- ❑ Commercial & Office Buildings
- ❑ Schools & Universities
- ❑ Daycare Centres
- ❑ Hospitals & Clean Rooms
- ❑ Dental Practices
- ❑ Medical Facilities
- ❑ Veterinary Centers
- ❑ Smoking Environments
- ❑ Manufacturing/Factories
- ❑ Food Processing & Storage Facilities
- ❑ Government Buildings & Facilities
- ❑ Fire Departments
- ❑ Police Departments

Controlling Airborne Diseases and sterilization for Food Processing and Storage facilities.

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Food Processing and Storage Industries

- Food & Beverage
- Butchery & Meat
- Fruit & Vegetables
- Fish & Sea Food
- Bread / Bakeries
- Cheese & Dairy Products
- Spices and Herbs








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Food Storage Facilities

Food Processing Plants

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Common Practice in Food Industries

Collecting of produce

Storage, Wet market

Food Processing

Wholesale

End product

Retail, Stock, Storage

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Legislation

- Air Quality is covered in UK legislation under COSHH regulations and the Health and Safety at Work Act 1974 which specify that employers owe "common duty of care" to employees and others who use or visit the premises. Furthermore the European standard VDI 6022 states that air conditioning plants should provide flawless air quality.

- In accordance with VDI 6022, air conditioning plants should provide physiologically beneficial indoor climate conditions and ensure that the indoor air is of flawless quality. The VDI standard stipulates that health risks and a decreased sense of well-being caused by air contaminated by micro-organisms must be avoided.

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Challenges in food industries during storage and processing

- Water & Food borne contamination
  - *Salmonella E.coli*
- Air Borne Contamination
  - *Staph. Aureus, coliform*
- Shelf Life of produce

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Prevention Method

- Good Manufacturing Practice
- Good circulation and sterilized air
- Ozonized water for washing
- Ozonized air

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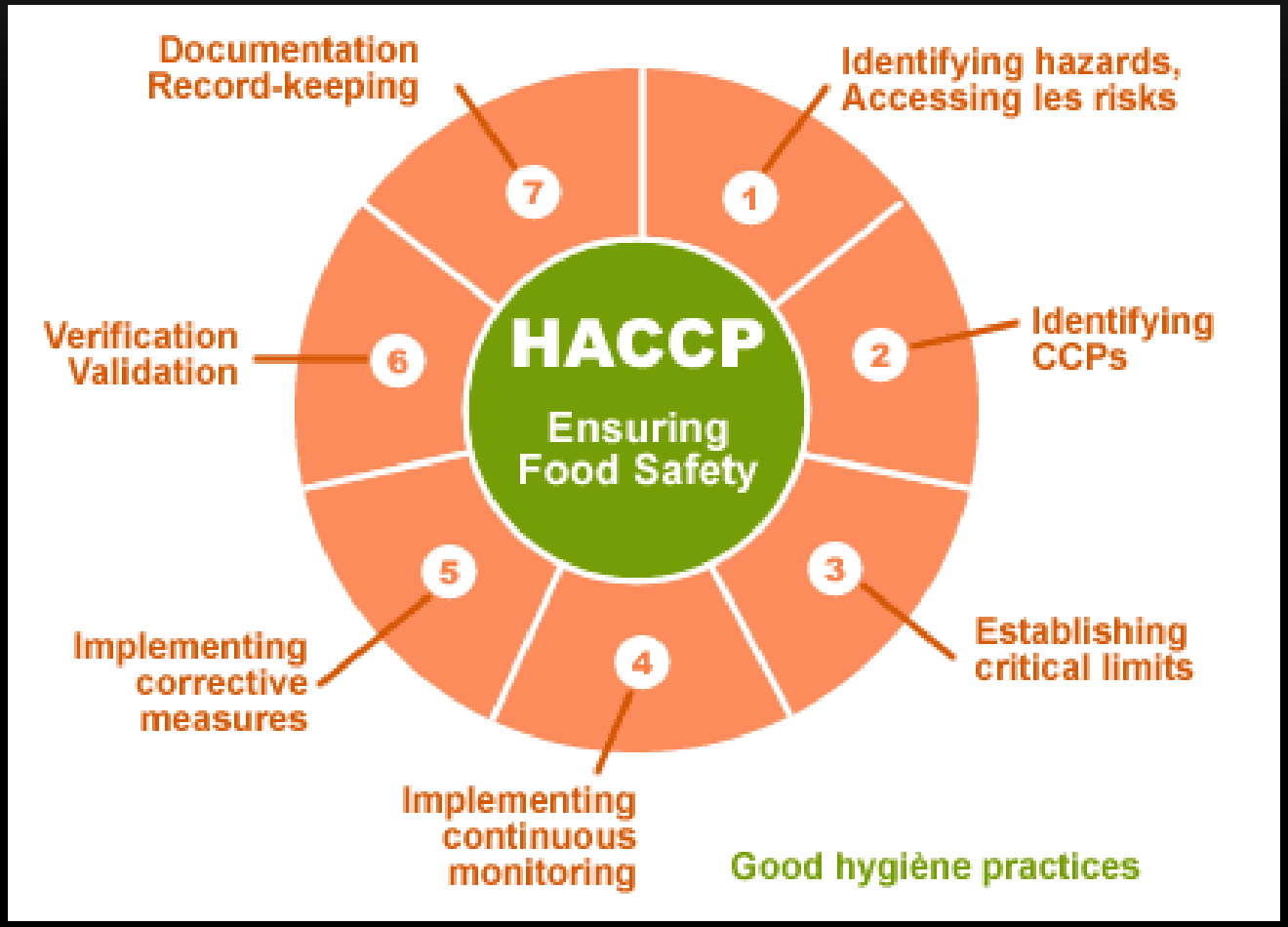
Good manufacturing practice



Good circulation and sterilized air

- Good Indoor Air Quality
- Good air conditioning system
- Clean Air

ACCORDING TO ENVIRONMENTAL PROTECTION AGENCY THERE ARE FIVE RECOMMENDED TECHNOLOGIES TO ACHIEVE ALL OF THE ABOVE

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EPA guideline technologies to achieve Good Indoor Air Quality

1. MERV (Minimum Efficiency Reporting Value) Rated Filters (H.E.P.A)
2. Germicidal UV Lights (UV-C)
3. Magnetized Air Media Filtration (ELECTROSTATIC FILTERS)
4. Bi-Polar Ionization (Medilite)
5. Photo-Catalytic Oxidation (NANO TiO_2)

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1. MERV (Minimum Efficiency Reporting Value) Rated Filters (H.E.P.A)

- Particulate matter contain pathogens (viruses, bacteria and infectious organisms), allergens and carcinogens.
- Mechanical air filters, like High Efficiency Particulate Air (HEPA) filters, remove 99.97% of all airborne particulates of 0.3 microns and above in size.
- They trap the particles in filters made out of tightly woven fibers.

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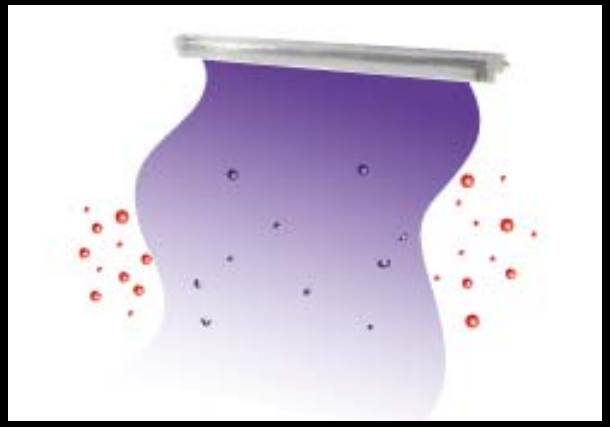
2. Germicidal UV Lights (UV-C)

How does UV-C Work?

- UV-C light emits germicidal wavelengths between 200-300nm. This reacts with the DNA and permanently alters the structure and the molecular bonds of microbiological contaminants such as *bacteria*, *viruses*, *germs*, *molds* and *mildews*.



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How does UV-C Work? – *cont'd*

Its scientifically proven that Ultraviolet Germicidal lamps (UVC) working at 253.7 nanometers at the correct intensity can effectively prevent cross contamination of the following airborne diseases:-

Aspergillosis Niger / Legionella / SARS

Bacillus Anthracis / Dust Mites / Allergy & Sinusitis

Tuberculosis (TB) / Influenza (Bird/Swine Flu)

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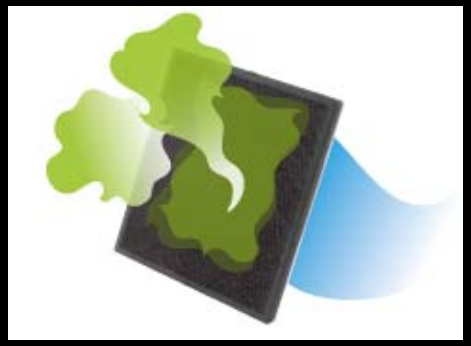
3. Magnetized Air Media Filtration (Electrostatic Filter)

- Electrostatic air precipitators use a process called electrostatic attraction to trap charged particles.
- They draw air through an ionization section where particles obtain an electrical charge.
- The charged particles then accumulate on a series of flat plates called collectors that are oppositely charged.



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4. Bi-Polar Ionization (Medilites)

- Air ion generators, or ionizers disperse negatively charged ions (anions) into the air, similar to the electronic air cleaners but without a collector plate.
- These ions attach to airborne particles, making them heavier and causing them to settle on the ground faster, away from the nasal breathing zone.
- Negatively charged oxygen molecules will behave like hydroxyl radicals to neutralize odors and destroy the DNA of pathogens and allergens.
- Studies have shown that anions can freshen indoor air, reduce tiredness, relieve stress, alleviate affective depression, reinforce collagen, and strengthen the functions of autonomic nerves and the immune system.

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5. Photo-Catalytic Oxidation - NANO Titanium Dioxide (TiO_2)

- Nano Titanium Dioxide (TiO_2) transforms biological and gaseous pollutants into harmless products by a process called photo catalytic oxidation (PCO).
- When applied as a coating and exposed to ultra-violet or ambient light, Nano-TiO_2 produces hydroxyl radicals and superoxide ions that will neutralize biological and gaseous contaminants in indoor air.

IS THERE AN EFFECTIVE METHOD OF STERILIZATION FOR FOOD AND STORAGE FACILITIES ?

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Yes!

THE ANSWER IS FOUND IN THE CONTROL OF HUMIDITY LEVELS AND THE USE OF EFFECTIVE UVGI SYSTEMS AS RECOMMENDED BY EPA & CDC

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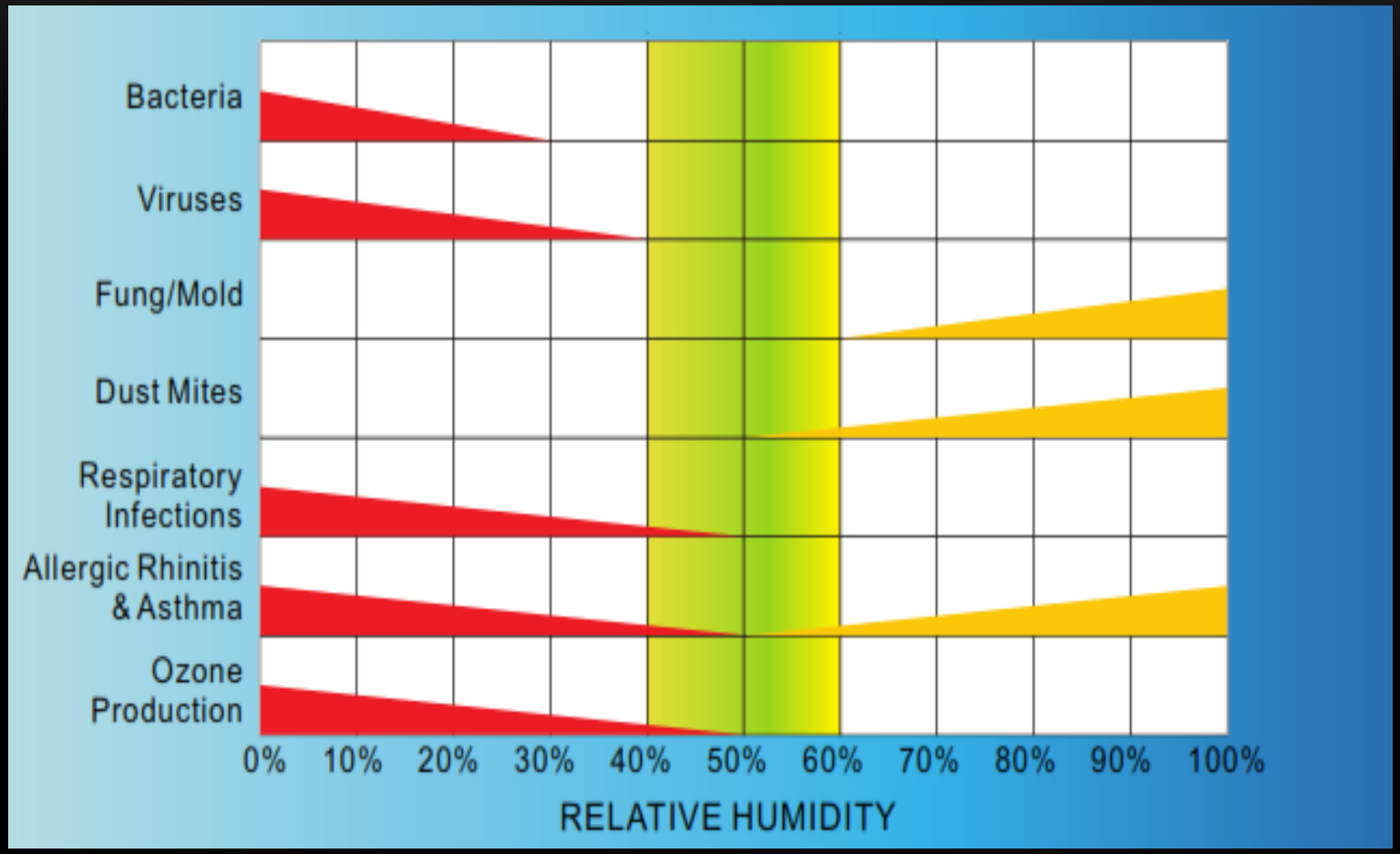
Optimum Humidity



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Hygro-Thermometer

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Handy Hygro-Thermometer

Features:

- » Indoor relative humidity and comfort level indicator
- » Clock display with alarm function
- » Selectable - Celsius or Fahrenheit (°C or °F) display by pressing C/F key

Specifications:

Measuring temperature range	-50 °C to 70.0 °C (-58°F to 158°F)
Temperature accuracy	±1 °C (±2 °F)
Temperature display resolution	0.1°C (0.2°F)
Humidity accuracy	±5%
Humidity display resolution	1%
Sampling period	10S

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Low indoor humidity increases droplet nuclei levels

- Viruses Evaporate faster in Low Humidity levels thus creating m**ore droplet nuclei.**
- Low humidity allows droplet nuclei to stay airborne longer as the droplets do not absorb water weight which would cause them to fall to the ground.
- Indoor Air currents both created by HVAC systems and people movement assure that droplet nuclei will remain airborne *Indefinitely.*
- This allows HVAC systems to remove and redistribute droplet nuclei throughout the building to infect more occupants.

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WHAT IS GERMICIDAL UVC LIGHT (UVGI) ?

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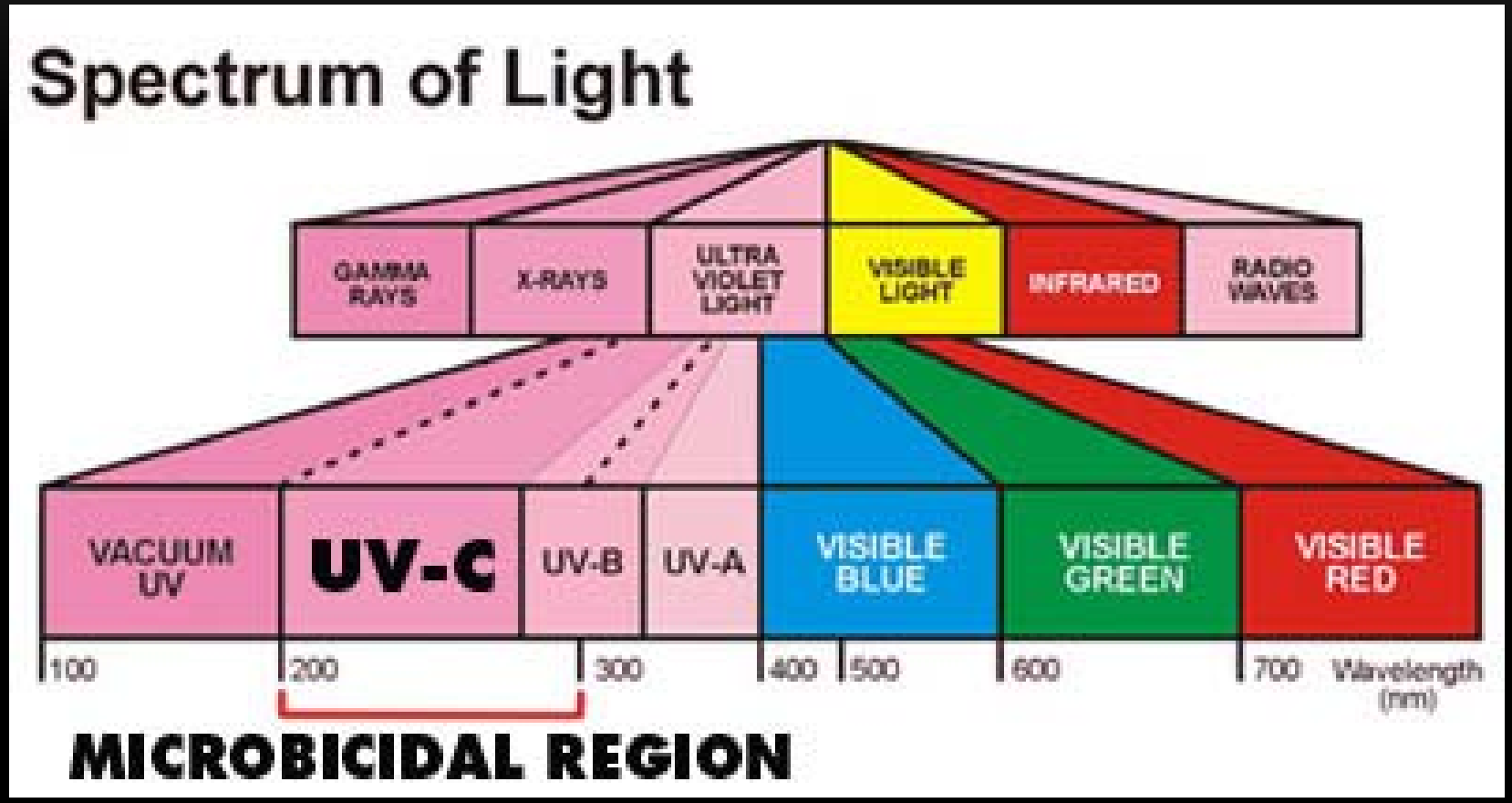
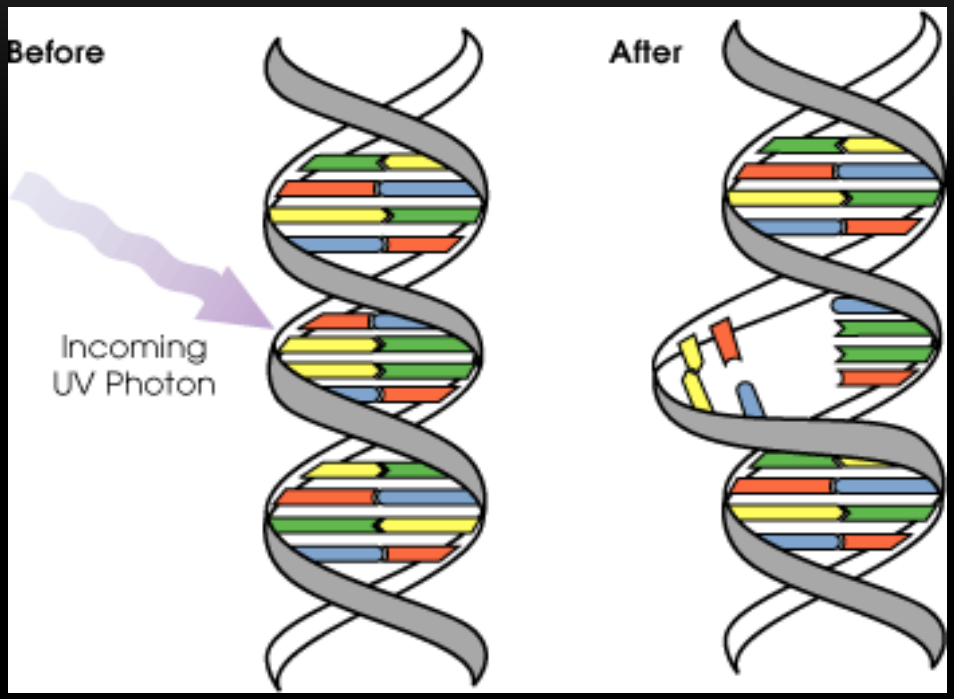
ULTRAVIOLET-C (UVGI)



HOW DOES UV-C WORK?



Ultraviolet photons harm the DNA molecules of living organisms in different ways. In one common damage event, adjacent thymine bases bond with each other, instead of across the "ladder". This makes a bulge, and the distorted DNA molecule does not function properly.

Why are microwatts important in UV-C?

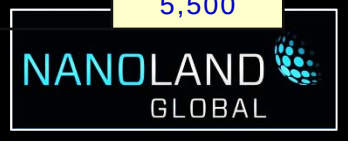
10^{-6} W	µW	microwatt

Microwatts are actually the main dosage unit of measurement for the calculation that determines the kill rate for every type of disease-causing agent (pathogen).

UV dosage for the inactivation of various microbes

Sourced from: Centre for Disease Control (CDC) & World Health Organization (WHO)

Bacteria	UV Dose	Bacteria	UV Dose
Agrobacterium lumefaciens 5	8,500	*Pseudomonas aeruginosa* (Environ.Strain)	10,500
***Bacillus anthracis* (anthrax veg.)**	8,700	*Pseudomonas aeruginosa* (Lab. Strain)	3,900
Bacillus anthracis* Spores (anthrax spores)	46,200	*Pseudomonas fluorescens*	6,600
Bacillus megatherium Sp. (veg)	2,500	*Rhodospirillum rubrum*	6,200
Bacillus megatherium Sp. (spores)	5,200	***Salmonella enteritidis***	7,600
Bacillus paratyphosus	6,100	***Salmonella paratyphi* (Enteric Fever)**	6,100
Bacillus subtilis	11,000	***Salmonella* Species**	15,200
Bacillus subtilis Spores	22,000	***Salmonella typhimurium***	15,200
Clostridium tetani	23,100	***Salmonella typhi* (Typhoid Fever)**	7,000
Clostridium botulinum	11,200	**Salmonella**	10,500
Corynebacterium diphtheriae	6,500	*Sarcina lutea*	26,400
Dysentery bacilli	4,200	*Serratia marcescens*	6,160
Eberthella typhosa	4,100	*Shigella dysenteriae* - Dysentery	4,200
Escherichia coli	6,600	*Shigella flexneri* - Dysentery	3,400
Legionella bozemanii	3,500	*Shigella paradysenteriae*	3,400
Legionella dumoffill	5,500	*Shigella sonnei*	7,000
Legionella gormanil	4,900	*Spirillum rubrum*	6,160
Legionella micdadei	3,100	*Staphylococcus albus*	5,720
Legionella longbeachae	2,900	***Staphylococcus aureus*** (incl. MRSA)	6,600
Legionella pneumophila (Legionnaire's Disease)	12,300	*Staphylococcus epidermidis* 5,7	5,800
Leptospira canicola-Infectious Jaundice	6,000	*Streptococcus faecalis* 5,7,8	10,000
Leptospira interrogans	6,000	*Streptococcus hemolyticus* 1,3,4,5,6,9	5,500



Dosage table continued....

Micrococcus candidus	12,300	*Streptococcus lactis*	8,800
Micrococcus sphaeroides	15,400	*Streptococcus pyrogenes*	4,200
Mycobacterium tuberculosis	10,000	*Streptococcus salivarius*	4,200
Neisseria catarrhalis	8,500	*Streptococcus viridans*	3,800
Phytomonas tumefaciens	8,500	*Vibrio comma* (Cholera)	6,500
Proteus vulgaris	6,600	*Vibrio cholerae*	6,500
Molds	**UV Dose**	**Molds**	**UV Dose**
Penicillium expansum	22,000	*Oospora lactis* 1,3,4,6,9	11,000
Penicillium roqueforti	26,400	*Penicillium chrysogenum*	56,000
Mucor racemosus (A & B)	35,200		
Protozoa	**UV Dose**	**Protozoa**	**UV Dose**
Chlorella vulgaris (algae)	22,000	Nematode	40,000
Virus	**UV Dose**	**Virus**	**UV Dose**
Adeno Virus Type III	4,500	**Influenza**	6,600
Bacteriophage	6,600	Rotavirus	24,000
Coxsackie	6,300	Infectious Hepatitis	8,000
Yeasts	**UV Dose**	**Yeasts**	UV Dose
Baker's Yeast	8,800	*Saccharomyces cerevisiae*	13,200
Brewer's Yeast	6,600	*Saccharomyces ellipsoideus*	13,200
Common Yeast Cake	13,200	*Saccharomyces sp.*	17,600

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CAN SOMA MEDICAL CUSTOMIZE AN INDOOR AIR QUALITY SOLUTION PROTOCOL FOR A STORAGE FACILITY?

YES!

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Soma Medical Ultraviolet light (C) range of product

- LEO-1, 2, 3 series (mobile / mounted)
  UVGI air sterilization unit for immediate sterilization
- Optimax 40C (ceiling mounted)
  UVGI air sterilization unit for immediate and continuous 24/7 sterilization
- UVMAX SM 14D
  Integrated unchangeable UVC Air and Water Sterilizer

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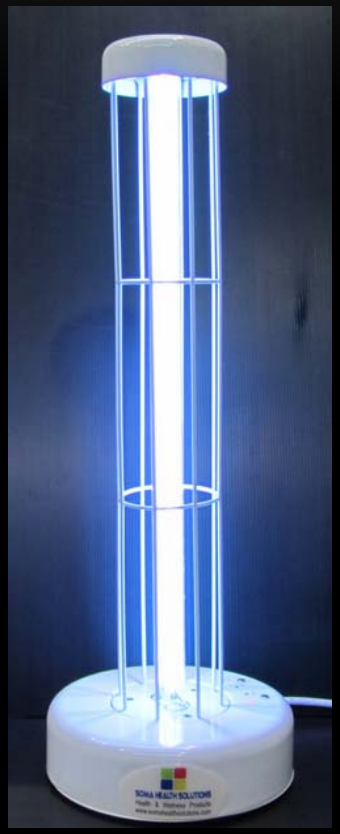
LEO-1 : UVGI Air Sterilization Unit for Immediate sterilization



Specifications:

Lightwave: UV-C primarily in the 253.7nm wavelength
UV intensity @1 meter: 170 ?W/cm2
Bulb lifespan: 8000 hours operational
Voltage supply: AC220-230V, 50Hz
Power of bulb / UVC power: 55 watts
Bulb length: 21”
DimensionS: 20 x 20 x 58 cm
Ballast (included) lifespan: 20 000 operational hours
PCO inside
Remote control
Includes a timer setting : 15' 30' 60' timer (30 seconds delayed when powered on)

Ozone option available

Cleanature

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LEO-2 : UVGI Air Sterilizer for continued sterilization (wall mounted)

Specifications:

Lightwave: UV-C primarily in the 253.7nm wavelength

Power: AC220-230V, 50Hz
UV intensity: 65 ?W/cm2
Bulb lifespan: 8 000 operational hours
Ballast lifespan: 30 000 operational hours
Bulb length: 23”

Power of bulb: 20 watts
Stainless steel housing

Ozone option available
Replacement lamps are available.

Cleanature

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LEO-3 : Cleanature UVGI Air Sterilization Unit for HVAC systems

Specifications:

Lightwave: UV-C primarily in the 253.7nm wavelength

UV intensity @ 1m: 85 ?W/cm2
Bulb lifespan: 8 000 operational hours
Bulb length: 21.5”
UVC power: 28 watts

Dimensions: 120 x 90 x 400 mm
Ballast lifespan: 30 000 operational hours
Power Voltage supply: AC220-230V, 50Hz
PCO inside (with Ozone option)
SM 1152 with Nano TiO coating

Metal housing

Cleanature

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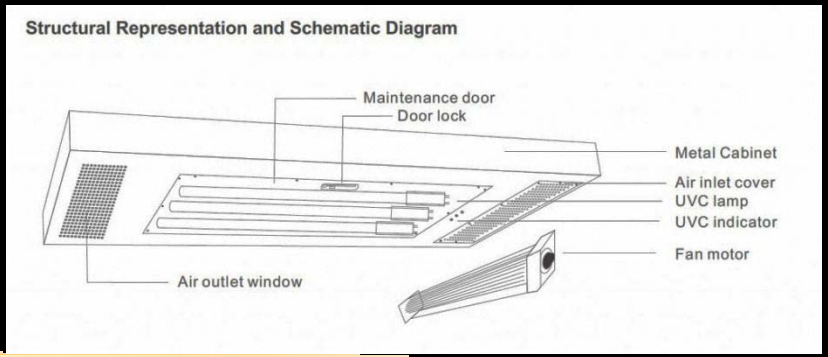
Optimax 40C – UVGI System (ceiling mounted)

- 3 pieces of 40 watts UVC quartz lamps working at 136 µw/cm intensity @ 1 meter
- LED indicates the working status of each UVC lamps
- Photocatalytic oxidation with Titanium
- Dioxide (TiO) working in conjunction with Ultraviolet Irradiation (UVC) at 253.7 nm.
- For continued air sterilization.



UVMAX SM-14-D Water purification system

Description:
This waterproof "immersion" type UVC sterilizer is suitable for disinfection of water storage tanks, fish-ponds, pools etc.
It is also suitable for air sterilization in production- & food-storage facilities or laboratories.
This method of sterilization will prevent secondary pollution of water in tanks. Also applicable for HVAC and DUCTING systems.

- Protective quartz glass.
- Very compact model, easy to install and maintain.
- Easy to operate.

Specifications:

All models are equipped with very high quality UV-C Sterilization lamp.

Average lifespan is 8,000 hours or more.

Available for all types of power-plugs, electrical systems (220 volts based) internal ballast.

Sterilizing casing pressure: 0.7Mpa.

Connector is waterproof PVC material.

Customization of this model is available

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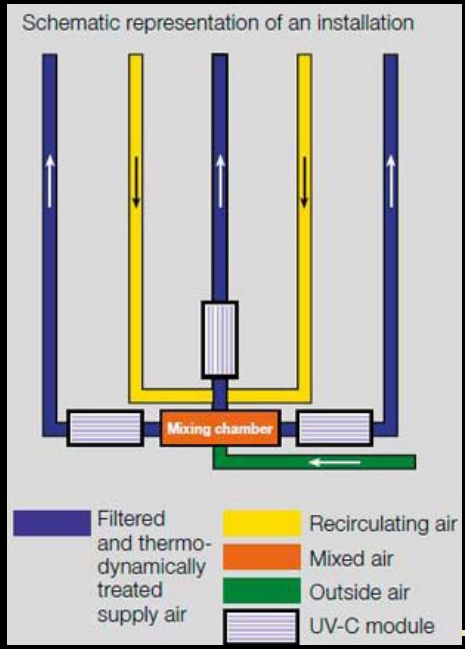
Customized – UVGI System (Ducting Mounted)



Installation in air-conditioning and ventilation systems.

Specifications:

- Galvanized sheet metal or stainless steel.
- Main element: radiation chamber.
- Dimensions can be adapted exactly to the existing or planned ventilation channels.
- UV-C low-pressure emitters located in the radiation chamber emit light with a wavelength of 253.7 nm (no ozone).
- Radiation has a lethal effect on micro-organisms.
- Interior coating of the quartz glass ensures an exceptionally long service life with minimal decline in radioactive power.
- Disinfection rates of up to 99.9%. Guarantees optimum production or storage parameters for all areas of use.

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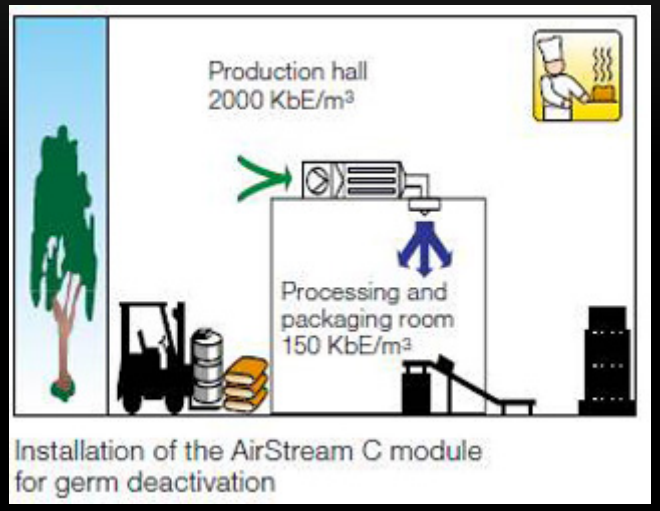
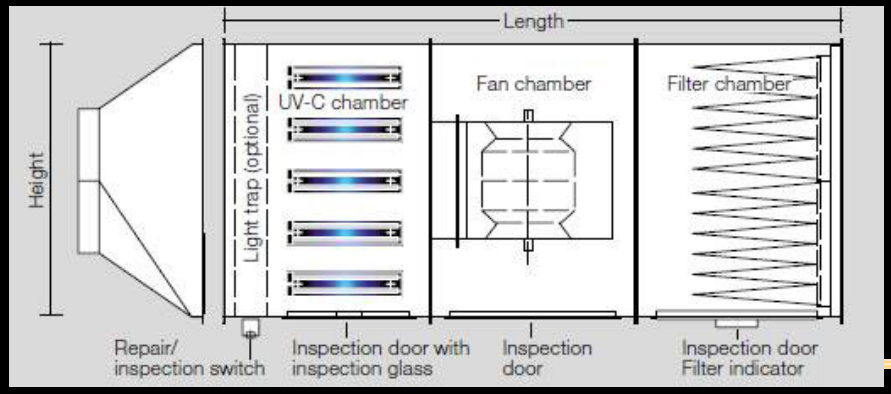
Customized – UVGI system (ducting system)

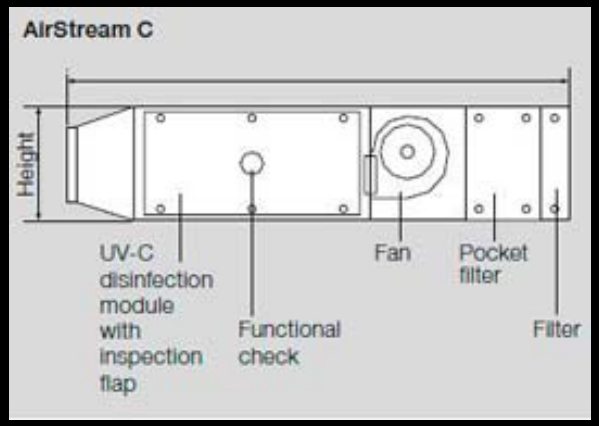


Installation of the AirStream C module for germ deactivation

- Self-contained module.
- Installation under room ceilings, intermediate ceilings or on the wall.
- Disinfects air quantities up to 50,000 m3/h.
- Powerful air suction. Filter systems clean the air before it is treated with UV-C in the radiation chamber. Integrated radiation traps ensure that no dangerous UV-C radiation escapes.
- Compact and modular construction enables easy and secure installation in your production rooms.



Customized – UVGI System (conveyors)



To a great extent contaminations come directly from the ambient air whilst the bakery products are cooling down and during packaging. The products often cool down on conveyor belts where they are exposed to the ambient air without protection. If the conveyor belt is enclosed and at the same time supplied with disinfected air, air contamination is practically ruled out.

The air is supplied via an air channel system - a protective fabric casing over the conveyor belt. The textile channel system is made of AIRTEX Bioactive fabric and has an anti-microbial effect thanks to nano-silver that is firmly integrated in the fibre matrix. The room air containing airborne germs no longer has any contact with the product. A further advantage is that the heat dissipates directly downwards which prevents condensation from forming.

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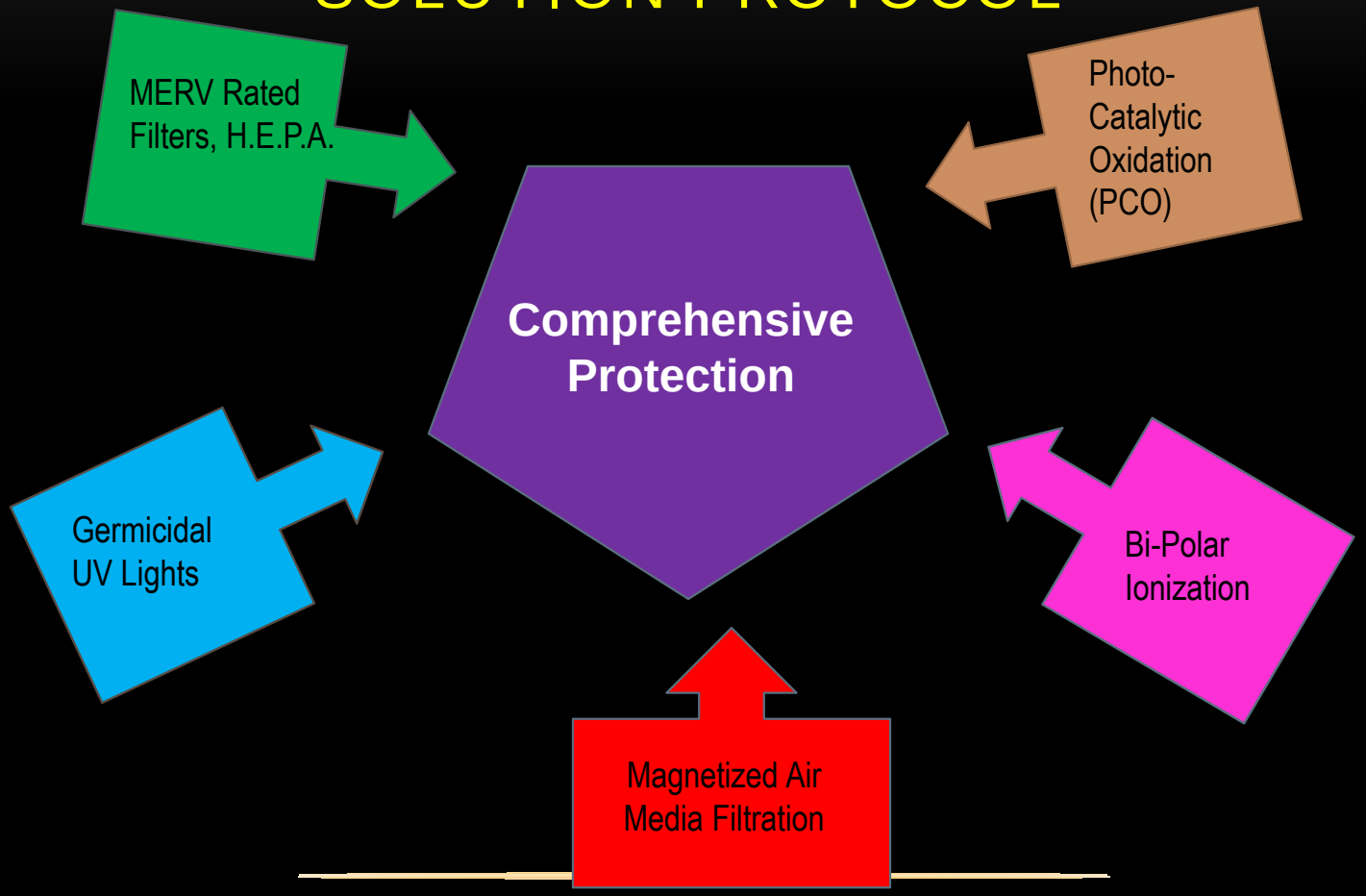
Summary of EPA Recommendations....

1. Seal your filter rack & HVAC system.
2. Get the highest MERV rated filter that your filter rack and air handling fan can tolerate.
3. **Put as many as UVGI lights systems in all critical areas.**
4. Consider Bi-Polar Ionization, Photocatalytic Oxidation and Magnetized Filtration Media Technologies for additional viral sterilization.
5. Install bathroom exhausts 11-12ft above floor level.
7. Coughing/sneezing occupants are advised to stay at home or wear a mask.

IN CONCLUSION IF WE ENCOMPASS THE USE OF ALL THESE 5 TECHNOLOGIES RECOMMENDED BY EPA THEN WE EFFECTIVELY HAVE A 24/7 IAQ SOLUTION PROTOCOL



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Advantages of UV-C technology when used in food industries

Other benefits are :

- Increased product yield and safety
- Ability to reduce / eliminate the use of chemicals and/or preservatives
- Longer product shelf life
- Reduce customer complaints
- Reduce product returns
- Improve freshness of the products
- Improves the hygiene standards
- Stricter quality assurance
- Fewer product losses results in higher profit

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UV-C disinfection without chemicals improve plant hygiene, maintenance of quality and a longer shelf life for products

- Airborne micro-organisms such as germs, bacteria, fungi and viruses can trigger health problems in humans and contaminate raw materials and fresh foodstuffs in food production - leading to premature spoilage.
- When UV-C radiation is used up to 90% of micro-organisms are destroyed.
- Encased disinfection systems are integrated in the ventilation and air conditioning equipment of buildings and food producing facilities. A completely chemical free disinfection method.
- Disinfected air can reduce health problems such as respiratory illnesses, mucus membrane problems and muscle aches. The advantages of UV-C disinfection for food production can significantly improve plant hygiene, maintenance of quality and a longer shelf life for produce.
- The food trade & industries require solutions that are simple to implement without interrupting production processes.
- We provide standard solutions which can be quickly installed on walls or ceilings.
- We can develop customized solutions for specific requirements tailored to the customer's needs. (UVC lights need to deliver high-output germicidal energy at low temperatures without loss of efficacy).
- The United States Department of Agriculture and the Food and Drug Administration have approved UV-C for surface decontamination, with no labeling required.
- In 2000, the FDA approved UV-light as alternative treatment to thermal pasteurization of fresh juice products (US FDA 2000).

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Thank you

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