

AIR AND MEDIA STERILIZATION

By

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STERILIZATION

- Term referring to any process that eliminates (removes) or kills all life forms of microbial life including transmissible agents (fungi, bacteria, viruses, spore forms etc.) present on a surface, contained in a fluid, in medication, or in a compound such as biological culture media.

STERILIZATION OF AIR

- Ultraviolet light treatment
- Filter sterilization
- Ozone gas treatment
- Chemical treatment

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FILTRATION

- Currently, there is a pronounced trend to use of membrane filters for air sterilization to obtain excellent performance with units of relatively small size. Moisture is bad for all methods of air sterilization and may help microorganisms to pass.
- A membrane pore size of 0.2 to 0.3 micrometers is recommended. Hydrophillic membranes should not be used because moisture held tightly in the pores is not dislodged unless there is quite high pressure drop across the membrane.

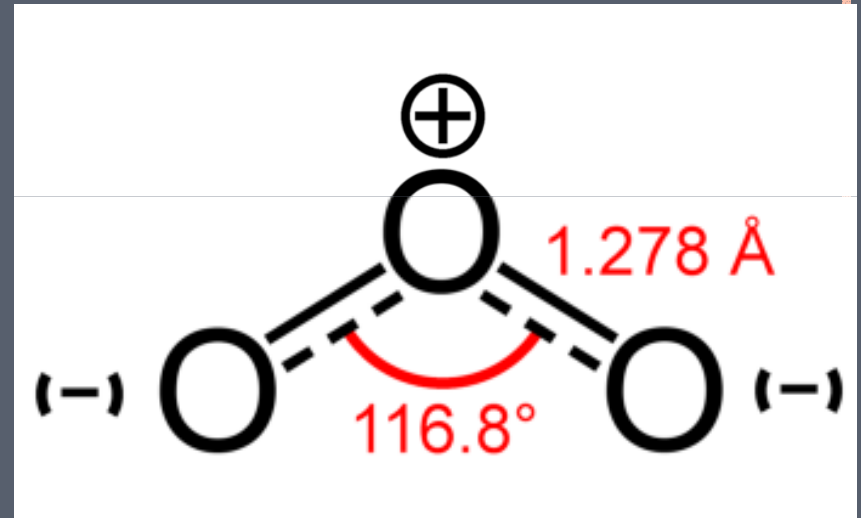
RADIATION

- UV, x-rays and gamma rays are all types of electromagnetic radiation that have
- profoundly damaging effects on DNA, so make excellent tools for sterilization.
- The main difference between them, in terms of their effectiveness, is their penetration.
- UV has limited penetration in air so sterilisation only occurs in a fairly small area around
- the lamp. However, it is relatively safe and is quite useful for sterilising small areas, like
- laminar flow hoods.
- X-rays and gamma rays are far more penetrating, which makes them more dangerous
- but very effective for large scale cold sterilization of plastic items (e.g. syringes) during
- manufacturing.

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OZONE

- Ozone, or O₃, is a naturally occurring part of the earth's atmosphere. It is created when oxygen (O₂) reacts with ultraviolet light or high-voltage electric discharges such as lightning.



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- Ozone will attach to any molecule. As a strongly charged molecule, it is a powerful oxidizing agent. Through its strong oxidation activities, ozone can break apart organic molecules, rendering them inert or non-toxic, create holes in the cell walls of bacteria and other microorganisms, and chemically alter heavy metals, making them more easily filtered.

ENZYME

- There have been some attempts to commercialize enzymatic sterilization of air. The basic concept is to bring microorganisms and viruses into contact with enzymes that attack nucleic acids. Viruses are destroyed by passage through a surfaces coated with deoxyribonuclease enzymes.

FUMIGATION

- Adding 35 mL of formalin (40 percent formaldehyde) to 10 g potassium permanganate per cubic metre of space.

STERILIZATION OF MEDIUM

- Sterilization by Moist Heat
- Moist heat acts by denaturation of protein, breakage of DNA strands, and loss of functional integrity of cell membrane.

STERILIZATION AT 100°C/ STEAMING/ TYNDALLIZATION

- Heat labile media like those containing sugar, milk, gelatin can be sterilized by this method. Steaming at 100°C is done in steam sterilizer for 20 minutes followed by incubation at 37°C overnight. This procedure is repeated for another 2 successive days. That is 'steaming' is done for 3 successive days. Spores, if any, germinate to vegetative bacteria during incubation and are destroyed during steaming on second and third day. It leads to sterilization.

STERILIZATION ABOVE 100°C: AUTOCLAVING

- Autoclaving is one of the most common methods of sterilization. Principle: In this method sterilization is done by steam under pressure. Steaming at temperature higher than 100°C is used in autoclaving. The temperature of boiling depends on the surrounding atmospheric pressure. A higher temperature of steaming is obtained by employing a higher pressure. When the autoclave is closed and made air-tight, and water starts boiling, the inside pressures increases and now the water boils above 100°C. At 15 lb per sq. inch pressure, 121°C temperature is obtained. This is kept for 15 minutes for sterilization to kill spores. It works like a pressure cooker.

STERILIZATION BY DRY HEAT

- Red Heat. Wire loops used in microbiology laboratory are sterilized by heating to 'red' in bunsen burner or spirit lamp flame. Temperature is above 100°C. It leads to sterilization.

FLAMING

- Flaming. The article is passed through flame without allowing it to become red hot, e.g. scalpel. Temperature is not high to cause sterilization.

STERILIZATION BY HOT AIR

- Hot Air Oven (Sterilizer). It Is one of the most common method used for sterilization. Glass wares, swab sticks, all-glass syringes, powder and oily substances are sterilized in hot air oven. For sterilization, a temperature of 160°C is maintained (holding) for one hour. Spores are killed at this temperature. It leads to sterilization.

THANK YOU