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TOPICAL ANTI- INFECTIVES

(ANTISEPTICS & DISINFECTANTS)

Definitions

Antiseptics can be defined as antimicrobial agents which can be applied on the body of living organisms to inhibit the action of microbes. They are not injected into the body like the antibiotics, rather they are applied on the surface of the skin to heal the living tissues in case of wounds and cuts.

Dettol is the most commonly used antiseptic. It is a mixture of chloroxylenol and terpineol. Iodoform is also used as an antiseptic for wounds.

Disinfectants can be defined as an antimicrobial agents that can be applied on the surface of some objects in order to destroy the microorganisms residing on it.

The Difference between Disinfectants and Antiseptics

Disinfectants and antiseptics are both used for killing the microbes but still, there is a difference between them.

- An antiseptic is used for killing the microbes on the living tissues whereas a disinfectant is applied on a non-living object.
- Secondly, the concentration of both differ. We can use the same chemical as a disinfectant and an antiseptic by varying its concentration.
- For example, phenol can be used as an antiseptic if its concentration is 0.2 per cent but to use it as a disinfectant the concentration should be 1 per cent.
- We can broadly conclude that the cleaning products contain disinfectants and the healing products (for curing the living tissues) contain antiseptics.
- Both are similar in nature but vary in their concentration. Lysol is a disinfectant whereas Dettol is an antiseptic.

Sterilization refers to any process that removes, kills, or deactivates all forms of life (in particular referring to microorganisms such as fungi, bacteria, viruses, spores, unicellular eukaryotic organisms such as Plasmodium, etc.)Sterilization can be achieved by a combination of **heat**, chemicals, irradiation, high pressure and **filtration** like **steam** under pressure, dry **heat**, ultraviolet **radiation**, gas vapor sterilants, chlorine dioxide gas etc.

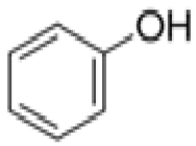
Classification of Anti-infectives

Phenol	Phenol, xylenol, chlorphenols, chlorxylenols,,etc....
Alcohols	Etanol, isopropanol,lso propyl alcohol, amyl alcohol, etc....
Aldehydes	Formaldehyde, glutaraldehyde,
Dyes	Acridine, triphenylmethane, acriflavine, proflavine, crystal violet, etc
Surface active agents	Cetremide, sodium stearate, sorbiton, tween 80, etc...

PHENOL

- Phenol is an aromatic organic compound with the molecular formula C_6H_5OH.
- It is a white crystalline solid that is volatile.
- The molecule consists of a phenyl group ($-C_6H_5$) bonded to a hydroxy group (−OH).
- Mildly acidic, it requires careful handling because it can cause chemical burns.

Structure & IUPAC name



Hydroxybenzene

Properties

- Bromination or chlorination of phenol leads to substitution on all carbon atoms ortho and para to the hydroxy group, not only on one carbon.
- Phenol reacts with dilute nitric acid at room temperature to give a mixture of 2-nitrophenol and 4-nitrophenol
- With concentrated nitric acid, more nitro groups get substituted on the ring to give 2,4,6-trinitrophenol which is known as picric acid.
- Aqueous solutions of phenol are weakly acidic and turn blue litmus slightly to red.
- Phenol is neutralized by sodium hydroxide forming sodium phenate or phenolate, but being weaker than carbonic acid, it cannot be neutralized by sodium bicarbonate or sodium carbonate to liberate carbon dioxide
- When a mixture of phenol and benzoyl chloride are shaken in presence of dilute sodium hydroxide solution, phenyl benzoate is formed.
- When phenol reacts with iron(III) chloride solution, an intense violet-purple solution is formed.

Uses

- Phenol was once widely used as an antiseptic
- Concentrated phenol liquids are commonly used for permanent treatment of ingrown toe and finger nails.
- Phenol in medicinal formulation is also used as a preservative in some vaccines.
- Phenol spray, usually at 1.4% phenol as an active ingredient, is used medically to help sore throat.
- It is the active ingredient in some oral analgesics such as Chloraseptic spray, commonly used to temporarily treat pharyngitis.

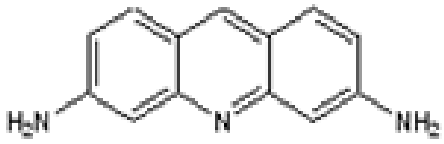
Storage

Stored in a cool, dry, well-ventilated area, away from heated surfaces or ignition sources.

PROFLAVINE

- It is also called as proflavin and diaminoacridine.
- It is an acriflavine derivative.
- It is a disinfectant bacteriostatic against many gram-positive bacteria.
- It has been used in the form of the dihydrochloride and hemisulfate salts as a topical antiseptic.
- It was formerly used as a urinary antiseptic.

Structure & IUPAC name



acridine-3,6-diamine

Storage

- Proflavine solutions stored under refrigeration were physically and chemically stable for at least 12 months.
- However, in solutions stored at room temperature increased turbidity and particulates were observed.
- Solutions stored at room temperature were chemically stable up to six months.

Uses

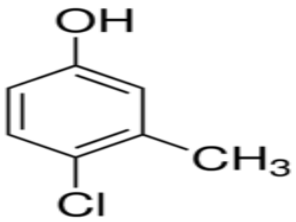
Proflavine is toxic and carcinogenic in mammals and so it is used only as a surface disinfectant or for treating superficial wounds.

CHLOROCRESOL

- Chlorocresol is the organic compound with the formula ClC_6H_4OH.
- It is a monochlorinated *m*-cresol.
- It is a white or colorless solid that is only slightly soluble in water.
- As a solution in alcohol and in combination with other phenols, it is used as an antiseptic and preservative.
- It is a moderate allergen for sensitive skin.

Structure & IUPAC name

4-Chloro-3-methylphenol



Properties

- It is a nearly white solid with a slightly phenolic odor which melts at 64.2°C and decomposes around 240°C.
- It is not highly flammable, does not have oxidizing and explosive properties and does not undergo spontaneous combustion.
- It is not surface active.
- It is a white or colorless solid that is only slightly soluble in water.

Storage

Chlorocresol should be kept in a well-closed container, protected from light.

Uses

As a solution in alcohol and in combination with other phenols, it is used as an antiseptic and preservative.