Class 10th Science

Chapter - 2

Acids-Bases and Salts

Textual Questions and Answers :

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Q.1. 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 :- First we have divided the red litmus paper in to three parts. We can dip each paper in the three test tubes separately. The test tubes in which the red litmus paper turns blue is basic solution. The test tube in which red litmus paper turns light red is distilled water. The test tube in which red litmus paper has no change in colour is acidic solution.

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Q.1. Why should curd and sour substances not be kept in a brass and copper vessels ?

Ans :- Curd and sour substances contains acids and acids react with brass and copper. So curd and sour substances not be kept in a brass and copper vessels.

Q.2. Which gas is usually liberated when an acid react with a metal. Illustrate with an example. How will you test for the presence of the gas ?

Ans :- (i) H_2 gas is liberated when an acid reacts with a metal.

(ii) Illustration :- Set up an apparatus. Take some Zinc granules in the test tube. Add about 5 ml dilute hydrochloric acid slowly. Soon the reaction between Zinc and hydrochloric acid starts and hydrogen gas is evolved.

(iii) Test for H_2 gas :- H_2 gas is not soluble in water. When passed through soap solution, it gets trapped into bubbles which burn with explosion.

Q.3. 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 :- Since the end product is calcium chloride and the gas formed extinguishes a burning candle, it is Co_2 . The metal compound must be calcium carbonate.

Hence, the reaction between calcium carbonate and hydrochloric acid is as follows :-

$$C\ aCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$$

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Q.1. 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 :- HCl, HNO_3 etc, are produced H^+ ions in the presence of water. Therefore they show acidic characters in aqueous solutions. While alcohol and glucose do not produce H^+ ions and therefore they do not show acidic character.

Q.2. Why does an aqueous solution of an acid conduct electricity ?

Ans :- Acids give ions in aqueous solution and the electric current is carried through the solution by ions. Therefore aqueous solution of an acid conduct electricity.

Q.3. Why does dry Hcl gas not change the colour of the dry litmus paper ?

Ans :- Dry Hcl gas does not contain H^+ ions and hence does not change the colour of the dry litmus paper.

Q.4. While diluting au acid, why is it recommended that the acid should be added to water and not water to the acid ?

Ans :- The acid must always be added slowly to water with constant stirring. If water is added to a concentrated acid, the heat generated may cause the mixture to splash out and cause burns. The glass container may also break due to excessive local heating.

Q.5. How is the concentration of hydronium ions (H_3O^+) affected when a solution of an acid is diluted ?

Ans :- Mixing an acid with water results in decrease in the concentration of H_3O^+ ions per unit volume.

Q.6. How is the concentration of hydroxide ions (OH^-) affected when excess base is dissolved in a solution of sodium hydroxide ?

Ans :- The concentration of hydroxide ions will increase when excess base is dissolved in a solution of sodium hydroxide because the amount of hydroxide ions per unit volume increases. This happens only when base added dissolved in water. If the base is not soluble in water, the concentration of hydroxide ions remains constant.

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Q.1. You have two solutions, A and B. The P^H of solution A is 6 and P^H 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 hydrogen ion concentration. Solution A is acidic and solution is basic.

Q.2. What effect does the concentration of H^+ (aq) ions have on the nature of the solution ?

Ans :- Acids that give rise to more H^+ ions are strong acids and acids that give less H^+ ions are weak acids.

Q.3. Do basic solutions also have H^+ (aq) ions ? If yes, then why are these basic ?

Ans :- Basic solution also have H^+ ions. But these are farless in number than OH^- ions. For more number of OH^- ions the solution is basic.

Q.4. 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 :- When the soil become acidic farmers treat the soil fields with bases like quick lime, slaked lime or chalk.

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Q.1. What is the common name of the compound $CaOCl_2$?

Ans :- Bleaching powder.

Q.2. Name the substance which on treatment with chlorine yields bleaching powder.

Ans :- Lime water.

Q.3. Name the sodium compound which is used for softening hard water.

Ans :- Sodium carbonate.

Q.4. What will happen if a solution of sodium hydrocarbonate is heated ? Give the equation of the reaction involved.

Ans :- Sodium hydro carronate on heating gives sodium carbonate and Co_2 gas. $2NaHCO_3 \rightarrow Na_2Co_3 + Co_2 + H_2O$

Q.5. Write an equation to show the reaction between plaster of paris and water.

Ans :- $CaSO_4 . ½ H_2O + 1½ H_2O \rightarrow CaSO_4 . 2H_2O$

EXERCISES

Q.1. A solution turns red litmus blue, its PH is likely to be

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

Ans :- (d) 10.

Q.2. A solution reacts with crushed egg- shells to give a gas that turns lime water milk.The solution contains.

(a) Nacl (b) Hcl (c) Licl (d) Kcl

Ans :- (b) Hcl.

Q.10 ml of solution of NaOH is found to be completely neutralized 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 solution as before) required to neutralize it will be

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

Ans :- (d) 16 ml.

Q.4. Which one of the following types of medicines is used for treating indigestion ?

(a) antibiotic.

(b) Analgesic.

(c) Antacid.

(d) Antiseptic.

Ans :- (c) Antacid.

Q.5. 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.

(c) dilute sulphuric acid reacts with aluminium powder.

(d) dilute hydrochloric acid reacts with iron filings.

Ans :- (a) Dil.Sulphuric acid + zinc → zinc sulphate + Hydrogen H_2SO_4 + zn $ZnSO_4$ + H_2

(b) Dil hydrochloric acid + Magnesium → Magnesium chloride + Hydrogen.

Hcl + Mg → $Mgcl_2$ + H_2

⇒ 2HCl + Mg → $Mgcl_2$ + H_2

(c) Aluminium powder + dil sulphuric acid → Aluminium sulphate + Hydrogen Al + H_2SO_4 → $Al_2(SO_4)_3$ + H_2

⇒ 2Al + $3H_2SO_4$ → Al_2 $(SO_4)_3$ + H_2

(d) Dil. hydrochloric acid + Iron → Iron chloride + Hydrogen Hcl + Fe → $FeCl_3$ + H_2

⇒ 6Hcl + 2Fe → $2Fecl_3$ +$3H_2$

Q.6. compounds such as alcohols and glucose also contain hydrogen beet are not categorised as acids. Describe an activity to prove it.

Ans :- Take solutions of glucose and alcohols in a beaker. Fix two nails on a cork and place the cork in the beaker.connect the nails to the two terminals of a 6 volt battery through a bulb and a switch. Switch on the current. The bulb does not glow. That means current does not pass through the circuit. This show that no H^+ ions are present in the solution. This experiment shows that alcohol and glucose are not acid.

Q.7. Why does distilled water not conduct electricity, whereas rain water does?

Ans :- There are not ions in distilled water, So distilled water not conduct electricity. But rain water contains ions and so conduct electricity.

Q.8. Why do acids not show acidic behaviour in the absence of water ?

Ans :- The separation of hydronium ions from acid molecules cannot occur in the absence of water. Therefore acids cannot show acidic behaviour in the absence of water.

Q.9. Five solutions A, B, C, D and E when tested with universal indicator showed P^H 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 P^H in increasing order of hydrogen ion concentration.

Ans :- (a) Neutral solution is D

(b) Strongly alkaline is C

(c) Strongly acidic is B

(d) Weakly acidic is A

(e) Weakly alkaline is E

P^H values in increasing order of hydrogen ion concentration 11<9<7<4<1

Q.10. 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_3 COOH) is added to test tube B. Amount and concentration taken for both the acids are same. In which test tube will be fizzing occur more vigorously and why ?

Ans :- Hydrochloric acid is stronger acid than acetic acid and reaction between magnesium ribbon and Hcl is faster than between magnesium ribbon and CH_3 COOH. So fizzing will occur more vigorously in test tube A. containing hydrochloric acid.

Q.11. Fresh milk has a pH of 6. How do you think the PH will change as it turns into curd ? Explain your answer.

Ans :- The PH value of fresh milk falls below 6 when it turns into curd due to the formation of lactic acid during the process.

Q.12. A milkman adds a very small amount of baking soda to fresh milk.

(a) Why does the 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) The milkman adds a little baking soda to fresh milk to make it slightly alkaline so that milk can be preserved for a longer time.

(b) The lactic acid is used for neutralize the base initially and when more lactic acid is formed then the milk sets as curd.

Q.13. Plaster of paris should be stored in a moisture-proof container. Explain why ?

Ans :- If plaster of paris will store in a moisture then it changes to gypsum giving a hard solid mass. Which does not have the required selting property.

Q.14. What is a neutralisation reaction ? Give two example.

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

Examples :- (i) $Hcl + NaOH \rightarrow Nacl + H_2O$
(acid) (Base) (Salt) (Water)

Q.15. Give two important uses of washing soda and baking soda.

Ans :-

Uses of washing soda.	Uses of baking soda
(i) Washing soda is used in glass, soap and paper paper industries.	(i) For making baking powder, which is a mixture of baking soda and a mild edible acid such as tartaric acid.
(ii) It is used for removing permanent hardness of water.	(ii) It is used in soda-acid fire extinguishers.

Additional Questions and Answers :

Q.1. What are acids ? How are they produced ?

Ans :- Acids are the chemicals which contain hydrogen atom and are sour in taste.

They are produced when oxides of non-metals react with water.

Q.2. Mention important characteristics of acids.

Ans :- Characteristics of acids :- (i) They are sour in taste.

(ii) They turn blue litmus to red.

(iii) Dilution of acid in water is an exothermic reaction.

(iv) Acids react with metals to evolve hydrogen gas.

(v) Acids reacts with bases to form salt and water.

Q.3. What are bases ? Give the characteristic of bases.

Ans :- Bases are the hydroxide of metals, which give hydroxide ion after dissociation in aqueous solution.

Characteristic of bases -

(i) They are bitter in taste.

(ii) They change red litmus to blue.

(iii) They react with acid to form salt and water.

(iv) Bases are soluble in water and known as alkalies.

Q.4. What is vinegar that is used in the kitchen ?

Ans :- Vinegar is a solution of an acid called acetic acid whose formula is CH_3 COOH.

Q.5. What are indicators ? Give example.

Ans :- The substances, which give different colours with acid and base are called indicator.

For example :- Litmu, Methyl oranges, phenolphthalein.

Q.6. What is lime water ?

Ans :- Dilute alkali solution of water is called as lime water.

Q.7. State differences between acids and bases.

Ans :-

Acids	Bases
(i) Acids are sour to taste.	(i) Bases are bitter to taste.
(ii) Acids turns blue litmus to red.	(ii) Bases turns red litmus to blue.

(iii) Acid is define as a substance which contains hydrogen ion.	(iii) A base is defined as a substance which contains hydroxyl ion.

Q.8. Write the name of two natural indicator.

Ans :- (i) Litmus.

(ii) Turmeric.

Q.9. What are ol factory indicators ? Give examples.

Ans :- There are some substances whose odour changes in acidic or basic media. These are called ol factory indicators.

For example :- Vanilla, onion and clove.

Q.10. Is the distilled water acidic/basic/ neutral ? How would you verify it ?

Ans :- The distilled water can be verify with the help of red and blue litmus paper. It shows no reaction in both the litmus paper. So distilled water is neutral.

Q.11. What is an oxide ?

Ans :- An oxide is the compound of an element with oxygen.

Q.12. Name four acids and bases. Write their formula.

Ans :-

Acids	Formula
(i) Hydrochloric acid.	(i) Hcl
(ii) Sulphuric acid.	(ii) H_2SO_4
(iii) Acetic acid.	(iii) CH_3 COOH
(iv) Nitric acid .	(iv) HNO_3
Bases	**Formula**
(i) Sodium Hydroxide.	(i) NaOH
(ii) Calcium Hydroxide.	(ii) $Ca(OHH)_2$
(iii) Ammonium Hydroxide.	(iii) NH_4OH
(iv) Magnesium Hydroxide.	(iv) $Mg(OH)_2$

Q.13. Name the various kind of oxides.

Ans :- Oxides are of three types :-

(i) Acidic oxides.

(ii) Basic oxides.

(iii) Amphoteric oxides.

Q.14. Which gas is used in fire extinguishers ?

Ans :- Carbon dioxide.

Q.15. What is the other name of lime ?

Ans :- Calcium Hydroxide ($Ca(OH)_2$).

Q.16. Name the acid produce in our stomach.

Ans :- Hydrochloric acid (Hcl).

Q.17. What are antacids. Give one example.

Ans :- During indigestion the stomach produces too much acid and this causes pain and irritation. To get rid of this pain, we use bases called antacids. These antacids neutralise the excess acid.

Example :- Magnesium hydroxide.

Q.18. What is the other name of magnesium hydroxide?

Ans :- Milk of magnesia.

Q.19. Which salt we use in our food ?

Ans :- Sodium chloride. (Nacl)

Q.20. What happens when a base is dissolved in water?

Ans :- When base dissolve in water it generate hydroxide (OH^-) ions in water.

Q.21. What are alkalis ?

Ans :- Bases which are soluble in water are called alkalis.

Q.22. What do you mean by PH scale ?

Ans :- A scale for measuring hydrogen ion concentration ina solution called PH scale. The h in PH stands for "potenz" in German, meaning powder. On the PH scale we can measure PH generally from 0 to 14. PH should be thought of simply as a number which indicates the acidic or basic nature of a solution. Higher the hydronium ion concentration, lower is he PH value.

Q.23. What are the PH value of a neutral, a acidic and a basic solution.

Ans :- PH value of a neutral solution is 7.
PH value of a acidic solution is less than 7.
PH value of basic solution is more than 7.

Q.24. What is the PH range of our body ?

Ans :- 7.0 to 7.8.

Q.25. What is acid rain ? What is it's effect ?

Ans :- When PH of rain water is less than 5.6 it is called acid rain. When acid rain flows into the rivers, it lowers the PH of the river water. The survival of aquatic life in such rivers becomes difficult.

Q.26. Does acid solution conduct electricity ?

Ans :- Yes, all acid solution conduct electricity. They allow the passage of an electric current through them.

Q.27. Distinguish between acid and alkali.

Ans :-

Acid	Alkali
1. The compound formed by the reaction of acidic oxide with water is called acid.	1. The hydroxide of metals which dissolve in water are known as alkali.
2. For example :- Hcl, HNO_3 H_2SO_4	2. For example :- NaOH, KOH, NH_4 OH.

Q.28. How do you measure the strength of an acid or a base ?

Ans :- The strength of an acid or a base depends on the number of H^+ ions or OH^- ions produced respectively by its given amount. If we take one molar concentration of hydrochloric acid and acetic acid then the acid which gives rise to move of H^+ ions is a stronger acid and the one that gives less H^+ ions is a weaken acid. In this case, it is found that hydrochloric acid is a strong acid. Similarly one can find whether it is a strong base or a weak base.

Q.29. Choose strong acid and strong base from the following- CH_3 COOH, NH_4 OH, KOH, Hcl

Ans :- Strong acid :- HCl

Strong base :- KOH

Q.30. (i) An aqueous solution has a P^H value of 7.0. Is this solution acidic, basic or neutral ?

(ii) Which has a higher P^H value; 1 M Hcl or I M NaOH ?

Ans :- (i) Neutral.

(ii) IM NAOH has higher P^H value.

Q.31. Given below are the P^H values of four different liquids. 7.0, 14.0, 4.0, 2.0 Which of these could be that of

(i) Lemon Juice.

(ii) Distilled water.

(iii) IM NaOH.

(iv) Tomato Juice.

Ans :- (i) Lemon juice 2.0

(ii) Tomato juice 4.0

(iii) Distilled water 7.0

(iv) IMNaOH 14.0

Q.32. What is the importance of P^H in tooth decay ?

Ans :- Tooth decay starts when the P^H of the mouth is lower than 5.5. Tooth enamel made of calcium phosphate is the hardest substance in the body. It does not dissolve in water, but in corroded when the P^H in the mouth is below 5.5. Bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth after eating. The best way to prevent this is to clean the mouth after eating food. Using tooth pastes, which are generally basic, for cleaning the teeth can neutralise the excess acid and prevent tooth decay.

Q.33. Name the acids found in the following :- vinegar, Ant's sting, curd, orange, unripe mangoes.

Ans :- Vinegar – Acetic acid.

Ant's sting – Formic acid

Orange – Citric acid

Curd – Lactic acid

Unripe mangoes – Tartaric acid

Q.34. Name the base found in the following :- Lime water, Soap, Milk of magnesia

Ans :- Lime water – Calcium hydroxide.

Soap – Sodium hydroxide/potassium hydroxide.

Milk of magnesia - Magnesium hydroxide.

Q.35. Out of tap water and pure water which is a poor q conductor ?

Ans :- Tap water is a very poor conductor while pure water or distilled water is non conductor.

Q.36. Match the items given in column I with those given in column II.

Column I	Column II
(a) Vinegar.	(i) Changes red litmus blue
(b) Sodium Chloride.	(ii) is sour in taste.
(c) Milk of magnesia.	(iii) major salt in sea.
(d) Potassium nitrate.	(iv) used in fertilizer industry.

Ans :- (a) Vinegar – (ii) is sour in taste.

(b) Sodium chloride – (iii) major salt in sea.

(c) Milk of magnesia – (i) changes red litmus blue

(d) Potassium nitrate – (iv) used in fertilizer industry.

Q.37. What is the chlor-alkali process ? Why it is called chlor-alkali process ?

Ans :- When electricity is passed through an aqueous solution of sodium chloride, it decomposes to form sodium hydroxide. The process is called the chlor-alkali process. It is called chlor-alkali process because of the products formed cholar for chlorine and alkali for sodium hydroxide.

$$2Nacl(aq) + 2H_2O\ (l) \rightarrow 2NaOH\ (aq) + Cl_2\ (g) + H_2\ (g)$$

Q.38. Write two uses of bleaching powder.

Ans :- (i) As an oxidising agent in many chemical industries.

(ii) for disinfecting drinking water to make it free of germs.

Q.39. Among the following salts, which salts are acidic, basic or neutral ? Sodium chloride, potassium nitrate, aluminium chloride, zinc sulphate, sodium acetate, sodium carbonate, copper sulphate, sodium sulphate, ammonium chloride.

Ans :- Acidic salts :- Aluminium chloride, zinc sulphate, copper sulphate, ammonium sulphate.

Basic salts :- Sodium acetate, sodium carbonate.

Neutral salts :- Sodium chloride, potassium nitrate, sodium sulphate.

Q.40. Write the chemical formula of washing soda. How can it be obtained form baking soda ? Describe the household application of washing soda.

Ans :- (i) Washing soda is sodium carbonate, $Na_2 CO_3$ IOH_2O

(ii) Baking soda on heating gives sodium carbonate.

$$2NaHCO_3 \xrightarrow{heat} Na_2CO_3+CO_2+H_2O$$

(iii) It is used as cleansing agent.

Multiple choice questions :

Q.1. Which one of the following types of medicine is used for treating indigestion ?

(a) Antibiotic.

(b) Analgesic.

(c) Antacid.

(d) Antiseptic.

Ans :- (c) Antacid.

Q.2. The solution of sodium hydroxide is

(a) Acidic.

(b) Alkaline.

(c) Neutrall.

(d) Amphoteric.

Ans :- (b) Alkaline.

Q.3. Name the acid present in lemon juice.

(a) Acetic acid.

(b) Citric acid.

(c) Propanoic acid.

(d) Sodium carbonate.

Ans. (b) Citric acid.

Q.4. Out of these which one gas is used in fire extinguishers.

(a) CO_2

(b) SO_2

(c) NO_2

(d) H_2S

Ans :- (a) CO_2

Q.5. Milk of magnesia has

(a) Acidic nature.

(b) Basic nature.

(c) Amphoteric nature.

(d) Neutral.

Ans :- (a) Acidic nature.

Q.6. Which of the following will give P^H less than seven?

(a) Blood.

(b) Milk of magnesia.

(c) Sodium hydroxide.

(d) Gastric juice.

Ans :- (d) Gastric juice.

Q.7. Which of the following compounds is used to repair fractured bones ?

(a) Na_2CO_3

(b) $CaOcl_2$

(c) $CaSo_4½ H_2O$

(d) $CaSo_4.5H_2O$

Ans :- (c) $CaSo_4½ H_2O$

Q.8. Tooth enamel contains.

(a) Calcium carbonate.

(b) Calcium sulphate.

(c) Calcium chloride.

(d) Calcium phosphate.

Ans :- (d) Calcium phosphate.

Q.9. The natural indicator among the following is

(a) phenolph thalein.

(b) methyl orange.

(c) methyl red.

(d) litmus.

Ans :- (d) litmus.

Q.10. Basic solutions contain :

(a) H^+ ions.

(b) OH^- ions.

(c) Both H^+ and OH^- ions.

(d) Na^+ ions.

Ans :- (c) Both H^+ and OH^- ions.

Q.11. What is corrosion ?

Ans :- The process that takes place when metals and alloys are chemically attached by oxygen, water or acid in their immediate environment is known as corrosion. It is a slow process.

Q.12. What is the other name of calcium hydroxide ?

Ans :- Slaked lime.

Q.13. What is rock salt ? Give example.

Ans :- Some of salts are mined from the minerals, that are called as rock salt.

Example :- Common salt (Nacl)

Q.14. Name two naturally occurring acids.

Ans :- Citric acid and acetic acid.

Q.15. Name a hydrogen containing compound which does not act as an acid.

Ans :- Methane (CH_4)