

PIOC, UNIT- 3: ANTI-MICROBIALS

OFFICIAL COMPOUNDS

1. BORIC ACID,
2. CHLORINATED LIME,
3. HYDROGENPEROXIDE,
4. IODINE,
5. POTASSIUM PERMANGANATE

Definition

Agents used to inhibit the growth or kill the micro-organism as they can cause infection. Example: bacteria, virus, fungus, etc

Classification:

Inorganic compounds

1. Halogens	Iodine, Lugol's solution, Bovidone-iodine, chlorhexidine
2. Oxidizing agents	Hydrogen peroxide, Potassium permanganate
3. Acids and alkali	Boric acid Salicylic acid, ammonia
4. Metallic salts	Silver nitrate, copper sulfate, zinc oxide

Unit III GIT
Antimicrobials

Anti-infective agents?

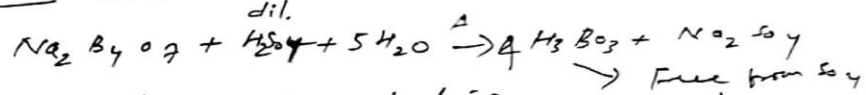
- reduce or prevent infection due to
- 1 - bacteria - bactericide
 - 2 - fungi - fungicide
 - 2 - pests - parasiticide
 - 4 - parasites - parasiticide

- ① Boric acid - H_3BO_3 GI: B3
- ② Chlorinated lime | : $CaClO_4$:
- ③ Hydrogen peroxide: H_2O_2 :
- ④ Iodine : I_2 :
- ⑤ pot. Permanganate: $KMnO_4$: 15B03

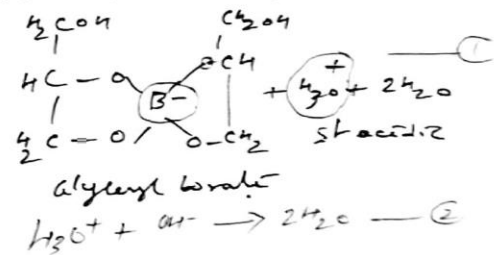
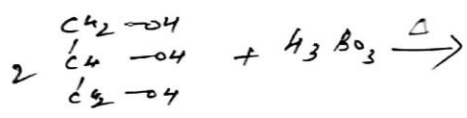
Note: antiseptic - oxidising process
 (only for topically not for orally)

① Boric Acid - volcanic steam from c removed & purified
 - Tuscany (Italy)

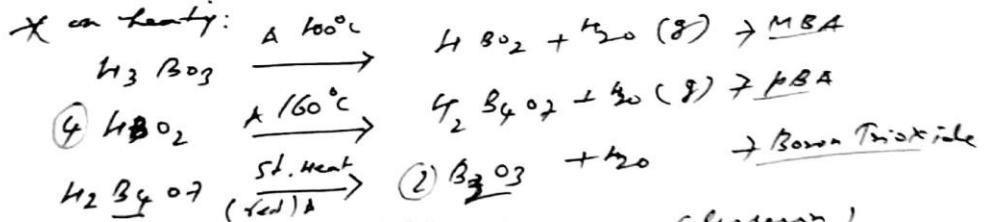
Synthesis: Lab:



Prop: Sparingly soluble in water (1:20)
 Hot 1) (1:3.5)
 alcoh: (1:16) (1:4 in glycerine)
 - 1.9% w/v solⁿ: isotonic in blood fluid
 - Weak acid & H_2CO_3
 - Form ester in poly hydroxyl alcohols (glycerol)



Stab: %: 99.5%



Assay: Acid-base titⁿ: (presence of glycerol)
 using phenolphthalein

Use: anti-infective agent (locally)
 - dusty powder
 - anti-septic cream/ointment/lozenge
 - 1% chlorinated soda or chlorinated lime
 - as buffer

Storage: clearly in not for internal use
 well-closed container

Chlorinated lime
pot permanganate

(2) Chlorinated lime: 142.98
9/mo

Prepared by the action of chlorine gas (Cl₂) on slaked lime. $Ca(OH)_2 + Cl_2 \rightarrow Ca(OCl)_2 + H_2O$
Calcium chloro hypochlorite (CCHO)
 $Ca(OCl)Cl \Rightarrow$ "bleaching powder"

Prop: - white powder, gradually decomposing on air liberating Cl₂



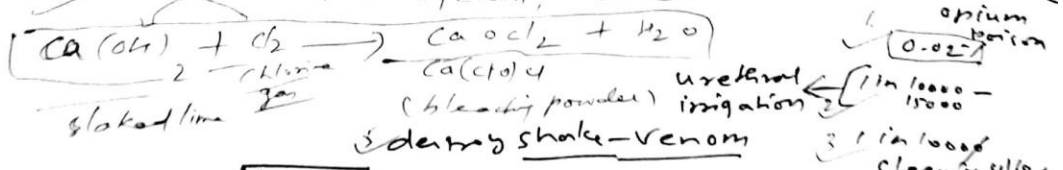
properties: partially soluble in water/alcohol

Storage: container should be unaffected by chlorine & lime protected from light/heat/moisture

Std: it has about 30% w/w of available chlorine

Assay: Iodo-metric titrimⁿ in which liberated I₂ from iodine water acidified tit against Na₂S₂O₃

Use: - typical anti-infective
- source of chlorine for prep of chlorinated lime NaOCl
- as a germicidal & disinfectant
- Toilet
- Swimming pools
- bathroom
- Textile industry
- beach cloths
- water sanitation
- Stychnine
- opium
- heroin
- 0.02%

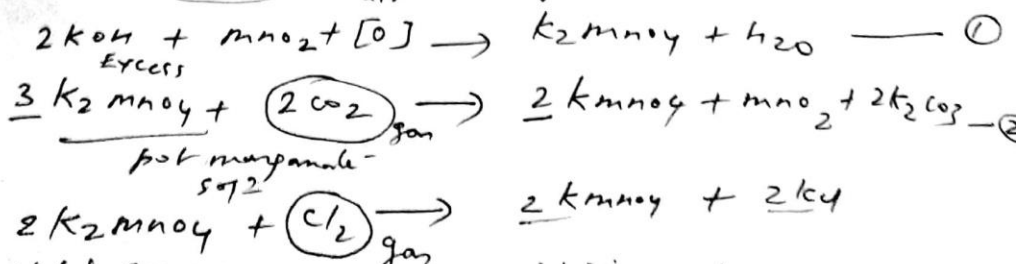


H₂O₂

24.016

(5) KMnO₄ 158.03

air freely supply + potassium/pot. chlorate



* Dark violet crystals \rightarrow powerful oxidizing agent

"Chile Salt Peter"

Sea Weeds

1. NaIO_3 = Sod. iodate (4) Iodine I.P.
2. NaHSO_3 = Sod. bisulfite
3. Na_2SO_4 = Sod. Sulfate
4. NaI = Sod. Iodide
5. $\text{K}_2\text{S}_2\text{O}_8$ = Sod. tetrathionate

253.8 (MM)
12679

Source:

Mother liquor containing salt peter [Nitrate mineral]



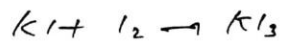
Properties:

black black metallic lustre = metalloid.

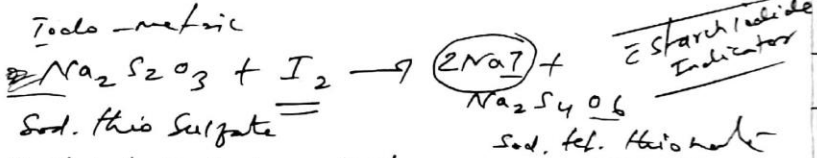
- 1 in 400 - water
- 1 in 125 - glycerin
- 1 in 10 - alcohol

freely soluble in
St. Iodine

titated & purified by sublimation
 $\left[\begin{array}{l} \text{CHCl}_3 \\ \text{CCl}_4 \\ \text{CS}_2 \\ \text{C}_2\text{H}_5\text{O}-\text{C}_2\text{H}_5 \end{array} \right]$



Assay:



Storage:

well closed container & stopper glass.

Use:

In Hospital

- 1 -> 2-1. 5% Iodine in water & KI
- 2 -> St. Iodine $\left[\begin{array}{l} 10\% \text{ w/v } \text{I}_2 \\ 6\% \text{ w/v } \text{KI in alcohol} \end{array} \right]$
- 3 -> Weak Iodine $\left[\begin{array}{l} 2.5\% \text{ } \text{I}_2 \\ 2.5\% \text{ } \text{KI in alcohol} \end{array} \right]$
- 4 -> Aqueous Iodine [Lugol's 5%]

$\left[\begin{array}{l} 5\% \text{ } \text{I}_2 \\ 10\% \text{ } \text{KI in water} \\ \text{or } \text{NaI} \end{array} \right]$

5. Mandl's pain 1.25% w/v of Iodine in Glycerin

6 as Antiseptic / germicidal / bactericidal disinfectant in pharyngitis

Throat paint

"Lizal acid base"
 St. Iodine 5%
 5% Iodine Iodine
 7% "Starch Iodine"

Povidone-iodine Betadine ^{soft}
 PVP-iodine or ^{gel}
 poly vinyl-pyrrolidone-iodine ^{ointment}
 9-12% 10% iodine is absorbed ^{aerosol}
 powder dressing

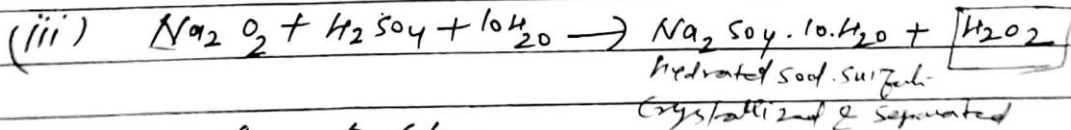
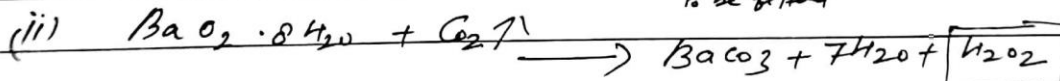
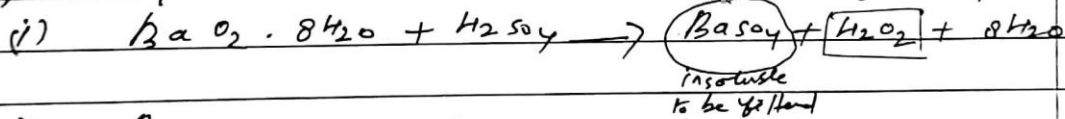
- yellowish brown powder
- Soluble in water / 0.4
- bacteria
- fungi
- protozoa

- Iodophores

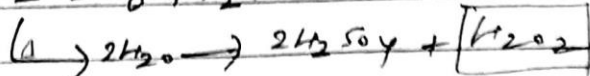
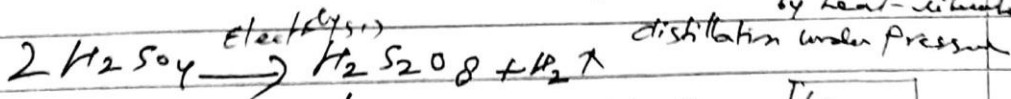
other similar compound: 1- poly-ox-ethylane
 2- Monoxinol
 3- Cadexomer

(3) H₂O₂ IP/USP (34.01 MM)

Method of preparation / A small scale form "Barium peroxide" ^{dit. acid}



Large scale: from 50% H₂SO₄ → per sulfuric acid → decomposed by heat-released H₂O₂



90% purity only obtained

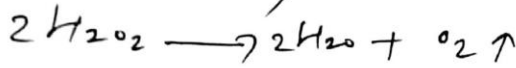
offered H₂O₂ : 27% w/w (100%)
 10% w/w (100%)

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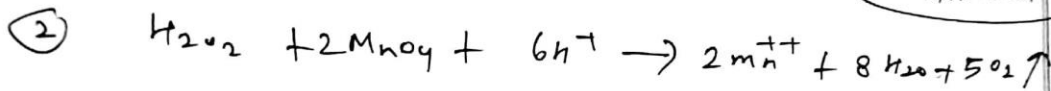
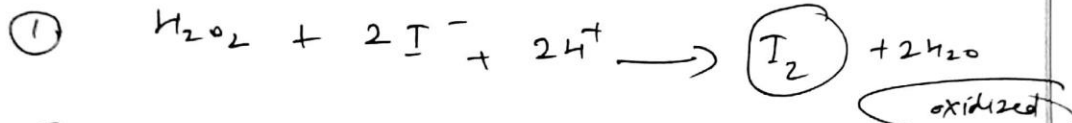
Date / /

Iodine.....

Properties: colourless / odourless / tingling sensation & fast
* highly unstable - decompose due to $O_2 \uparrow$ liberation



Redox reaction:



Uses: → Nascent oxygen for oxidation purpose

→ disinfectant / mild antiseptic

→ deodorant or (mouth wash 3% or less) cleaning wound ear by (20 vol)

→ domestic cleaning sol. sol: 15%

foaming action can be used for cleaning wound

help: Catalase

enzyme
hasten decay of H_2O_2
promote antiseptic action.