



## EXPERIMENT - 5

ESTIMATION OF ACTIVE CHLORINE  
CONTENT IN BLEACHING POWDER

**Aim:** to estimate the amount of active chlorine content present in the given bleaching powder sample using standard hypo solution (Iodometric method)

**APPARATUS:** 250 ml conical flask, 10 ml pipette, 50 ml burette stand with clamp, glazed tile, 100 ml volumetric flask, measuring jar, wash bottle etc.

**CHEMICALS REQUIRED:** Standard Copper Sulphate solution, 10% KI solution, hypo solution, glacial acetic acid and bleaching powder sample.

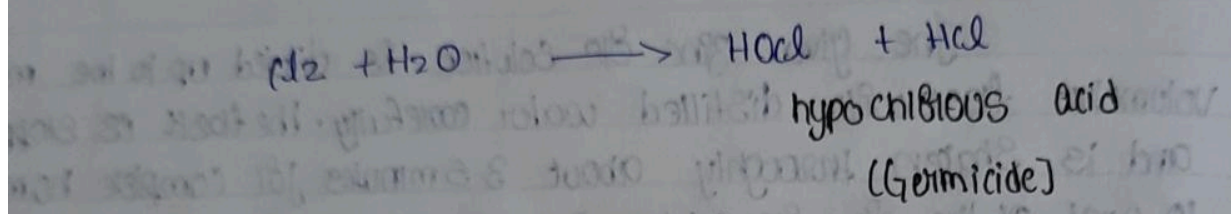
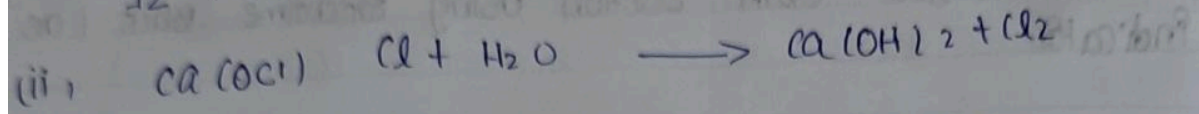
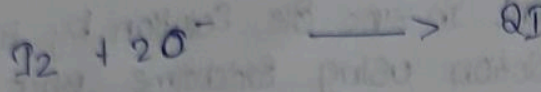
**INDICATOR:** 1% Starch solution

**END POINT:** Blue to colourless

**THEORY:** the available chlorine content in a bleaching powder sample can be estimated with hypo by iodometric method based on the reaction given below while it involves the conversion of elemental iodine as given by (i)

Bleaching powder contains a mixture of calcium hypochlorite and calcium chloride. The active component of bleaching powder is calcium hypochlorite  $\text{Ca}(\text{OCl})_2$  which is responsible for the bleaching action.





Report: The amount of free present in the given solution is 0.300 g.





bleaching powder Bleaching powder which is a good disinfectant hypochlorous acid inactivates certain enzymes in the cell of leading to their death available in chlorine in liberates active chlorine which in turn liberates iodine from iodine quantitatively.

Hence available chlorine can be determined iodometrically by adding KI and acetic acid to suspension of bleach powder in distilled water the liberated chlorine in the presence of acetic acid releases iodine from potassium iodine solution quantitatively and the liberated of known concentration. as a hypo solution is not a primary standard it is standardized with standard copper (Cu) solution as was mentioned above.

**PROCEDURE:-** The given bleaching powder sample solution is 100 volumetric flask is shaken thoroughly for complete homogenization the burette is filled with hypo solution the pipette is filled with bleaching powder sample solution and 10 ml of same is pipetted out into a clean 250 ml conical flask to which 10 ml of glacial acetic acid and 10 ml of 10% KI solution is added followed by 40 ml of distilled water down the inner wall of the conical flask the contents of the conical flask are mixed well by swirling the conical flask. liberation of iodine from potassium iodide by active chlorine is almost complete in the dark brown solution in the conical flask. taken in



**TABLE**  
**ESTIMATION OF AVAILABLE CHLORINE CONTENT IN BLEACH**

SNO	vd of bleach of soln pipette ml (V <sub>3</sub> )	Burette	Readings	vd of hypo standard ml (V <sub>2</sub> )
1	10.0	0.0	9.3	9.3
2	10.0	9.3	18.6	9.3

**CALCULATIONS:-** the concentration of available chlorine is calculated using

the equations  $N_2 V_2 = N_3 V_3$

$N_2$  = normality of hypo solution = 0.05058N

$V_2$  = Volume of hypo standard from burette = 9.3ml

$V_3$  = volume of bleach sample solution pipetted out = 10.0ml

$N_3$  = normality of "available chlorine" in bleaching powder sample

$$\frac{N_2 V_2}{V_3} = \frac{9.3 \times 0.05058}{10} = 0.04704N$$

$\therefore$  Normality of available chlorine content in bleaching powder;

$$N_3 = 0.04704N$$

Available chlorine present in 100ml bleaching powder sample

$$X = \frac{N_3 \times \text{eq wt of Cl} \times 100}{1000} = \frac{N_3 \times 35.45}{10} = 3.545 \times N_3$$

$$= 0.1668$$

Amount of bleach sample taken;  $y = 0.5005g$

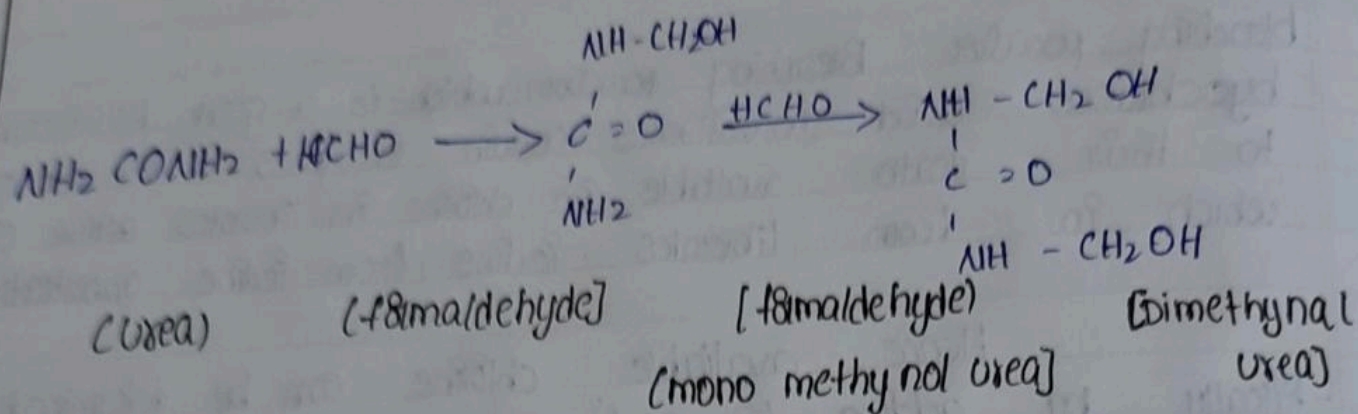
% of available chlorine bleaching powder =  $\frac{X \cdot 100}{y}$

$$= \frac{0.1668 \times 100}{0.5005} = 33.33\%$$

until the colour solution changes from dark brown to light yellow at this stage 2ml of 1% of indicator is added. the solution with hypo is continued until the blue solution to disappear two successive concurrent tiles are obtained and the readings are recorded in table and the available chlorine content is calculated as shown in table.

Report:- percentage of available chlorine content in bleaching powder = 33.33%

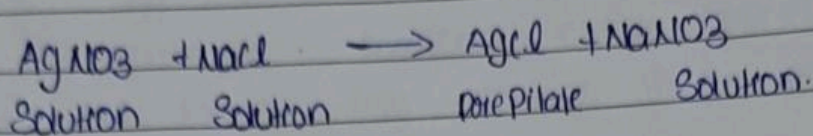








reactions:-



Usually the strength of a soln is expressed either in molarity or in normality. A molar solution (1M) is one which contains one gram molecular weight of the reagent per litre of sol; the gram equivalent weight varies with the type of the reaction, the same compound passes, different gram equivalent weight in different context.

In neutralisation reactions, the gram equivalent weight of an acid is obtained by dividing the gram molecular weight of it by the number of replaceable hydrogen ions that it contains. For example the gram equivalent weight of HCl is its given mass is its gram molecular weight divided by (36.45/1) while that of  $\text{H}_2\text{SO}_4$  is its gram molecular weight divided by 2 as it contains two replaceable hydrogen ions. Similarly the gram equivalent weight of a base is obtained by dividing its molecular weight by number of replaceable hydroxide ions that it contains. For example the given equivalence of  $\text{Ba(OH)}_2$  is its gram molecular weight divided by 2 as it contains two replaceable hydroxide ions.

With reference to redox reactions the gram equivalent weight of an oxidant is obtained by dividing its molecular weight by the number of electrons that it gains.



molecular weight by the number of electron it loses in the reaction. For example thallous chloride ( $TlCl$ ) is a reductant and thallium ( $Tl$ ) loses two electrons in the process of oxidation.



## EXPERIMENT - 6

## \* PREPARATION OF UREA FORMALDEHYDE \*

AIM:

To prepare urea formaldehyde resin.

## APPARATUS REQUIRED:-

Beaker, glass rod, funnel, filter paper and chemical balance.

## CHEMICALS REQUIRED

urea, formaldehyde soln, conc  $H_2SO_4$ , distilled water.

## THEORY :-

Amino resins are condensation products obtained by the reaction of formaldehyde with nitrogen bearing compound such as amine amides for eg: melamine formaldehyde, urea formaldehyde etc.

Urea formaldehyde formed during the formation of resin is monomethyl and dimethyl ureas.

Polymerization can take place from mono (or) dimethyl urea (or) possibly through both, with the formation of long

Observation:-

mass of the beaker ( $w_1$ ) = 50.401g

mass of the beaker + urea + formaldehyde ( $w_2$ ) = 54.672g

$\therefore$  mass of urea + formaldehyde ( $w_2 - w_1$ ) = 4.271g



Procedure:-

1. Place about 5ml of 10% formaldehyde solutions in 100 beaker.
2. Add about 2.5g of urea with constant stirring till saturation solution is obtained.
3. Add a few drops of conc.  $H_2SO_4$  with constant stirring.
4. A voluminous white solid mass appears in the beaker.
5. Wash the white solid with water and dry it in the folds filter paper.
6. Weigh the yield of product.

Precautions:-

1. While adding concentrated  $H_2SO_4$  it is better to sit little away from the beaker as it sometimes vibrate.
2. The reaction mixture should be stirred continuously.

Result:- The yield of urea formaldehyde resin = 4.2g



Procedure:-

1. Place about 5ml of 10% formaldehyde solutions in 10 beaker.
2. Add about 2.5g of urea with constant stirring till saturation solution is obtained.
3. Add a few drops of conc.  $H_2SO_4$  with constant stirring.
4. A voluminous white solid mass appears in the beaker.
5. Wash the white solid with water and dry it in the filter paper.
6. Weigh the yield of product.

Precautions:-

1. While adding concentrated  $H_2SO_4$  it is better to tilt away from the beaker as it sometimes vaporizes.
2. The reaction mixture should be stirred continuously.

Result:- The yield of urea formaldehyde resin = 4.8





## EXPERIMENT - 7

# DETERMINATION OF STRENGTH OF HYDROCHLORIC ACID By PH METRIC METHOD

Aim:-

To determine the strength of hydrochloric acid using standard sodium hydroxide by pH metric method.

Apparatus:-

pH meter, combined electrode glass electrode and calomel 100 ml beaker, 10 ml micro burette and plastic stirrer.

Reagents:-

Distilled water, standard 0.1N NaOH sol<sup>n</sup>, HCl sample sol<sup>n</sup>, standard buffer sol<sup>n</sup> of pH 4 and 9.2

Theory:-

For many purposes, especially when dealing with small concentrations it is cumbersome to express conc. of  $H^+$  and  $OH^-$  ions in gram equivalent per liter. A very convenient method to express the concentration of these ions was proposed by S.P.L. Sorensen in 1909. He introduced the  $H^+$  ion exponent, pH, defined the relationships:-

$$pH = -\log_{10} [H^+] = \log_{10} [1/H^+] \quad (81)$$

$$[H^+] = 10^{-pH}$$

Table: 1

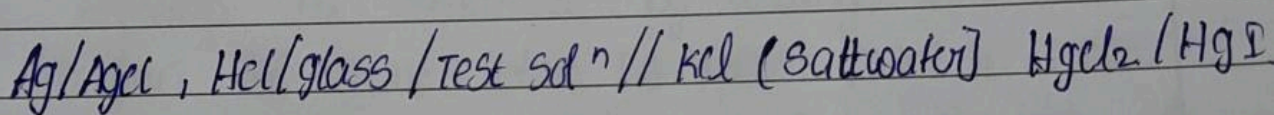
Pilot titration.

Sno	Volume of NaOH	3d <sup>n</sup> (mL)	pH
1	0.0		1.75
2	1.0		1.91
3	2.0		1.98
4	3.0		2.09
5	4.0		2.17
6	5.0		2.28
7	6.0		2.40
8	7.0		2.55
9	8.0		2.79
10	9.0		2.35
11	10.0		4.49
12	11.0		8.85
13	12.0		9.37
14	13.0		9.80
15	14.0		10.07
16	15.0		10.40



The quantity of pH is thus the logarithm (to base 10) of the reciprocal of the  $H^+$  ion conc  $[H^+]$  or is equal to the logarithms of  $[H^+]$  with negative sign, this method of expression has the advantage that all states of acidity and alkalinity b/w  $2M$  in  $[H^+]$  of those a neutral soln w/  $[H^+] = 10^{-7}$  has a pH of 7; a soln in  $[H^+]$  has a pH of zero; and a soln in  $[OH^-]$  passes a pH of 14.

The common lab pH meter is an electric digital millivoltmeter scaled the read pH directly with a resolution of 0.01 pH unit and an accuracy of  $\pm 0.01$  unit the reading displayed by the meter is a direct measure of the potential difference registered b/w a glass electrode and calomel electrode immersed in the test sol. the basic electrochemical cell involving glass electrode calomel electrode and test soln may be represented as



The strength of given hydrochloric acid soln can be determined using standard sodium hydroxide soln following the pH meter method.

### PROCEDURE:-

The given hydrochloric acid sample soln is in volumetric flask is made upto the mark is with distilled water. 10ml of soln is pipetted out into a clean 100ml



Table 2:  
(Accurate Titration)

SNO	Vol of NaOH soln (ml)	pH
1	0.0	1.75
2	1.0	1.91
3	2.0	1.98
4	3.0	2.09
5	4.0	2.17
6	5.0	2.28
7	6.0	2.40
8	7.0	2.55
9	8.0	2.79
10	9.0	3.35
11	10.0	5.60

SNO	Vol of NaOH soln (ml)	pH
12	10.1	4.84
13	10.2	5.60
14	10.3	7.95
15	10.4	8.30
16	10.5	8.51
17	10.6	8.66
18	10.7	8.71
19	10.8	8.76
20	10.9	8.81
21	11.0	8.85
22	12.0	9.20
23	13.0	9.37
24	14.0	9.80
25	15.0	10.0
26	16.0	10.0



beaker 40 ml of distilled is added to this Sol<sup>n</sup> mean while the pH meter 4.0 and 9.2 offer connect the combined electrode or else, glass electrode calomel electrode combined electrode into the HCl Sol<sup>n</sup> in the 100ml beaker and the Sol<sup>n</sup> is stirred Sol<sup>n</sup> each time, the Sol<sup>n</sup> is thoroughly missed often each addition of the titrant, making use of a plastic stirrer and the corresponding pH values as displayed by the pH meter are recorded in table 1.

After reaching a certain stage in the titration a sudden and large change in pH will be noticed indicating over stepping of equivalence. is known as pilot titration accurate titration on similar lines to the pilot titration is carried out until the equivalence point is reached After this a titration is continued by adding 0.1 ml incre of the titration Sol<sup>n</sup> until the equivalence point is crossed the process is continued until the all the relevant obs are recorded in table-2

A graph is drawn b/w volume and corresponding values on y-axis for the accurate titration from the the correct equivalence point is hydrochloric acid in the Sol<sup>n</sup> is calculated in table-2

Repeat:- Amount of hydrochloric acid present in 100ml of the

Calculations:-

The conc HCl in the given soln can be calculated by

$$N_1 V_1 = N_2 V_2$$

where  $V_1$  = Volume of NaOH = 10.25 ml

$N_1$  = Normality of Sodium hydroxide = 0.05078 N

$V_2$  = Volume of HCl = 10 ml

$N_2$  = Normality of HCl = ?

Hence

$$N_2 = \frac{N_1 V_1}{V_2} = \frac{0.05078 \times 10.25}{10} = 0.0520 \text{ N}$$

Amount of HCl acid present in 100ml given soln is 0.1899g