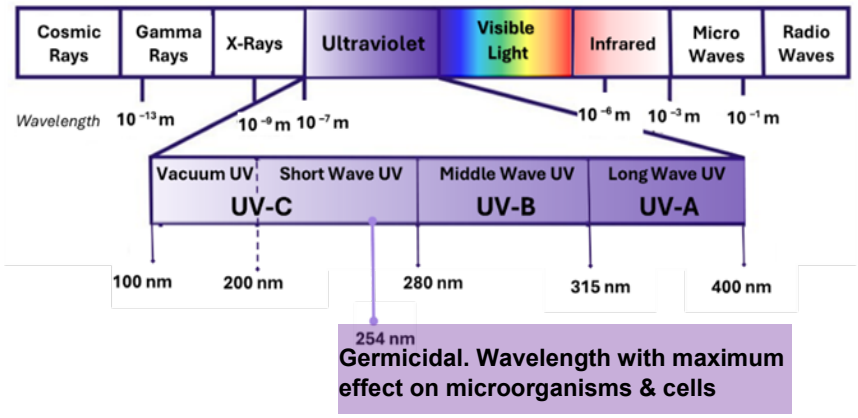
Ultraviolet-Radiation Safety

Mindfulness Minute: Incorporate safety into your workflow by considering the hazards associated with laboratory sources of ultraviolet radiation (UV-A, UV-B, and UV-C).

What is UV radiation?

UV radiation (UV-R) belongs to the non-ionizing part of the electromagnetic spectrum (100-400 nm) and is divided into three wavelength bands: UV-A (315-400 nm), UV-B (280 -315 nm) and UV-C (100- 280 nm). The dividing lines between bands are chosen as convenient boundaries. They do not represent a division with abrupt, significant shifts in characteristics of the UV emissions. The biological, physical and chemical effects of UV light vary enormously with wavelength. Sources of wavelengths less than 220 nm will generate Ozone (O_3) in air.



UV-A represents the largest UV component of natural sunlight, (approximately 90 %). The upper atmosphere blocks a portion UV-B, and virtually all UV-C rays from the sun. Exposure to harmful UV-C occurs only from artificial sources. Some of those sources, where protection of your skin and eyes is critical, are: germicidal lamps in biosafety cabinets; transilluminators & DNA crosslinkers; mercury lamps & handheld UV lights; excimer lamps in UV-curing chambers; and xenon pulse lamps used in chemical analysis & spectral imaging.

Adverse Health Effects of UV Exposure on Skin & Eyes			
	Wavelength	Skin	Eyes
UV-A	**315 - 400 nm** Longwave or blacklight	▪Low potential for adverse health effects ▪Lowest energy	▪Photokeratitis (aversion to light) ▪Conjunctivitis (Inflammation of the inner eyelid & corneal membrane)
UV-B	**280 - 315 nm** Middle wave or erythemal	▪**Acute:** Erythema (sunburn) ▪**Chronic:** Accelerated aging & abnormal pigmentation	▪**Acute:** Painful photokeratitis, conjunctivitis *Symptoms are often delayed, but can last up to 48 hours* ▪**Chronic:** Cataracts (opacity of the lens), retinal damage & degeneration, scarring & unwanted tissue growth, cancer of the eye, loss of vision
UV-C	**100 - 280 nm** Shortwave or germicidal *100- 200 nm Vacuum Range*	▪**Acute:** Sunburn/blistering of skin ▪**Chronic:** Hyperpigmentation, melanoma/other skin cancers	

How to protect yourself from exposure:

Gloves and a lab coat should be worn to protect your skin. Consider gaps at your wrists and protect your skin by pulling your gloves up over your sleeve cuffs.

Safety glasses should be ANSI-Z87 rated and provide UV protection from side exposure via a side lens or "wrap around" lens. Contact the manufacturer for guidance on the appropriate UV protection for your application.

A **UV-protective face shield** should be worn to protect your eyes and face if contact with UV light cannot be avoided. It should be marked with a U and a number between 2 and 6 if they provide UV protection. **If there is no U printed on the face shield, then it is NOT UV-protective**.

UV protective safety glasses that have an ANSI-Z87 and a U6 rating marking.