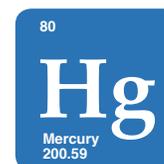


Mercury Safety and UV Lamps

What is mercury?

Mercury is a naturally occurring chemical element with the symbol Hg that is found in the air, water and soil. It is a heavy, volatile, silvery liquid. When vaporized is it colorless and odorless. Exposure to mercury salts and mercury vapor, or eating mercury-contaminated food, can cause mercury poisoning.



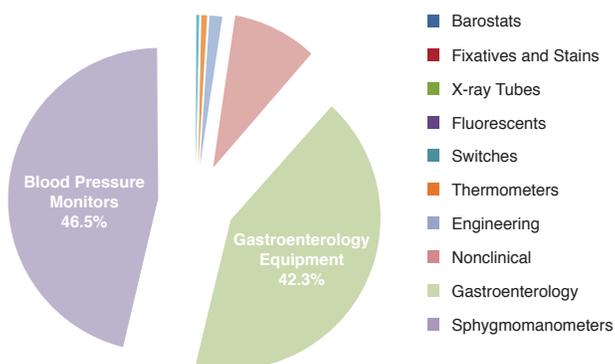
Where is mercury found in hospitals?

In hospitals, mercury is found in many places, including ICUs, ERs, Surgery, laboratories, nursing stations, patient rooms, and storage & maintenance areas. A northern California study found that blood pressure monitors (sphygmomanometers) that contain 70–90 g of mercury, accounted for 46.5% of the mercury in seven hospitals. Fluorescent lamps accounted for only 0.07% of the mercury in the same study.

Mercury Sources in Seven Northern CA Hospitals, CA Dept. of Health Services, 2000

<http://www.epa.gov/region9/waste/p2/projects/hospital/mercury.pdf>

| Hg Sources | Amount of Hg in Hospital |
|----------------------|--------------------------|
| Barostats | 0.04% |
| Fixatives and Stains | 0.04% |
| X-ray tubes | 0.06% |
| Fluorescents | 0.07% |
| Switches | 0.12% |
| Thermometers | 0.66% |
| Engineering | 1.43% |
| Nonclinical | 9.17% |
| Gastroenterology | 42.30% |
| Sphygmomanometers | 46.50% |



UVDI Meets the European Commission Standards for Mercury use in UV Devices

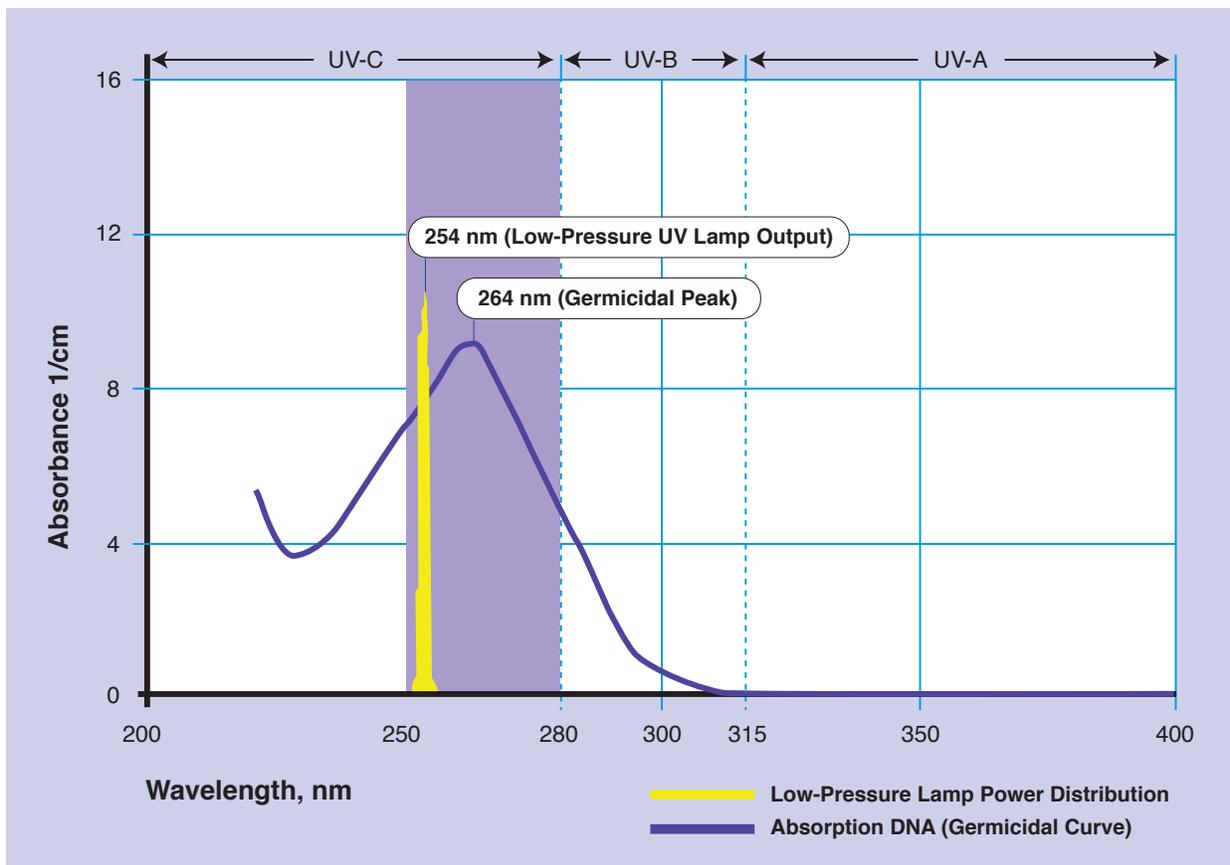


How is mercury used in a UV device?

Ultraviolet light is typically referred to as UV-A, UV-B or UV-C depending on the wavelength of light, which is measured in nanometers. UV-A (320–400 nm) is essentially non-germicidal. The UV-B (280–320 nm) and especially the UV-C (200–280 nm) components are responsible for the efficacy. A range of about 250–280 nm provides the most bacterial efficacy.

Electricity passed through mercury vapor contained in the bulb produces ultraviolet light. The light output is directly related to the mercury vapor pressure of the lamp. Mercury lamps typically use sodium-barium silicate soft glass or quartz tubes to contain the mercury. Additionally, device manufacturers may utilize proprietary technologies to optimize bulb performance (i.e., light efficiency, vapor pressure, power output) or improve the safety profile of their device.

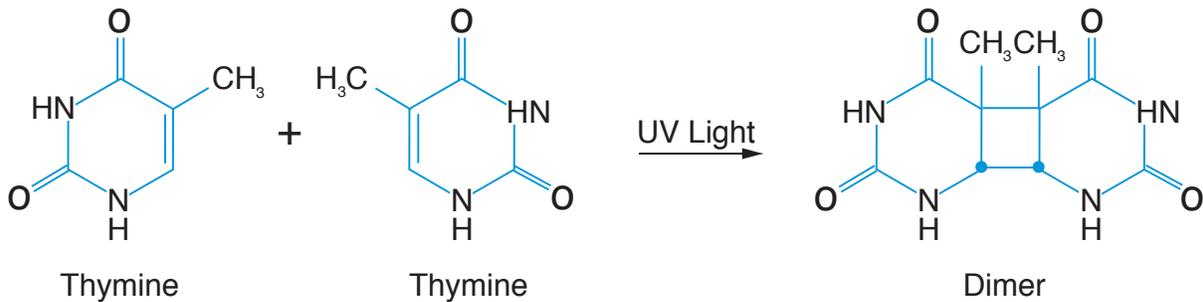
Typical germicidal mercury lamps, such as those used in portable UV devices, are low pressure mercury lamps that emit a strong narrow-band in the UV-C spectrum at 253.7 nm as shown by the sharp yellow peak below. This is clearly in the range of highest bacterial efficacy (shown in purple below).



Source: Ormechi, B., Ishida G., Linden K., IMPACT OF CHLORINE AND MONOCHLORAMINE ON ULTRAVIOLET LIGHT DISINFECTION.

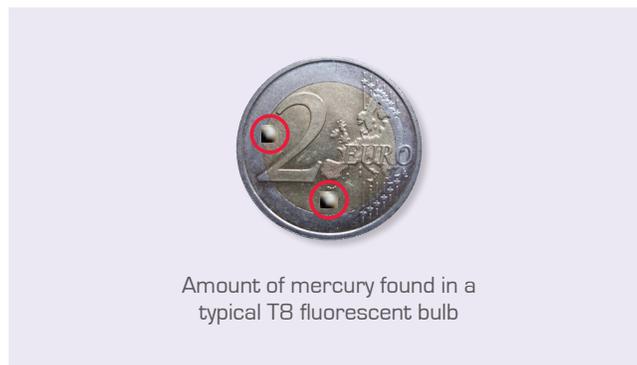
How does mercury damage cells?

UVC is highly damaging to cells because it can be absorbed by proteins, RNA and DNA. Although several mechanisms for cell degradation may occur, by far the most prevalent is a thymine dimerization reaction that occurs within DNA (or uracil dimerization within RNA), which renders the organism unable to reproduce. A dimer is a compound made up of two identical (or very similar) molecules. The thymine dimerization is outlined below.



Does the use of mercury lamps produce a safety hazard?

If used appropriately, mercury lamps do not produce a safety hazard. Low pressure mercury lamps, like those typically used in portable UV room treatment devices may have up to 20 mg of mercury per lamp. The small dots on the coin in the picture below illustrate the amount of mercury in a typical low pressure mercury lamp used for UV treatment.



To put this in perspective, common four-foot fluorescent bulbs, which are also low pressure mercury discharge lamps, contain about 20 mg of mercury. And, as outlined in the previous page, all the fluorescent lamps in a hospital make up only 0.07% of the mercury in a typical hospital.

Even though UV and fluorescent bulbs account for a minimal amount of the mercury in hospitals, broken or used bulbs should be properly disposed. Cleanup procedures following the breaking of a UV lamp are similar to those recommended for broken fluorescent bulbs. Always refer to the UV device manufacturer's recommendations, and check if individual lamps are encapsulated in a protective polymer sleeve to contain broken glass and mercury, or if the lamps have other safety features.

References:

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