CHEMISTRY PRACTICALS FOR CLASS 10

EXPERIMENT – 1

AIM: To find the pH of the following samples by using pH paper / universal indicator.

1. Dilute hydrochloric acid.
2. Dilute NaOH solution.
3. Dilute ethanoic acid solution.
4. Water.
5. Dilute sodium bicarbonate solution.

THEORY: pH indicator is a chemical that turns different colours in different media. For example, blue litmus turns red in acidic medium; the red litmus turns blue in alkaline medium.

Neutral solution has pH value 7. pH of acid solution is always less than 7, whereas that of alkaline solution is always more than 7.

Litmus solution is a purple dye, which is extracted from a Thallophyte known as Lichen. Litmus solution when in neutral medium (i.e., neither acidic nor basic) is greenish in colour.

Blue & red litmus solution, universal indicator, phenolphthalein, methyl orange are some of the commonly used indicators in the laboratory.

A scale for measuring hydrogen ion concentration is known as pH scale. In the term pH, p stands for '*potenz*' in German meaning power.

MATERIALS REQUIRED: Dilute hydrochloric acid,Dilute NaOH solution, dilute ethanoic acid solution, water, dilute sodium bicarbonate solution, teat tubes, droppers, universal indicator.

PROCEDURE: One by one small amounts of the given solutions are taken in a test tube and 3 to 4 drops of the universal indicator are added to the solutions. The colour developed in each case is compared with the colour chart (along with the approximate pH) given on the bottle of the universal indicator.

OBSERVAIONS:

S.NO	SAMPLE SOLUTION	COLOUR PRODUCED	APPROXIMATE pH	INFERENCE
1	Dilute hydrochloric acid	PINK	1	STRONGLY ACIDIC
2	Dilute NaOH solution	VIOLET/PURPLE	9	STRONGLY BASIC
3	Dilute ethanoic acid solution	YELLOW	3	WEAKLY ACIDIC
4	Water	GREEN	7	NEUTRAL
5	Dilute sodium bicarbonate solution	VIOLET/PURPLE	9	STRONGLY BASIC

PRECAUTIONS:

1. Only the standard colour chart given on the side of the bottle containing universal indicator should be used for assessing the pH value.
2. The universal indicator solution should be kept away from chemical fumes.
3. Only fresh fine dropper or glass rod should be used for each different sample, or the dropper or rod should be washed well with water every time.

EXPERIMENT – 2

AIM: To study the properties of acids and bases (HCl and NaOH) by their reaction with:

- Litmus solution (blue/Red)
- Phenolphthalein
- Zinc metal
- Solid sodium carbonate

THEORY: According to Arrhenius concept of acid and bases, an acid is a substance which furnishes H^+ ions, when dissolved in water, while a base is a substance which furnishes OH^- ions, when dissolved in water.

Examples:

$$HCl(aq) \rightarrow H^+(aq) + Cl^-(aq)$$

$$NaOH(aq) \xrightarrow{H_2O} Na^+(aq) + OH^-(aq)$$

HCl reacts with sodium carbonate to give rise to CO_2.

$$Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2 \uparrow$$

HCl reacts with zinc metal to form zinc chloride and hydrogen.

$$Zn + 2HCl \rightarrow ZnCl_2 + H_2 \uparrow$$

NaOH reacts with zinc to form sodium zincate and hydrogen.

$$Zn + 2NaOH(aq) \rightarrow Na_2ZnO_2(aq) + H_2$$

Phenolphthalein is an indicator. In alkaline solution it gives pink colour, whereas it becomes colourless in acidic medium. So, NaOH gives pink colour with phenolphthalein.

HCl is an acid and turns blue litmus to red, while sodium hydroxide (NaOH) is a strong alkali, and it turns red litmus to blue.

MATERIALS REQUIRED: Dilute HCl, dilute NaOH, litmus solution (blue/Red), phenolphthalein, zinc metal, sodium carbonate (aq).

OBSERVATION:

EXPERIMENT	OBSERVATION	INFERENCE
A little amount of blue and red litmus solutions are taken separately in two test tubes. Add few drops of HCl to each test tube using a dropper.	Blue litmus turns red.	HCl is an acid having pH value below 7.
A little amount of blue and red litmus solutions are taken separately in two test tubes. Add few drops of NaOH to each test tube using a dropper.	Red litmus turns blue.	NaOH is an alkali having pH value more than 7.
Some pieces of zinc metal is taken in a test tube. Few drops of HCl are added into the boiling tube using a dropper.	A gas is evolved. It extinguishes the burning matchstick (brought near the mouth of the test tube) and burns itself with mild explosion and produces a "pop" sound.	The gas evolved is hydrogen which burns with mild explosion.
Take some pieces of zinc metal in a test tube. Add few drops of NaOH into the boiling tube using a dropper. The test tube is heated.	A gas is evolved. It extinguishes the burning matchstick (brought near the mouth of the test tube) and burns itself with mild explosion and produces a "pop" sound	The gas evolved is hydrogen which burns with mild explosion.
To the test tube containing small amount of dil HCl, aqueous solution of sodium carbonate is added.	Brisk effervescence is seen due to the evolution of CO_2, which turns lime water milky.	The gas produced is carbon dioxide due to the action of HCl on Na_2CO_3, which turns lime water milky.
To the test tube containing small amount of dil NaOH, aqueous solution of sodium carbonate is added.	No reaction	Dilute NaOH does not react with aqueous solution of sodium carbonate
(i) To one test tube containing small amount of dil HCl, 2 to 3 drops ofphenolphthalein	The solution remains colourless.	

indicator are added. (ii) To the second test tube containing small amount of dil NaOH, 2 to 3 drops ofphenolphthalein indicator are added.	The solution turns pink	Dilute NaOH is alkaline/ basic in nature.
(i) To one test tube containing small amount of dil HCl, 2 to 3 drops of blue litmus solution are added. (ii) To the second test tube containing small amount of dil NaOH, 2 to 3 drops ofred litmus solution are added.	The solution turns red The solution turns blue.	Dilute HCl is acidic in nature. Dilute NaOH is basic in nature.

Precautions:

(i) Small quantities of zinc, HCl and NaOH should be taken for their reaction, otherwise large amount of hydrogen produced may cause explosion.

(ii) NaOH and HCl are injurious, these chemicals should be handled carefully.