Experiment no - 1

OBJECT :- To determine the percentage of available chlorine in the given sample of bleaching powder (iodometrically).

REQUIREMENTS :- Potassium Iodide, Bleaching Powder, Glacial acetic acid, N/10 sodium thiosulphate solution, water sample, freshly prepared starch solution, Burette, Pipette, Measuring flask etc.

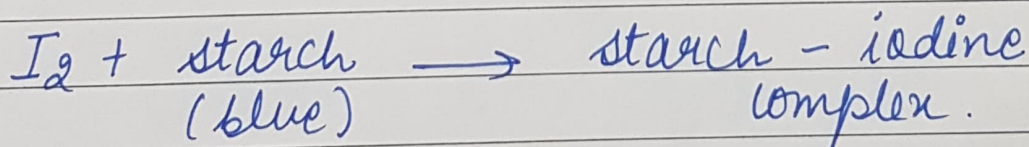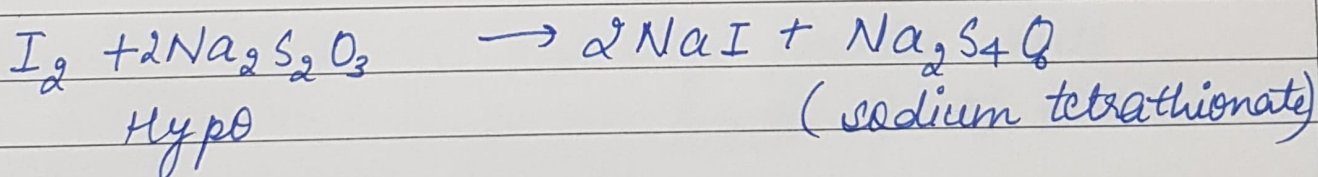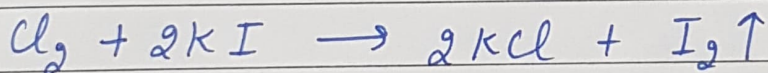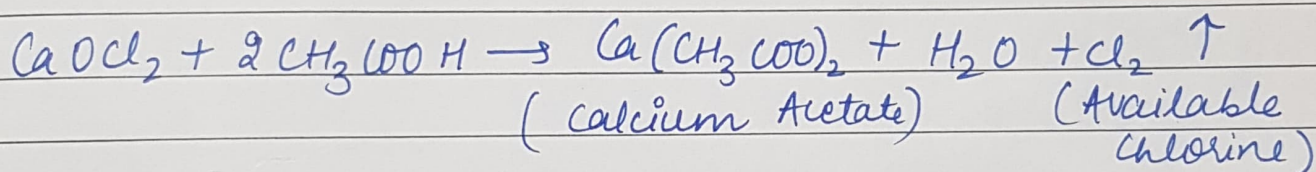**INDICATOR :-** Freshly prepared starch solution.

PRINCIPLE :- The available chlorine is the amount of chlorine liberated by the action of dilute mineral acids and expressed in terms of percentage weight of bleaching powder.

Bleaching powder is a mixture of calcium hypochlorite [$Ca(OCl)_2 . 4H_2O$], basic calcium chloride [$CaCl_2 . Ca(OH)_2 . H_2O$] and some free calcium hydroxide [$Ca(OH)_2$]. The calcium hypochlorite is responsible for disinfection and bleacing action of bleaching powder. When dilute HCl reacts with bleaching powder then free chlorine

is liberated and gives hypochlorous acid responsible for disinfection and bleaching action
The estimation depends upon fact that when a suspension of bleaching powder is acted upon by glacial CH_3COOH in presence of KI solution, the liberated chlorine reacts with KI solution giving free iodine. This free iodine is titrated against standard sodium thiosulphate solution using starch as an indicator. This is an iodometric titration.

$$Ca\,OCl_2 + 2\,CH_3COOH \longrightarrow Ca(CH_3COO)_2 + H_2O + Cl_2 \uparrow$$
         (calcium Acetate)   (Available chlorine)

$$Cl_2 + 2KI \longrightarrow 2KCl + I_2 \uparrow$$

$$I_2 + 2Na_2S_2O_3 \longrightarrow 2NaI + Na_2S_4O_6$$
  Hypo   (sodium tetrathionate)

$$I_2 + starch \longrightarrow starch - iodine$$
   (blue)   complex.

OBSERVATION:- vol of hypo solution used for 10 ml of bleaching powder (V_2) = 10.4 ml

OBSERVATIONS:-

SNO	Volume of Sample taken (ml)	Burette Reading (ml)		Volume of N/10 hypo solution used (ml) (V_2) ml.
		Initial	Final	
1	10	0.0	10.0	10.0
2	10	10.0	20.0	10.0
3	10	20.0	30.4	10.4

volume of hypo solution used for 10 ml
of bleaching powder (V_2) = <u>10.4</u> ml.

CALCULATIONS :

1 gm equivalent of available chlorine $\cong$ 1 gm. Equivalent of hypo solution.

$$N_1 V_1 = N_2 V_2$$

B.P.　　Hypo.

(BP $\to$ Bleaching Powder).

$$N_1 \times 10 = \frac{1}{10} \times V_2$$

$$N_1 = \frac{\text{Volume of hypo used}}{10 \times 10} = \frac{10.4}{100} = 0.104$$

Available chlorine or amount of chlorine per litre of solution $= N_1 \times 35.5$ g/L

1 L of bleaching powder gives $= N_1 \to$ solution contains w gms of bleaching powder or

w gms of bleaching powder gives $= N_1 \times 35.5$ g of chlorine.

Therefore, 100 gm of bleaching powder will give $= \frac{N_1 \times 35.5 \times 100}{W}$ g of chlorine.

(W = weight of B.P. = 12g)

So % of available chlorine = 30.766 %

RESULT :—
The available chlorine in a given sample of bleaching powder = 30.766 %

PRECAUTIONS :-

(1) All reagents should be freshly prepared.

(2) The glass apparatus should be washed first with chromic acid and then with distilled water.

(3) The amount of starch indicator should be same in all titrations.

(4) The end point of titration should be carefully observed.