

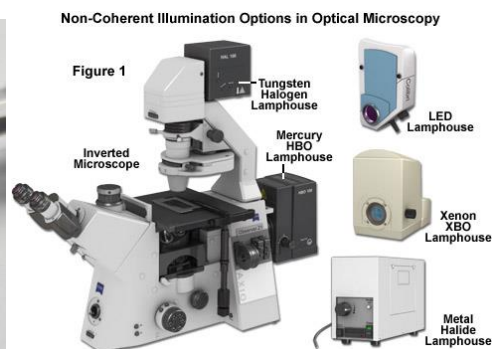
Guidance on the safe use of Mercury Vapour Lamps

INFORMATION AND SAFE USE CONTROLS

A mercury-vapour lamp is a gas discharge lamp that uses an electric arc through vaporised mercury to produce light. The arc discharge is generally confined to a small fused quartz arc tube mounted within a larger borosilicate glass bulb.



Picture 1 – a mercury-vapour lamp



Picture 2 – an inverted microscope showing mercury lamp location and housing chamber

When the lamp is cold (i.e. at room temperature) metallic droplets of (elemental / metallic) mercury can be seen in the lamp bulb. During operation of the lamp the mercury vaporises due to heating of the discharge tube (lamp body). The temperature of the discharge tube reaches approximately 800°C. After the lamp is in thermal equilibrium (5 to 10 minutes after ignition), the vaporised mercury gives rise to a pressure of 30 to 75 times the atmospheric pressure.

Some items of laboratory equipment (e.g. inverted, fluorescent, confocal microscopes and also thermometers, barometers) contain mercury vapour lamps to generate UV and other wavelength light. Such lamps generate an atmosphere of mercury vapour at high pressure. Typically, in modern laboratory equipment, they are housed in a protective chamber with a UV protection shield against eyes / skin exposure.

Safe Use:

- Mercury vapour lamps must be changed in accordance with the manufacturer's recommendations (for time usage, life span) as a key control in preventing lamp breakages. A log of hourly usage must be kept to monitor this.
- Never open the housing chamber unless the lamp is intact and switched off.
- Do not tamper with the UV protection shield.
- Ensure ventilation is adequate to remove any slow release of vapours during equipment operation.
- Do not obstruct ventilation and exhaust points into the room or area where equipment is kept.

HEALTH, PHYSICAL AND ENVIRONMENTAL HAZARDS



Health: **Inhaling** mercury vapour or small particles of mercury or its compounds can be harmful to lungs, kidneys and the central nervous system (specific target organ toxicity). Mercury can cross the blood-brain barrier easily and is also classified as a reproductive toxin. Mercury (and divalent inorganic compounds) have a Workplace Exposure Limit (WEL) of 0.02 mg / m³ (over a Time Weighted Average of 8 hours).

Physical: Injuries to health can also arise due to **penetration / corrosion** of the skin or resorption via the gastro-enteric tract.

Environmental: mercury is acutely and chronically toxic to aquatic life.

EMERGENCY PROCEDURE, CLEAN UP AND DISPOSAL - MERCURY VAPOUR LAMP BREAKAGE

In the rare cases that short arc lamps break or burst and the mercury content is released, the following actions should be taken:

- All personnel should **EVACUATE** the surrounding room / area at once, to ensure that no mercury is inhaled. Disrobe or remove outer garments if contamination onto body is suspected and leave at edge of the 'danger zone'.
- **ISOLATE** the area by locking the door or if not possible, cordon off area with barriers and place GHS hazard signage on the door / barrier to warn others of the risk.
- **CALL** for help (first aider, Fire Brigade, medical assistance) via 9-999 or 0207 882 **3333** if anyone is injured or unconscious - Do **not** enter or re-enter the danger area unless you have face fitted effective respiratory equipment or breathing apparatus and are trained to assist; otherwise call for the Fire Brigade with Breathing Apparatus. Ensure first aid and further medical assistance is provided as per Public Health England (PHE) protocols (see below for web link).
- The room / area should be **VENTILATED** thoroughly.
A local risk assessment (in advance) must have assessed the level of ventilation in the area and the number of air changes per hour to decide on an appropriate time before re- entry can occur. Ventilation exhaust point/s must be cordoned off and hazard signed during this time to prevent any exposure to others (contact QMUL Estates and Facilities on 0207 882 **2580**).
- After the lamp housing has cooled and area ventilated, a trained and competent person should clean-up mercury residue using a plastic syringe or Pasteur pipette and collect into a sealable container; the contaminated area should be treated with a special adsorbent (typically, a mixture of sulphur with additional stabilisers; a commercial mercury spill kit will contain necessary items).
- If there has been a substantial spill and/or the space is confined / semi-confined and/or has poor ventilation, you should monitor the air with a mercury meter before entry to ascertain levels of residual vapour.
- **Always use effective personal and (face fitted) respiratory protective equipment** during a clean-up (gloves with sufficient breakthrough time against mercury (e.g. Silver Shield with an outer nitrile glove for dexterity), sulphur and puncture resistant; tight fitting chemical resistant outer clothing (e.g. Tyvek suit), and using a face fitted half mask respiratory equipment with cartridge/s appropriate for mercury (with an assigned protection factor of at least 10 for mercury). Contact Health & Safety Directorate (HSD) for selection protective equipment.
- Mercury is classified as **Toxic Waste [H6]** and therefore intact and broken mercury lamps must be treated as hazardous waste in accordance with the Hazardous Waste (England & Wales) Regulations 2011.
- Disposal of sealed (and non-pressurised) laboratory mercury waste containers / bottles or safely packaged intact old laboratory mercury lamps can be arranged via the Health & Safety Directorate (HSD). See <http://hsd.qmul.ac.uk/Lab%20Safety/Hazardous%20Waste/index.html> for process and contacts.

FURTHER INFORMATION

QMUL HSD <http://hsd.qmul.ac.uk/>

HSE <http://www.hse.gov.uk/pubns/guidance/oce14.pdf>

Public Health England (PHE) <https://www.gov.uk/government/publications/mercury-properties-incident-management-and-toxicology>