

Non-Ionizing Radiation

The diagram shows the electromagnetic spectrum with labels for radio waves, microwaves, infrared, visible light, UV, X-rays, and gamma rays. The visible light spectrum is color-coded from violet to red.

- > 1nm
- UV radiation 260nm
- Thymine dimers
- UV light sterilization
- Sterilization of vaccines
- UV Lamps
- Kill airborne microbes
- Does NOT penetrate glass OR plastics
- Sunlight weakly antimicrobial
- Formation of singlet oxygen in cytoplasm
- Microwaves not antimicrobial
- Friction boils water creating steam

- Disk Diffusion Method
- Filter paper soaked in disinfectant
- Placed on plate inoculated with target organism
- Larger zone of inhibition = greater susceptibility to disinfectant

Evaluating a Disinfectant

The image shows three petri dishes. The first (left) is for Staphylococcus aureus and shows disks for Chlorine, Hexachlorophene, O-phenylphenol, and Dust. The second (middle) is for Escherichia coli and shows disks for Chlorine, Hexachlorophene, O-phenylphenol, and Dust. The third (right) is for Pseudomonas aeruginosa and shows disks for Chlorine, Hexachlorophene, O-phenylphenol, and Dust. The Chlorine disk shows the largest zone of inhibition in all three.

Phenols, Phenolics and Bisphenols

- Lister's Carbolic Acid
- Phenolics
 - Less irritating
 - Damages lipid-rich plasma membranes
 - *Mycoplasma*
 - Active in presence of organic compounds
 - Lysol
- Bisphenols
 - 2 phenol rings
 - Hexachlorophene
 - Effective: Gram +ve Staph + Strep
 - Triclosan




Biguanides

- Chlorhexidine
- Broad spectrum antiseptic
 - Surgical prep
- Disrupts plasma membrane
- Effective against most vegetative bacteria
- Not effective:
 - Mycobacteria
 - Endospores
 - Protozoan cysts




- Antiseptic
- Effective against
 - All kinds of bacteria
 - Many endospores
 - Various fungi
 - Some viruses
- Damages: Enzymes?
- Tincture
- Iodophor
 - Betadine
 - Isodine

Iodine



- Cl₂ gas Dissolves in H₂O → Hypochlorous acid
- Oxidizing agent
 - Affects proteins with sulfhydryl (SH) groups
 - Nucleic acids
 - Swimming pools
- Drinking water
- Sodium hypochlorite NAOCl
 - Clorox
 - Chloramines
 - Sanitize glassware

Chlorine



Ethylene Oxide

- Gas
- Used to sterilize objects too large to autoclave
- Mattresses
- Space shuttles



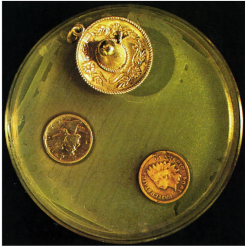
Aldehydes

- Inactivate proteins
- Formaldehyde
 - Less irritating
 - More effective
- Glutaraldehyde
 - [2%] bactericidal, tuberculocidal, viricidal in 10 mins
- Disinfect hospital instruments
 - Sporicidal 3-10 hours
- OPA ortho-phthalaldehyde



- Biocides
- Silver
 - Silver impregnated dressings
 - Silver sulfadiazine
- Mercury chloride
 - Bacteriostatic
 - toxic
- Copper sulfate
 - Algicide
 - Reservoirs
 - Swimming pools

Heavy Metal



Quaternary Ammonium Compounds

- Strongly bactericidal v Gram + ve
 - Fungicidal
 - Amoebacidal
 - Envelope viruses
- Not effective
 - Endospores
 - Mycobacteria
 - *Pseudomonas* actively grows in them
- Zephiran
- Cepacol
- Antrimicrobial
- Colorless, odorless, tasteless



- Retard food spoilage
- Sodium nitrite
 - Bacon
- SO₂
 - wine
- Sodium benzoate
 - Acidic foods
 - juices + sodas
- Sorbic acid
 - Cheeses + wines
- Calcium propionate
 - Inhibits molds
 - bread

Chemical Food Preservatives



- Oxidizing agents
- Ozone
 - Drinking water
- Hydrogen Peroxide
 - Sporicidal
 - Sterilization of contact lenses
- Benzoyl Peroxide
- Peracetic acid
- Legionella

Peroxygens