

# DISINFECTION (Sterilization) UV

Disinfection Conveyors & Cabinets

An Eye  
Looking into the  
INVISIBLE  
Ultra-Violet  
(UV)

# INTRODUCTION TO UV DISINFECTION

- ◉ UV light provides rapid effective inactivation of microorganisms through a physical process.
- ◉ When bacteria, viruses and protozoa are exposed to the germicidal wavelengths of UV light, they are rendered incapable of reproducing and infecting.

# WHAT IS ULTRAVIOLET (UV) LIGHT?

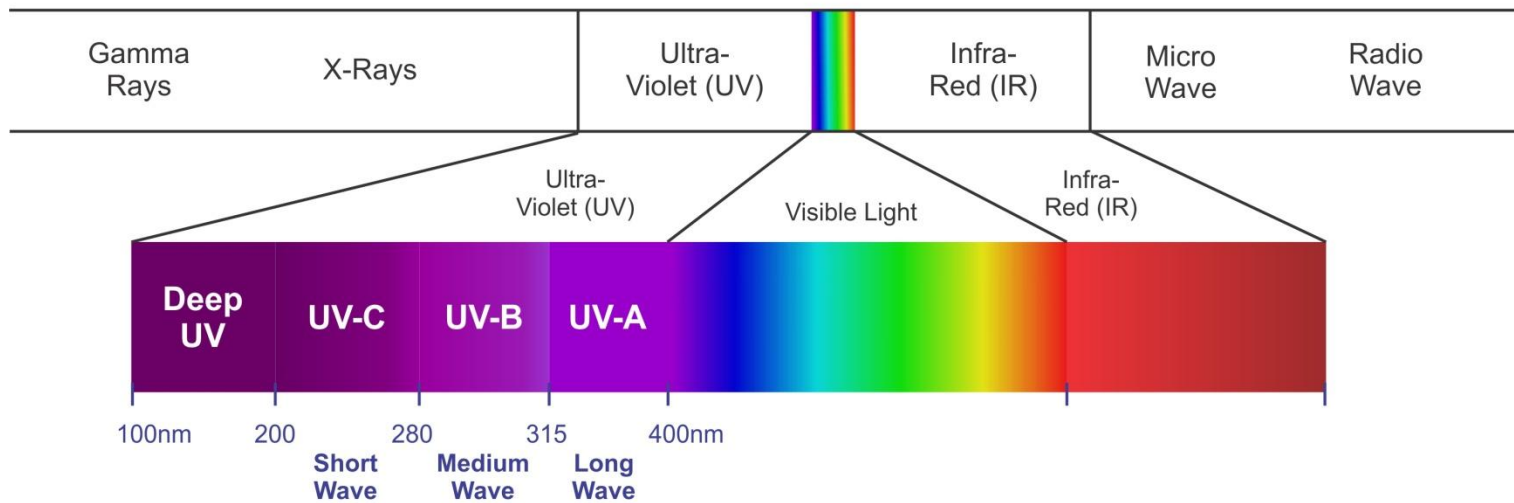
- Ultraviolet (UV) light is a form of light that is invisible to the human eye.
- It occupies the portion of the electromagnetic spectrum between X-rays and visible light.
- The sun emits ultraviolet light; however, much of it is absorbed by the earth's ozone layer.

# WHAT IS ULTRAVIOLET (UV) LIGHT?

- ⦿ A unique characteristic of UV light is that a specific range of its wavelengths, those between 200 and 300 nanometers (billionths of a meter), are categorized as germicidal - meaning they are capable of inactivating microorganisms, such as bacteria, viruses and protozoa.
- ⦿ This capability has allowed widespread adoption of UV light as an environmentally friendly, chemical-free, and highly effective way to disinfect and safeguard against harmful microorganisms.

# WHAT IS ULTRAVIOLET (UV) LIGHT?

## Electro-Magnetic Spectrum



$$\begin{aligned} 1 \text{ nm} &= 1 \times 10^{-9} \text{ m} \\ &= 1 \times 10^{-6} \text{ mm} \\ &= 1 \times 10^{-3} \text{ } \mu\text{m} \end{aligned}$$

# UV-A RADIATION

- ◉ curing mainly photo polymerization of different monomers and polymers.
- ◉ Applied in Drying Inks, Varnishes coated on different substrates like papers, boards, plastics, wood, ceramics.
- ◉ Radiation is measured in range of intensity ie watt per cm.
- ◉ Higher the intensity; Faster the curing
- ◉ Source : Medium Pressure Mercury Vapour lamp
- ◉ UV-A LEDs
- ◉ Gallium Lamps

# UV-B RADIATION

- Used for photo polymerization and sterilization.
- Applied in Drying Inks, Varnishes coated on different substrates like papers, boards, plastics, wood, ceramics.
- Disinfection of bacteria to a extent
- Radiation is measured in range of intensity ie watt per cm.
- Higher the intensity; Faster the curing
- Source : Medium Pressure Mercury Vapour lamp
- UV-B LEDs
- Gallium Lamps



# UV-C RADIATION



- ◉ Used for Sterilization
- ◉ Disinfection for micro organisms
- ◉ Intensity in range of milliwatts per cm.
- ◉ Used for initiation of photo curing by activating photo initiators
- ◉ Source : Low Pressure Mercury Vapour lamp
- ◉ Xenon filled lamps
- ◉ UV-C LEDs

# HOW UV DISINFECTION WORKS

- ⦿ UV provides rapid, effective inactivation of microorganisms through a physical process.
- ⦿ When bacteria, viruses and protozoa are exposed to the germicidal wavelengths of UV light, they are rendered incapable of reproducing and infecting.
- ⦿ UV light has demonstrated efficacy against pathogenic organisms, including those responsible for cholera, polio, typhoid, hepatitis and other bacterial, viral & parasitic diseases.

# HOW UV DISINFECTION WORKS

- ⦿ The high energy associated with short wavelength UV energy, primarily at 254 nm, is absorbed by cellular RNA and DNA.
- ⦿ This absorption of UV energy forms new bonds between adjacent nucleotides, creating double bonds or dimers.

# HOW UV DISINFECTION WORKS

- ⦿ Dimerization of adjacent molecules, particularly thymine, is the most common photochemical damage.
- ⦿ Formation of numerous thymine dimers in the DNA/RNA of bacteria and viruses prevents replication and inability to infect.

# SAFE EXPOSURE TIME OF UV

- ◉ Normally it is not recommended to expose our body to UV.
- ◉ The Sun is having UV-A, UV-B, UV-C radiations. But UV-C is absorbed by ozone.
- ◉ Lower Percentage of UV-A & UV-B reaching our body after travelling through atmosphere.
- ◉ Threshold Limit Value (TLV) is a standard value of time that how much time can our body exposed under UV.
- ◉ Normally 6-10mW for 8 hours is a standard TLV.



- + Use safety Goggles and Gloves doing operation.
- + Do not see the light with bare eyes.
- + Do not expose your body under UV light.

# CONTACT

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