

Aim: To prepare hand sanitizer.

Theory:

Types of Hand sanitizer on the Basis of form

Gel

Form

Cream

Spray

Wipe

Types of Hand sanitizer on the Basis of Chemicals used

Alcohol based (ABHS)

Alcohol free

→ 60-95% V/V alcohol

alcohol — {
→ Ethanol
→ Isopropanol
→ n-propanol

• Antiseptic

→ Chlorohexidine

→ Chloroxylenol

→ Iodine / Iodophors

→ Quaternary ammonium compounds

→ Triclosan.

→ H_2O_2

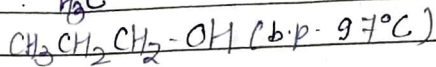
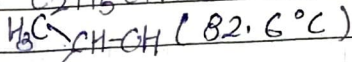
→ Glycerine

→ Fragrance

→ Colourant

Role of Various Chemicals:

1. Alcohol: e.g. C_2H_5OH ($78.37^\circ C$)



→ Denaturation of proteins in the plasma membrane.

2. Chlorine Compounds:

e.g. Hypochlorites (ClO^- e.g. $NaOCl$)



Chloramine-T trihydrate ($C_7H_7ClNNaO_2 \cdot 3H_2O$)

→ Halogenation / oxidation of cellular proteins.

3. Iodine Compounds:

e.g. Povidone-iodine (polyvinylpyrrolidone with iodine)

→ Iodine can easily penetrate through the cell membranes of pathogens followed by attacking vital proteins, nucleotides and fatty acids of cell.

4. Quaternary Ammonium Compounds:

→ Lower surface tension

→ Inactivate enzymes

→ Degrade cell proteins

5. Peroxygens: e.g. H_2O_2
free-radical oxidation of cell components.

6. (Bio)phenols: e.g. Triclosan
penetrate cytoplasmic bilayer

7. Biguanide: e.g. chlorhexidine
→ Ionic interaction
→ Disrupt cell membrane.

8. Glycerol: Act as a humectant that maintains the skin moisture.

9. Essential Oils:
Antibacterial
Antiviral
antimicrobial and antiseptic properties.
→ flavoring agent.

WHO Recommended Sanitizer:

Ethyl alcohol based

Reagent: Ethanol 80% (V/V)
Glycerol 1.45% (V/V)
 H_2O_2 0.125% (V/V)

Isopropyl based (75% V/V)

~~96%~~ $\rightarrow$ 99.8% we have.

Conc. of Chemical we have.

$\rightarrow C_2H_5OH$ 96%
 $\rightarrow$ Glycerol 98%
 $\rightarrow H_2O_2 \rightarrow 3\%$

Calculation:

$$\text{Reagent requirement} = \frac{\text{Final volume required} \times \% \text{ of Chemical required}}{\text{conc. of Chemical we have.}}$$