Ultraviolet light (UV) is non-ionizing radiation in the 180 to 400-nanometer wavelength region of the electromagnetic spectrum. The ultraviolet spectrum is commonly divided into the following three regions:

- **VUV**: Vacuum UV, 100-180 nm
- **UVC**: Germicidal, 180-280 nm
- **UVB**: Erythemal, 280-314 nm
- **UVA**: Black Light, 315-400 nm

Hazard Assessment:
The Radiation protection program can perform hazard assessments such as confirming the performance of safety equipment, shielding and personal protective equipment.

Personal Protective Equipment Recommendations:
Radiation Protection is available to recommend appropriate personal protective equipment suited for the particular source of UV radiation.

**Harms Associated with Exposure to Ultraviolet Light**

- **Skin Injury** - UV radiation can initiate a photochemical reaction called erythema within exposed skin. This "sunburn" can be quite severe and can occur as a result of only a few seconds exposure. Effects are exaggerated for skin photosensitized by agents such as coal tar products, certain foods (e.g., celery root), certain medications and photoallergens. Chronic skin exposure to UV radiation has been linked to premature skin aging, wrinkles and skin cancer.

- **Eye Injury** – UV radiation exposure can injure the cornea, the lens, or the retina depending on the type of UV radiation.

- **Photokeratitis** is a painful inflammation of the eye caused by UV radiation-induced lesions on the cornea. Symptoms include a sensation of sand in the eye that may last up to two days.

- **Cataracts** may result from chronic exposures to acute high-energy UV radiation.

- **Blue light hazards** are unique since the damage may not be manifested until 24 to 48 hours post exposure. Blue light hazards are part of the reason we should not stare at the sun or arc flashes.

**Basic Description of UV Radiation**

Ultraviolet light (UV) is non-ionizing radiation in the 180 to 400-nanometer wavelength region of the electromagnetic spectrum. The ultraviolet spectrum is commonly divided into the following three regions:
Many overexposures occur as a result of individuals not knowing the hazards associated with UV-emitting equipment. To help prevent eye and skin injuries, any equipment that emits UV radiation must be conspicuously labeled with a caution label. The label should contain language similar to:

**Equipment Labeling**

Many overexposes to UV radiation have occurred as a result of individuals not knowing the hazards associated with UV-emitting equipment. To help prevent eye and skin injuries, any equipment that emits UV radiation must be conspicuously labeled with a caution label. The label should contain language similar to:

**Do's and Don'ts**

- Do
  - read the manufacturer’s instructions.
  - follow the controls in the procedure
  - wear protective clothing if there is a risk of harmful exposure.
  - avoid unnecessary exposure to eyes or skin.

- Don’t
  - expose other people to UV radiation due to your activities.
  - modify the equipment.
  - remove covers.
  - defeat interlocks

**Emergency Procedures**

Emergency: Dial 100 from Campus Phone or 617-253-1212

General Medical Attention: If you suspect a UV exposure, seek medical attention by contacting MIT Medical; note that symptoms may not appear till 12 – 48 hr after exposure.

Follow-up: Notify Supervisor so that an injury report can be filed if necessary • Notify EHS Radiation Protection to review the incident to assess and help identify corrective actions.

**Commonly UV Sources in Laboratories**

- **Biological Safety Cabinets**
  - Although Centers for Disease Control (CDC) and the National Institute of Health (NIH) no longer recommend the use of UV for sterilization, a number of them exists at MIT. Never work in a biological safety cabinet while the germicidal lamp is on. If possible, close the sash while lamp is on.

- **Transilluminators**
  - UV transilluminators should be guarded (enclosed in an absorbent polymer) with an interlock that will make the device safe (i.e. turn it off) if the guard is opened. Eye and skin exposure should be avoided, alternatives to manipulating gels with hands whilst under UV should be found. The manufacturer’s specification should be consulted for information as to the potential exposure level and frequency of radiation and their suggested operating protocols. Never use a transilluminator without the protective shield in place. Shields must be kept clean and replaced when damaged.

- **Crosslinkers**
  - **UV-Crosslinker** is used to "cross-link" or covalently attach nucleic acid to a surface or membrane following Southern blotting, Northern blotting, dot blotting, and Colony/Plaque lifts. 254 nm wavelength is used. Crosslinkers must not be used if the door safety interlock is not working properly.

- **UV Curing Systems**
  - UV curing is a speed curing process in which high-intensity ultraviolet (UV) light is used to create a photochemical reaction that instantly cures inks, adhesives, and coatings. The spectra available for UV curing are quite varied and may extend into the blue light spectrum.

**Traits of a Positive Safety Culture**

1. Leadership Safety Values and Actions
2. Problem Identification
3. Personal Accountability
4. Work Processes
5. Continuous Learning
6. Environment for Raising Concerns
7. Effective Safety Communication
8. Respectful Work Environment
9. Questioning Attitude

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