3 Procedure

3.1 Introduction to Mercury

Mercury is a highly toxic metal and is hazardous to both humans and the environment. Mercury-containing devices include thermometers, manometers, switches, and thermostats. The greatest health danger from elemental mercury is through inhalation (breathing in mercury vapor). Mercury presents a special challenge because it is a liquid at room temperature and volatile. Elemental mercury vaporizes slowly when spilled or exposed to the air. Mercury will vaporize more quickly in a warm environment (e.g., oven or on a hot plate), resulting in higher indoor mercury levels. In its vapor form, mercury is extremely toxic. Mercury may also be absorbed through the skin so contact must be avoided.

Principal Investigators are responsible for the identification and implementation of engineering and administrative controls and/or personal protective equipment to protect workers from mercury exposure. A spill kit for mercury as well as written procedures for mercury spill clean-up must be available. Supervisors must train workers on the hazards of mercury and the correct procedure to clean up mercury spills.

3.2 Controls

- Whenever possible, less hazardous materials should be substituted for mercury.
- Replace all mercury thermometers. Use alcohol (red-liquid) or digital thermometers.
- Vacuum gauges can be used to replace manometers and oil diffusion pumps can replace mercury diffusion pumps.
- Use oil bubblers instead of mercury bubblers.
- Consider using reducing agents other than mercury amalgams.
- Minimize the amount of mercury in use or in storage by practicing just in time delivery from chemical warehouse.
- Conduct all operations with mercury under a chemical fume hood.
- Use spill containment trays under mercury applications to contain spilled mercury; containment should be used whenever dispensing, or transferring elemental mercury.
- Do not use mercury where it could contact a hot surface and vaporize.

- Do not use open containers of mercury inside the lab. If used in a bubbler, the exhaust should go up a vertical tube to eliminate splashing and should be vented to the lab exhaust system.
- Clean up all spills immediately.

3.3 Personal Protective Equipment

- Safety glasses and a lab coat should be worn when working at the chemical fume hood with mercury.
- Gloves should be worn to protect from absorbing mercury through the skin. Each manufacturer does individual testing on its gloves so it is best to check the chemical compatibility prior to use.

3.4 Medical Surveillance

Upon request, HSE will determine the need for biological monitoring or medical surveillance examinations of workers with potential for mercury exposure based on an evaluation of the operation; workplace controls; and any relevant human factors as well as input received from the research team. Departments/projects are responsible for covering the costs of medical surveillance.

3.5 Spills

Mercury spills can present a challenge. When mercury spills it breaks up into very small droplets that are difficult to see and can remain in cracks and crevices for years until the mercury evaporates. All spills, regardless of size, must be cleaned up immediately.

Small Spills (≤5 ml):

- Isolate the spill area to prevent spreading contamination. Keep uninvolved people away.
- If the spill occurs inside an oven or other heated device, immediately turn off the device and let it cool.
- Wear gloves, a lab coat and safety glasses. Disposable booties should be worn if contamination may be on the floor.
- A mercury spill kit should be used to clean up the spill. Usually this consists of a small vacuum device. There is usually also an absorbent powder that reacts with mercury to form an amalgam. This can be very helpful for hard to reach places where mercury will hide.
- An amalgam, when applied to a small mercury spill, binds the mercury with another metal. This causes a chemical reaction, which inhibits vaporization. Since mercury vapor is highly toxic, treating pooled mercury with an amalgamating agent greatly reduces the dangers that even a minor spill could pose. There are commercially available kits that contain amalgamating agents.
- HSE has a mercury vapor meter that can be used to determine airborne exposure levels and if the spill has been completely cleaned up.

Large Spills (>5mL):

- For larger spills such as barometers or manometers, the user shall immediately contain the spill as much as possible and isolate the spill area to prevent spreading the contamination. Keep uninvolved people away.
- Contact HSE at hse@kaust.edu.sa for advice. Appropriate respiratory protection devices and special vacuum apparatus may be necessary.

3.6 Waste Disposal

All mercury and mercury contaminated materials must be disposed of as a Hazardous Waste. Improper disposal of mercury and mercury contaminated items will adversely affect the environment.

4 References

- OSHA 3404-11R (2011) – Laboratory Safety Guidance
- [KAUST Laboratory Safety Manual](#)
- HSE-RST-Chem001M – Chemical Safety Program

5 Help

Questions about this guideline? Contact: hse@kaust.edu.sa