

Hazards of Ultraviolet Light

Health effects – Equipment Uses – Questions and Answers

UV or ultraviolet lamps are used in biological safety cabinets, light boxes, and crosslinkers in many university laboratories. One of the problems in working with UV radiation is that of the symptoms of over exposure are not immediately felt so that persons exposed do not realize the hazard until after the damage is done.

UV radiation is that radiation just outside the visible range, or under 400 nanometers (nm). There are three ranges of UV (see table below).

Region	Also known as	*Range in nm	Hazard Potential	Damage Mechanism (High Exposures)
UV-A	near UV	320-400	lowest	Cataracts
UV-B	mid UV	290-320	mid to high	**skin or eye burns
UV-C	far UV	190-290	highest	Skin or eye burns

**Early “black lights” emitted in the range of 360-390 nm.*

***Increased risk for some types of skin*

Health Effects

The biological effect of UV light varies greatly depending on its wavelength. The health effects of exposure can range from a mild skin irritation, equivalent to sunburn, to severe skin or eye ulceration. Although the effects of mild UV exposure mimic that of sunburn, the UV light levels around UV equipment can greatly exceed levels found in nature. Acute (short term) effects include redness or ulceration of the skin. At high levels of exposure these burns can become serious. Chronic exposures can lead to premature aging of the skin and skin cancer depending upon the amount of exposure received during your life.

Signs of exposure are not immediately evident...the user may not realize a hazard until after the damage is done!

The eyes are also susceptible to UV damage. Like the skin, the layer of cells covering the eye, is also epithelial tissue. Damage to the eye can occur any time that you are in the presence of UV light. The danger to the eye is enhanced by the fact that light can enter from all angles and not just from the direction you are looking, causing corneal damage. Acute eye pain is the first symptom felt, sometimes several hours after eye exposure. The lens can also be damaged, even though the cornea acts as a filter, mitigating the damage to the lens. This should not lessen the concern over lens damage however, because cataracts are the direct result of exposure to UV light.

Burns to the eyes are usually more painful and serious than a burn to the skin. Make sure your eye protection is appropriate for this work. Specially made safety glasses for the different UV ranges are available. **NORMAL EYEGLASSES OR CONTACTS OFFER VERY LIMITED PROTECTION!**

Always protect the rest of your face as well as your eyes. Severe skin burns can happen in a very short time, especially under your chin (where most people forget to cover). Full-face shields are the most appropriate protection when working with UV light boxes for more than a few seconds.

Protect your arms and hands by wearing a long sleeve lab coat and gloves.

UV sources used in the Biology Department

Germicidal lamps emit radiation almost exclusively in the far-UV range of 254 nm, and are commonly used in Laminar Air Flow hoods or biological safety cabinets and should be treated with extreme caution. **DO NOT** expose yourself to these lights!

UV light boxes This instrument is literally a box with a glass top and a UV lamp inside. Some units have multiple lamps that allow a choice of wavelengths. Most of these instruments are stationary, but there are a few hand held types that carry the same hazard as the stationary models. Nucleic acid (DNA or RNA) which has been stained with the Ethidium Bromide, fluoresces when exposed to UV light

UV-Crosslinkers are used to covalently bond nucleic acids to the surface of membrane during Southern blotting, Northern blotting, dot blotting and Colony/Plaque lifts. A 254-nm wavelength is usually used in this apparatus.

UV Questions and Answers

How do I know if my eye protection is adequate for your use? Look for a symbol indicating a rating for UV protection or check with the Manufacturer.

How can I work safely around a germicidal lamp? The UV lamp should **NEVER BE TURNED ON WHEN PEOPLE ARE IN THE ROOM**. Even a small opening at the bottom of the hood sash can exceed occupational exposure standards several feet away. Use the germicidal lamp after hours or when no one is in the room. Post a sign on the door to the lab where the germicidal lamp is in use to warn of the hazard.

If you have questions regarding the emission of UV light contact your Departmental Safety Representative x3644, or the Campus EH&S office, x7612