Use of UV in Foodservice Industry

discover the ABC’s of UV lights and their applications in hygiene management and food safety programs

Rajat Rialch, FCSI
Ultra Violet Light

- **Ultraviolet (UV)** light is electromagnetic radiation with a wavelength shorter than that of visible light, but longer than X-rays, in the range 10 nm to 400 nm, and energies from 3eV to 124 eV. It is so named because the spectrum consists of electromagnetic waves with frequencies higher than those that humans identify as the color violet.
## Type of UV

<table>
<thead>
<tr>
<th>Type of UV</th>
<th>Wavelengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultra Violet A – Black light</td>
<td>400nm – 315nm</td>
</tr>
<tr>
<td>Ultra Violet B - Dangerous UV</td>
<td>315nm - 280nm</td>
</tr>
<tr>
<td>Ultra Violet C – Germicidal</td>
<td>280nm – 200nm</td>
</tr>
<tr>
<td>Ultra Violet V – Vaccum</td>
<td>200nm – 100nm</td>
</tr>
</tbody>
</table>
Usage of UV

1. Bug Zappers - UVA
2. Pest Control - UVA
3. Sanitary compliance - UVA
4. Air purification - UVC
5. Sterilization - UVC
6. Disinfecting drinking water - UVC
7. Food processing – UVC
8. Solar cells -- UVC
Air Purification

• Exhaust Hood

• UV lamps look very similar to a standard fluorescent tube but are made of quartz. When turned on, they generate some UV light at 185 NM and a great deal of light energy at 254 NM. The UV 254 creates hydroxyl radicals, which break down organic matter (grease) into smaller particles. The UV 185 creates ozone, which in turn makes more hydroxyl radicals, breaking down the already smaller particles.
Air Purification

- Fresh air

- UV light exposure, a strong oxidative effect occurs on any organic objects. Converting otherwise irritating pathogens, pollens, and mold spores into harmless inert byproducts. The contaminants that pollute the indoor environment are almost entirely based upon organic or carbon-based compounds. These compounds break down when exposed to high-intensity UV at 240 to 280 nm.
Insect Traps

- Ultraviolet traps called bug zappers are used to eliminate various small flying insects. They are attracted to the UV light, and are killed using an electric shock, or trapped once they come into contact with the device.
Pest Control

- Some animals, including birds, reptiles, and insects such as bees, can see near-ultraviolet light. Scorpions glow or take on a yellow to green color under UV illumination, thus assisting in the control of these arachnids. The urine and other secretions of some animals, including dogs, cats, and rodents, is much easier to spot with ultraviolet. Urine trails of rodents can be detected by pest control technicians for proper treatment of infested dwellings.
Sanitary compliance

- UV lamps including newer LEDs (light-emitting diode) aid in the detection of organic mineral deposits that remain on surfaces where periodic cleaning and sanitizing may not be properly accomplished. Many hospitality industries use UV lamps to inspect for unsanitary bedding to determine lifecycle for mattress restoration as well as general performance of the cleaning staff.
Sterilization

- Ultraviolet lamps are used to sterilize workspaces and tools. Commercial Kitchen. Commercially available low-pressure mercury-vapor lamps emit about 86% of their light at 254 nanometers (nm), which coincides very well with one of the two peaks of the germicidal effectiveness curve (i.e., effectiveness for UV absorption by DNA). One of these peaks is at about 265 nm and the other is at about 185 nm.
Disinfecting drinking water

- UV radiation can be an effective viricide and bactericide. Disinfection using UV radiation is commonly used in wastewater treatment applications and is finding an increased usage in drinking water treatment.
Food processing

- As consumer demand for fresh and "fresh-like" food products increases, the demand for non-thermal methods of food processing is likewise on the rise. In addition, public awareness regarding the dangers of food poisoning is also raising demand for improved food processing methods. Ultraviolet radiation is used in several food processes to kill unwanted microorganisms. UV light can be used to pasteurize fruit juices by flowing the juice over a high-intensity ultraviolet light source.
UV solar cells

- A transparent solar cell that uses ultraviolet light to generate electricity but allows visible light to pass through it. Most conventional solar cells use visible and infrared light to generate electricity. In contrast, the innovative new solar cell uses ultraviolet radiation. Used to replace conventional window glass, the installation surface area could be large, leading to potential uses that take advantage of the combined functions of power generation, lighting and temperature control.

- Japan's National Institute of Advanced Industrial Science and Technology (AIST) has succeeded in developing the same.