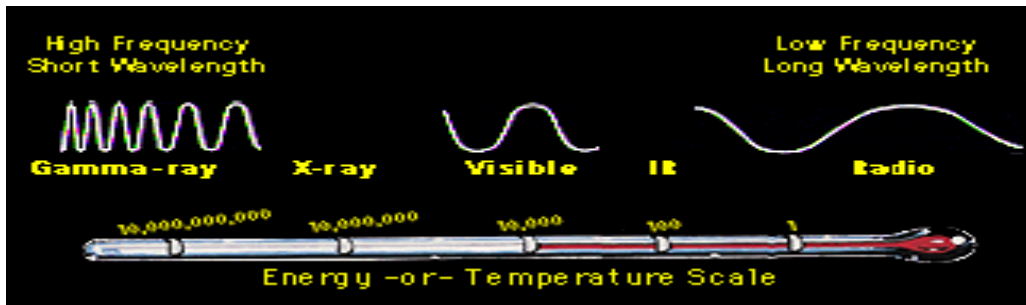


Ultraviolet Germicidal Irradiation (UVGI)

Light can kill? Ultraviolet light can sterilize my stuff? And is it for real?

UVA, UVB and UVC.....all ultraviolet light but are they all the same? Yes and no. Visible light as we know it is a phenomenon that allows us to see objects in our view and also promotes chemical processes in the human body and other life forms. Without it we would not exist. Electromagnetic (EM) radiation is photon energy (photons are massless particles which travel at the speed of light) yet at different wavelengths. This is what makes the (EM) different in its effects. From radio waves which are very long waves to Gamma Radiation which has a very short wavelength. We may not be able to visually see it but it is there. This is the case of ultraviolet rays, we know they exist but we can't see them. The ones that blister our bodies and make the insides of closed cars baking hot. We do not "see" them but they alter the environment dramatically. The mystery of ultraviolet (UV) rays is not in the sense that they are all the same but they are at different wavelengths. The wavelength is what determines their effects and name hence UVA, UVB and UVC.

The chart below shows the wavelength of the different EM..

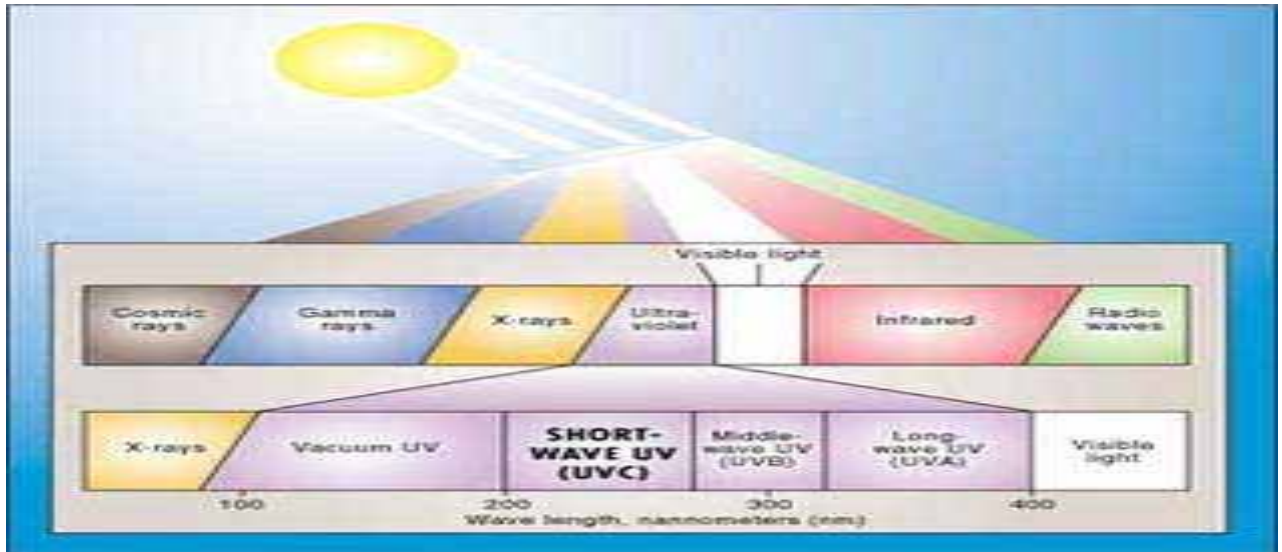


Let's examine the differences of UV rays. Even though we see sun rays, aside from the visible spectrum which is at a longer wavelength, as being the same, they are actually divided in three categories that have different effects upon our body: UVA, UVB and UVC rays.

Out of these, only UVA and UVB types are harmful to our skin, damaging its surface and inner structure when taking prolonged sunbaths. This is because the third type, the UVC radiation, does not penetrate the atmosphere's ozone layer and does not reach Earth.

However, UVB and UVA act differently upon our skin and do not equally damage it. The UVB rays are mostly responsible for most cases of sunburn, as they are shorter than UVA rays and only reach the surface of the skin that is made up of the epidermal layer. The UVB radiation is absorbed by the stratum corneum on the epidermal surface. This stratum corneum is the dead cell layer – the visible layer of the skin. The UVB radiation is partly absorbed and blocked by the ozone layer before reaching Earth.

The UVA damage is deeper, as the UVA rays are longer than the UVB ones and reach the inner strata of the skin. They are responsible for causing the skin to lose its elasticity and wrinkling, leading to premature aging of the skin. They also can burn the skin, but at a deeper level. The UVA rays are not at all absorbed by the atmosphere and completely reach Earth.



What is UVC?

Short-wave ultraviolet radiation, in the "C" band (200 to 280 nanometers) has been used for over 100 years. UV-C (UVC) is also referred to as UVGI (ultraviolet germicidal irradiation). UVC penetrates the outer structure of the cell and alters the DNA molecule, preventing replication and causing cell death.

UVC rays are very rare in our environment because the earth's atmosphere reflects or shields us from these rays. These rays cause mutations and death to organisms that are exposed to them. This includes human beings. The "Death Ray" is an effective sterilizer in that it makes surfaces or spaces that have been exposed to it free of all living organisms, in a very short amount of time.

In reviewing a living organism they must have a cell with components that allow it to metabolize chemicals and reproduce itself. Humans are made up of billions of cells, and bacteria, fungus and viral organisms can be single cell entities. The UVC rays kill organisms by effectively baking the life out of them. Some organisms it takes only a few seconds such as staph, tuberculosis, HIV or hepatitis on a hard non-porous surface. In porous or wet environments it can take longer, such as a cup of water may take 15 minutes. The human body if exposed will undergo surface damage and mutations can occur. The eyes can be blinded with a few minutes of exposure.

The review of UV rays is to shed some light on the UV sterilizer which has been in use for years in many settings, from hospitals, barber shops and food manufacturing to name

a few. The UV sterilizer utilizes UVC rays and are man made by the use of chemicals in a tube that when excited by electricity produce UVC rays. They are not the same as a blacklight or the UV units sold for nail applications. The lights look the same but are emitting a different wavelength. Today there are sterilizers that have handheld capabilities and are small enough for home use or studio use in beauty salons, tattoo shops and body piercing establishments. The units are relatively safe and non-toxic to the environment because they do not produce toxic chemical waste. The costs for the units vary from around a \$150 dollars to \$300 for small studio sizes. Sterilizing of tattoo machines can be done without the use of water based cleaners and disinfectants and of course an autoclave can wreak havoc on electrical and rubber components. Jewelry in cases that are sold to customers can be packaged and sterilized in a few seconds instead of using a disinfectant or autoclaving, forcing your client to wait for their purchase. The autoclave is still the industry standard for sterilizing large quantities of equipment such as needles, tubes and forceps etc. But the single items and jewelry sold over the counter and used items after a body art service can be treated with a hand held unit before being disposed of in the garbage. Thus it protects the artist as well as anybody who may come in contact with refuse.

Some considerations about the use of the UVGI units are safety. The units produce a minimal amount of ozone but no hazardous waste. The units must also have their light bulbs replaced yearly and be kept clean from dust. Since, they lose their effectiveness with fluctuating power and dust on the bulbs. If the unit you use is battery operated such as the degerminator it needs to be fully charged and a maintenance schedule needs to be implemented to ensure it operates at peak performance. There is no standard method to check the effectiveness of its sterilizing capabilities, like the autoclave, as yet. The operator needs to be sure they do not expose the eyes or body to the light due to the damaging nature of the UVC emissions.

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