

Antiseptics and disinfectants

By

Aziza Mahrous Mohamed Amer

EX-Dean, Prof. of Pharmacology,

Faculty of Veterinary Medicine,

Cairo University, Giza, Egypt.

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I.DEFINATIONS

II.TYPES

1.OXIDIZING AGENTS, Peroxides,

Pot.Permanganates, Halogens

2.REDUCING AGENTS, Sulphur Dioxide,

Aldehydes, Formaldehydes, Glutraldehydes

3.METALIC COMPOUNDS

4.ACID AND ALKALIS

5.ALCOHOLS

6.PHENOLS, CRYSOLS AND XYLENOLS

7.MISCELLANEOUS ORGANIC COMPOUNDS

8.DYES

9.DETERGENTS

DEFINATIONS

- Antiseptics: Agents Used On Human And Animals To Kill Or Prevent Multiplication Of Infective Agents(Bacteria,viruses, fungal, protozoa,)
- Disinfectants: Agents Applied on Inanimate Objects to Destroying Pathogens(Bacteria,viruses, Fungal, Protozoa,) on Building, Feeding Utensils, Surgical Instruments,etc.

SURFACE – ACTIVE AGENT (SURFACTANTS)

Surfactants: is a chemical agent that lower the surface tension of an aqueous solution. [ionic, nonionic or amphoteric].

Properties: **Detergents:** 1- Emulsifying agent
2-Cleansing (Also posses Antibacterial activity) (Cleansers).

Wetting
Spreading
Penetrating
Foaming or non foaming
Cleansing

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TYPES OF DETERGENTS

1- Anionic detergents (Active in slight acidity)

Properties:

- Reducing surface tension
- Emulsifying
- Possessing some antibacterial properties

e.g.

- Soap
- Sodium or potassium oleates
- Calcium and ammonium mandates and sodium lauryl sulphate

2- Cationic detergents (Active in alkaline pH)

Properties:

- **Sanitizing activity**
- **Bactericidal activity**
- **Cleaning**

e.g.

- **quaternary ammonium compounds**
- **Benzalkonium chloride**

3- Amphoteric detergents (nonionic surfactant) e.g. nonyl phenyl ethoxylate

Types of chemical disinfectants

1- Oxidizing Agents

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graph TD; A[1- Oxidizing Agents] --> B[• Release gaseous (nascent) oxygen]; A --> C[• Those cause oxidation without release of oxygen gas]; B --> B1["• (Peroxides) H2O2"]; B --> B2["• Sodium perborate Benzyl peroxide"]; C --> C1["• Halogens iodine sodium hypochlorite & chlorine"]; C --> C2["• Potassium permanganate"];
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- Release gaseous (nascent) oxygen

- (Peroxides) H₂O₂

- Sodium perborate Benzyl peroxide

- Those cause oxidation without release of oxygen gas

- Halogens iodine sodium hypochlorite & chlorine

- Potassium permanganate

a. Hydrogen peroxide

- **Gerimicide activity (contact with organic matter)**
- **Deodorant**
- **Action persists only as long as oxygen being produced**
- **Activity in presence of organic matter is transient and considerably reduced**
- **Mostly used as mechanical antiseptic for sepses and purulent wounds**

N.B. H₂O₂

- **It is active against some gram-negative and gram+ve aerobic bacteria. It inhibits growth of anaerobic organisms but does not destroy bacterial spores in cones. That are nontoxic to tissues**

- **The duration of germicidal action is very brief (unstable solution)**

- **50 volume solution requires 5 mins. To kill spores and 1 mins to kill pyogenic cocci**
- **Not used as them fogging**
- **Irritant**
- **Corrosive**
- **Decomposes in presence of alkaline media, in contact with organic matter and metals.**

b. Potassium permanganate

- **Relative strong antibacterial (antiseptic + disinfectant)**
- **Unstable in solution (fresh preparation)**
- **If solution is changed from purple colour to chocolate colour, this means that the preparation has lost most of its activity .**
- **Activity is lost just after contact with organic matter**
- **1:1000 solution** → **wound + mouth wash .**
- **5% solution** → **foot bath**

b. Potassium permanganate

- **Fumigant + P. Permanganate 20 ML of 40% sol. Formaldehyde 45-90g pot. Permanganate + hot water (for m³) for incubator, hatcheries, houses.**
- **It has no detergent activity.**

2.HALOGENS:

IODINE + CHLORINE PREPARATIONS

- They are in-expensive bactericidal, fungicidal and viricidal.
- Iodine is more stable in organic matter than chlorine and bromine.

a. Iodine preparations as disinfectant:

- Iodine itself as solution is more stable than other halogens antiseptic solution is Tr. Iodine lugal's iodine.

Disinfectant preparation:

- Iodine + acid + surfactants (nonionic)
- Iodophore (iodine + polyvinyl pyrrolidene) iodine bearers + detergents wetting agent, solurbizers.

Iodine not less than 2.75% active

- **Phosphoric acid +: detergent + antimicrobial**
- **Sulphuric acid +: enhance antibacterial activity to obtain maximal activity for penetration of naked + coated viruses and spores.**
- **Nonionic surfactants (+): Detergents helps iodine for penetration and to be stable in organic matter.**
- **Cleaning + disinfection 1:400 and disinfection 1:300**
- **Egg spray 1:400 (for obtaining wetting and cleaning) utensiles: (1:300) teat disinfection (1:300) drinking water 1:2500.**

Disadvantages

- **Affected by organic matter**
- **Staining**
- **May be corrosive if not well diluted with water for obtaining correct concentration.**
- **Influenced by hard water.**
- **Lost its activity in traces of alkaline media (anionic surfactants)**

b.Chlorine:

- Antibacterial activity
- Viricidal
- Fungicidal activity
- Protozoacidal activity
- Deodorizing activity

Used in form : sodium hypochlorite solution unstable due to slowly released chlorine in presence of organic matter



All chlorine releasing agents are rapidly inactivated in presence of organic matter (soil, faces, etc..)

- **Chlorinated lime Mixture of:**

- **(Potassium hypochlorite + calcium chloride bleaching powder)**

- **(Deodorant): rapidly deteriorated**

- **Must freshly prepared or tightly closed container are used to prevent release of chlorine gas. (poisonous) (170g/3.8 liter used for disinfection 5% solution used for destroy Newcastle virus**

- Chlorine preparation are used to treat swimming pools and drinking water.

c. Sodium Hypochlorite Solution

- Containing 2-5% chlorine used as 0.5
- Laundering clothes
- Disinfection of daily utensils
- Irrigation for dirty wounds
- disinfection of inanimate objects in infectious diseases (anthrax, T.B. tetanus)
- Disadvantages: inactivated in organic matter, hard water, acids, unstable in alkaline media.

3-ALCOHOLS

4-PHENOLS AND CRESOLS

a-PHENOL

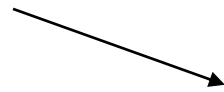
- **Carbolic acid**
- **Protoplasmic poisons**
- **Irritant + corrosive action**
- **Destructive to most germs**
- **Slow inactivated by organic matter, 5% solution used as disinfectant (general) but not a rapid killer to spores**
- **Very toxic.. not safe.**

- **Limited in use**
- **N.B. usually evaporated with heat**
- **Not authorized in the presence of food, even for animals & poultry.**
- **Sporicidal activity are insufficient (in active on naked viruses**
- **Disinfection limited to pH less than 4 and more than 7**
- **Inactivated by non ionic surfactants **11** not used in food processing industry**
- **Cresol**
- **Cresol + soap = lysol**
- **Like phenol**

5-ACIDS AND ALKALIES

a.Acids:

Sulphoric acid



Phosphoric acid



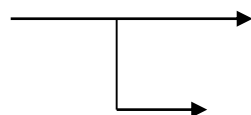
iodine + iodophore helper

- **Germicide detergent**
- **Used with iodine or iodophore in non ioxic or corrosive**
- **Compatable with ionic and non ionic surfactants or detergents**
- **Their corrosive action limited their used in inanimate purpose**

b.Alkalies:

1- Sodium hydroxide (lye) 440 g/20 L 2% as solution detergent and disinfection of soil killing of oocytes + cleansing)

2- Quick lime (calcium oxide)

**3- Sodium carbonate 4% (Disinfection +cleansing)
inactive In hard water**  **Corrosive
Irritant**

6-reducing agents

e.g.

1- Formaldehyde 4. Glyoxal

2- Gluteraldehyde

3- Sulphur dioxide

Formaldehyde solution USP (formalin hydrophilic) (40%)
broad spectrum activity



Viricidal

Bactericidal, Fungicidal

Bactericidal conc 1-2% of gas 4% kill anthrax spores in 15m.

Advantages:

Powerful germicidal

Not affected with organic matter

Not react with metals, plastic pipe biodegradabl

Disadvantages: Toxic , irritating, carcinogenic (1987)

a. Glutaraldehyde

 **Coated**
Naked

**Even T.B. pseudomous,
klebsiella IB, Pox ILT, FMD,
gumbro**

- **Fungicidal activity**
 - **Sporocidal activity**
 - **Protozoacidal activity**
 - **Non irritant**
 - **Biodegradable**
 - **Non corrosive**
 - **Non toxic** • **Non staining**
 - **Active in presence of organic matter**
 - **Most effective when used in 2% in buffered sol. PH. 7.5-8.5**
- Destruction of coccidial oocysts**

Thank you

Aziza Mahrous