EDUCATION SOURCE
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ACID, BASES AND SALT

CHAPTER: 2

EDUCATION SOURCE
Class:10th

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Chapter:2
Acid, Bases and Salt

Page: 18

Q1:- You have been provided with three test tubes. One of them contains distilled water and the other two contain an acidic solution and a basic solution, respectively. If you are given only red litmus paper, how will you identify the contents of each test tube?

Ans: Add few drops of solution from all three test tubes on the red litmus paper separately.

- The solution which turns red litmus to blue contains that will be basic solution.
- Use this blue litmus paper to test the solutions in other two test tubes. The solution from the test tube which turns blue litmus paper to red that will be the acidic solution .
- And the solution of the test tube which do not change either red or blue litmus paper contain distilled water**.**

Page: 22

Q1:- Why should curd and sour substances not be kept in brass and copper vessels?

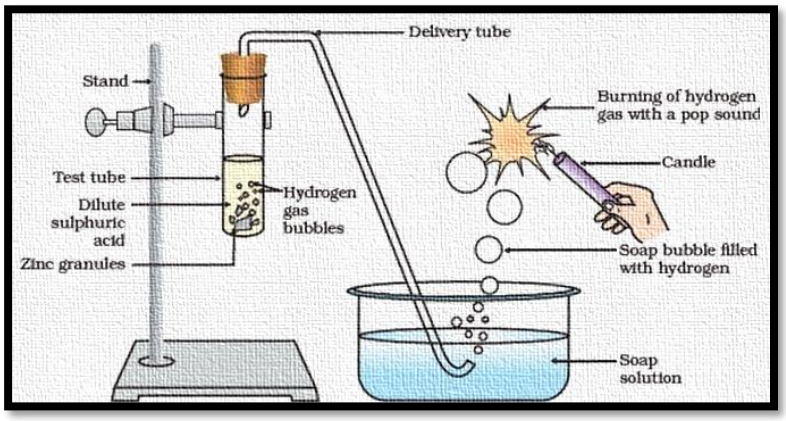
Ans: curd and sour substances contain acids . Acid reacts with metals to give salt and hydrogen gas, and this product react with food to make it toxic . which is harmful for our body.

Q2:- Which gas is usually liberated when an acid reacts with a metal? Illustrate with an example. How will you test for the presence of this gas?

Ans: When a metal reacts with an acid, usually hydrogen gas is liberated. When zinc granules react with dilute sulphuric acid, then the bubbles of the soap solution are formed. These soap bubbles contain hydrogen gas and zinc sulphate solution is formed.

$$Zn + 2H_2SO_4 \rightarrow Zn(SO_4) + 2H_2$$

The evolved hydrogen gas can be tested by taking a burning candle near soap solution containing hudrogen gas . If candle burns with pop sound, it confirms the evolution of hydrogen gas.



Q3:- Metal compound A reacts with dilute hydrochloric acid to produce effervescence. The gas evolved extinguishes a burning candle. Write a balanced chemical equation for the reaction if one of the compounds formed is calcium chloride.

Ans: We know that CO_2 extinguishes fire, carbonates and bicarbonates when react with dilute acid produce CO_2.

It means the compound A must be calcium carbonate ($CaCO_3$).

$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$.

Page: 25

Q1:- Why do HCl, HNO_3, etc., show acidic characters in aqueous solutions while solutions of compounds like alcohol and glucose do not show acidic character?

Ans: The acids like HCl and HNO_3 ionise in aqueous solution to produce Hydrogen(H^+) ions. Due to this reason , these acids show acidic character. On the other hand the compounds like alcohol and glucose do not ionise in the aqueous solution to give hydrogen ions . Hence, they do not show acidic character .

Q2:- Why does an aqueous solution of an acid conduct electricity?

Ans: when acid dissolved in water , acids dissociate to form ions e.g.,

$HCl + H_2O \rightarrow Cl^- + H_3O^+$.

These ions are responsible for electerical conductivity.

Q3:- Why does dry HCl gas not change the colour of the dry litmus paper?

Ans: Because in the absence of water the HCl does not get ionized and therefore H^+ ions are not produced.

Q4:- While diluting an acid, why is it recommended that the acid should be added to water and not water to the acid?

Ans: Dilution of concentrated acid is an exothermic process. If water is added to a concentrated acid, the heat generated may cause the mixture to splash out and cause burns. When the acid is added to water slowly with constant stirring, the mixture will not splash out.

Q5:- How is the concentration of hydronium ions (H_3O+) affected when a solution of an acid is diluted?

Ans: The concentration of hydronium ions decreases when an acid is diluted because on adding water the H^+ ions of the acid and hydroxyl ions of water react to form water molecules and the concentration of hydronium ions decreases.

Q6:- How is the concentration of hydroxide ions (OH^-) affected when excess base is dissolved in a solution of sodium hydroxide?

Ans: When an excess base is dissloved in a solution of sodium hydroxide dissociates into OH^- ions and when the number of OH^- ions increases then concentration also increases .

Page: 28

Q1:- You have two solutions, A and B. The pH of solution A is 6 and pH of solution B is 8. Which solution has more hydrogen ion concentration? Which of this is acidic and which one is basic?

Ans: Solution A has more H^+ ion concentration . solution A is acidic and solution B is basic .

Q2:- What effect does the concentration of $H^+(aq)$ ions have on the nature of the solution?

Ans: As the concentration of H^+ ions increases the solution becomes more acidic.

Q3:- Do basic solutions also have $H^+(aq)$ ions? If yes, then why are these basic?

Ans: Basic solutions also have H^+ (aq) ions but there are OH^- ions also. These are basic because the concentration of OH^- ions is more than the H^+ (aq) ions in them.

Q4:- Under what soil condition do you think a farmer would treat the soil of his fields with quick lime (calcium oxide) or slaked lime (calcium hydroxide) or chalk (calcium carbonate)?

Ans: Quick lime , slaked lime and chalk are basic in nature . therefore if the soil condition is acidic then the farmer would treat the soil with these substances.

Page: 33

Q1:- What is the common name of the compound $CaOCl_2$?

Ans: Bleaching powder.

Q2:- Name the substance which on treatment with chlorine yields bleaching powder.

Ans: Dry slaked lime $Ca(OH)_2$.

Q3:- Name the sodium compound which is used for softening hard water.

Ans: Washing soda (Na_2CO_3).

Q4:- What will happen if a solution of sodium hydrogencarbonate is heated? Give the equation of the reaction involved.

Ans: Sodium hydrocarbonate dissociate into sodium carbonate, carbondioxide and water on heating .

$$2NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + CO_2 + H_2O.$$

Q5:- Write an equation to show the reaction between Plaster of Paris and water.

Ans: $CaSO_4.\frac{1}{2}H_2O + 1\frac{1}{2}H_2O \rightarrow CaSO_4.2H_2O.$

(Plater of paris + Water → Gypsum)

Exercise

Q1:- A solution turns red litmus blue, its pH is likely to be

(a) 1
(b) 4
(c) 5
(d) 10

Ans: (d) 10.

Q2:- A solution reacts with crushed egg-shells to give a gas that turns lime-water milky. The solution contains

(a) NaCl
(b) HCl
(c) LiCl
(d) KCl

Ans: (b) HCl.

Q3:- 10 mL of a solution of NaOH is found to be completely neutralised by 8 mL of a given solution of HCl. If we take 20 mL of the same solution of NaOH, the amount HCl solution (the same solution as before) required to neutralise it will be

(a) 4 mL
(b) 8 mL
(c) 12 mL
(d) 16 mL

Ans: (d) 16 ml.

Q4:- Which one of the following types of medicines is used for treating indigestion?

(a) Antibiotic
(b) Analgesic
(c) Antacid
(d) Antiseptic

Ans: (c) Antacid

Q5:- Write word equations and then balanced equations for the reaction taking place when –

(a) dilute sulphuric acid reacts with zinc granules.

(b) dilute hydrochloric acid reacts with magnesium ribbon.

(c) dilute sulphuric acid reacts with aluminium powder.

(d) dilute hydrochloric acid reacts with iron filings.

Ans: a) Zinc + sulphuric acid → Zinc sulphate + hydrogen

$$Zn + H_2SO_{4(dil)} \rightarrow ZnSO_4 + H_2$$

b) Magnesium + Hydrocloric acid → Magnesium chloride + hydrogen

$$Mg + 2HCl_{(dil)} \rightarrow MgCl_2 + H_2$$

c) Aluminium + Sulpuric acid → Aluminium sulphate + hydrogen

$$2Al + 3\,H_2SO_{4(dil)} \rightarrow Al_2(SO_4)_3 + 3H_2$$

d) Iron + Hydrochloric acid → Iron (II) chloride + hydrogen

$$Fe + 2HCl_{(dil)} \rightarrow FeCl_2 + H_2$$

Q6:- Compounds such as alcohols and glucose also contain hydrogen but are not categorised as acids. Describe an Activity to prove it.

Ans: The apparatus is set as shown in figure. Solutions of glucose is added and the switch is turned on. The bulb does not glow . This means glucose does not dissociate into ions. So, glucose is not an acid . similarly, alcohol is also not an acid.

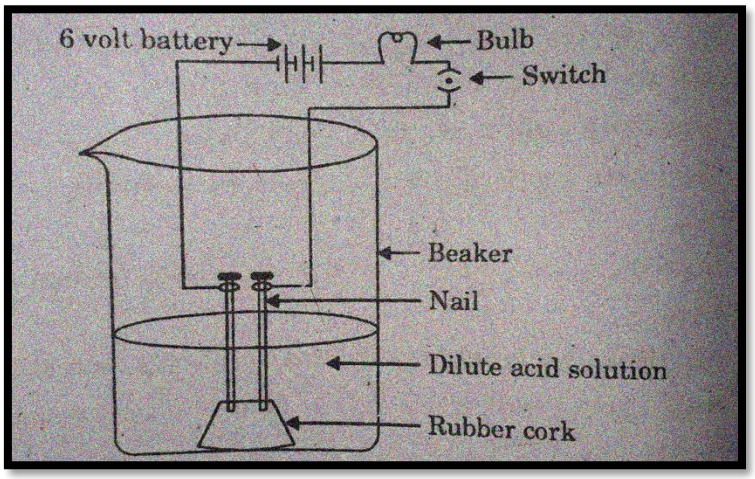


Figure : Acid solution in water conducts electricity.

Q7:- Why does distilled water not conduct electricity, whereas rain water does?

Ans: Gases like CO_2, SO_2 are dissolved in rain water, which form carbonic acid (H_2CO_3) , Sulphurous acid (H_2SO_3) etc. These dissociate into ions. Therefore rain water can conduct electericity. There are no gases or salt dissolved in distilled water and there are no ions present in distilled water. Therefore, It does not conduct electricity.

Q8:- Why do acids not show acidic behaviour in the absence of water?

Ans: In the absence of water, acids do not dissociate into free ions. So, they do not show acidic behaviour.

Q9:- Five solutions A,B,C,D and E when tested with universal indicator showed pH as 4,1,11,7 and 9, respectively. Which solution is

(a) neutral?

(b) strongly alkaline?

(c) strongly acidic?

(d) weakly acidic?

(e) weakly alkaline?

Arrange the pH in increasing order of hydrogen-ion concentration.

Ans: a) D , b) C , c) B , d) A , e) E.

Increasing order of H^+ Cooncentration:

C(11) < E(9)< D(7) < A(4) < B(1).

Q10:- Equal lengths of magnesium ribbons are taken in test tubes A and B. Hydrochloric acid (HCl) is added to test tube A, while acetic acid (CH_3COOH) is added to test tube B. Amount and concentration taken for both the acids are same. In which test tube will the fizzing occur more vigorously and why?

Ans: In test tube A, fizzing occur more vigorously because HCl is a strong acid and dissociate more, produce high amount of hydrogen gas.

Q11:- Fresh milk has a pH of 6. How do you think the pH will change as it turns into curd? Explain your answer.

Ans: When fresh milk turns into curd its pH value decreases. This happen because curd is more acidic . Curd has lactic acid in it. More is the acid, less will be its pH value.

Q12:- A milkman adds a very small amount of baking soda to fresh milk.
(a) Why does he shift the pH of the fresh milk from 6 to slightly alkaline?
(b) Why does this milk take a long time to set as curd?

Ans: a) At lower pH , the milk will turn sour easily. In order to prevent this, milkman adds baking soda to fresh milk. The baking soda will make the medium alkaline and this will not allow the milk to turn sour .

b) The presence of baking soda will not allow the formation of lactic acid. Due to this reason, the milk mixed with baking soda take a long time to set as curd.

Q13:- Plaster of Paris should be stored in a moisture-proof container. Explain why?

Ans: Plaster of paris changes into a hard solid mass on mixing with water . This solid mass is of gypsum .

$CaSO_4.\frac{1}{2}H_2O + 1\frac{1}{2}H_2O \rightarrow CaSO_4.2H_2O$

(Plaster of paris) water Gypsum(Hard mass)

Q14:- What is a neutralisation reaction? Give two examples.

Ans: The reaction between an acid and a base to give a salt and water is known as a neutralisation reaction .

$NaOH_{(aq)} + HCl_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$

Q15:- Give two important uses of washing soda and baking soda.

Ans: Uses of washing soda :

i. It is used in glass , soap and paper industries .
ii. It is used for removing the permanent hardness of water .

Uses of baking soda :

i.It is used in soda – acid fire extinguisher .
ii.it is used as an ingredient in antacids, as it neutralises excess acid in the stomach .