CHAPTER No.: 2

ACIDS, BASES AND SALTS

HOTS: (High Order Thinking Skill) Questions with Answers:

1. Kazi and priyam want to prepare dil H_2SO_4 .Kazi added conc.H_2SO_4 to water slowly with constant stirring& cooling whereas Priyam added water to conc. H_2SO_4.Name the student who was correct and why?
2. A compound X is bitter in taste. It is a component of washing powder& reacts with dil.HCl to produce brisk effervescence due to colourless, odourless gas Y which turns lime water milky due to formation of Z. When excess of CO_2 is passed, milkiness disappears doe to formation of P. Identify X, Y, and Z & P.
3. Compound P forms enamel of teeth. It is the hardest substance of the body. It does not dissolve in water but it is corroded when pH in the mouth is below 5.5. How does tooth paste prevent dental decay?
4. The oxide of a metal M was water soluble when a blue litmus strip was dipped in this solution, it did not go any change in colour. Predict the nature of oxide
5. A first aid manual suggests that vinegar should be used to treat wasp sting and baking soda for bee stings.
    (i) What does this information tell you about the chemical nature of the wasp stings
    (ii) If there were no baking soda in the house, what other household substance could you use to treat bee stings?
6. `A` is a soluble acidic oxide and `B` is a soluble base. Compared to pH of pure water. What will be the pH of (a) solution of A (b) solution of B?
7. A road tanker carrying an acid was involved in an accident and its contents spilled on the road. At the side of the road, iron drain covers began melting and fizzing as the acid ran over them. A specialist was called to see if the acid actually leaked into the nearby river.
    (a) Explain how the specialist could carry out a simple test to see if the river water contains some acid or not.
    (b) The word melting is incorrectly used in the report. Suggest a better name that should have been used.
    (c) Explain why drain covers began fizzing as the acid rain over them.
8. A compound `X` on electrolysis in aqueous solution produces a strong base. `Y` along with two gases `A` and `B`. `B` is used in manufacture of bleaching powder. Identify X, Y, A and B. Write chemical equations.
9. A yellow powder X gives a pungent smell if left open in air. It is prepared by the reaction of dry compound Y with chlorine gas. It is used for disinfecting drinking water. Identify X and Y. and write the reaction involved.
10. When CO_2 gas pass through saturated solution of ammonical brine, two compound `X` and `Y` are formed. `Y` is used as antacid and decomposes to form another solid `Z`. Identify `X`,`Y`, `Z` and write chemical equations.

11.A compound `A on heating at 370 K gives `B` used as plaster for supporting fractured bones in the right position. `B` on mixing with water changes to `A`. Identify `A` and `B` and write the chemical reaction.

12. A few drops of phenolphthalein indicator were added to an unknown solution A. It acquired pink colour. Now another unknown solution B was added to it drop by drop and the solution becomes colorless. Predict the nature of A & B.

13. A student heated a few crystals of copper sulphate in a dry boiling tube.
    (a) What will be the color of the copper sulphate after heating?
    (b) Will you notice water droplets in the boiling tube?
    (c) Where have these come from?

14. A substance `X` used in the kitchen for making tasty crispy pakoras.and is also an ingredient of antacid. Name the substance `X`.
    (i) How does `X` help to make cakes and bread soft and spongy.
    (ii) Is the pH value of solution of `X` is lesser than or greater than 7.0?

ANSWERS

Ans.1 Kazi was correct. 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.

Ans.2

$$\underset{\textbf{X}}{Na_2CO_3(s)} + 2HCl(aq) \rightarrow 2NaCl(aq) + H_2O(l) + \underset{\textbf{Y}}{CO_2(g)}$$

$$\underset{\textbf{(Lime water)}}{Ca(OH)_2(aq)} + CO_2(g) \rightarrow \underset{\textbf{(White precipitate)}}{CaCO_3(s)} + H_2O(l)$$

$$\underset{\textbf{Z}}{CaCO_3(s)} + H_2O(l) + CO_2(g) \rightarrow \underset{\textbf{(Soluble in water)}}{Ca(HCO_3)_2(aq)}$$

P

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Ans.3 P = $Ca_3(PO_4)_2$. Bacteria present in the mouth produce acids by degradation of sugar and food particles remaining in the mouth after eating. Using toothpastes, which are generally basic, for cleaning the teeth can neutralize the excess acid and prevent tooth decay.

Ans.4 The Metal oxide (MO) is of basic in nature. It dissolves in water to form metal hydroxide as $MO + H_2O \longrightarrow M(OH)_2$

Blue litmus does not undergo any change in colour in the basic medium.

Ans 5: (i) Since vinegar (acetic acid) is used to heal or neutralize the effect of wasp stings this means that the chemical present in the stings must be some base.

(ii)NH_4OH

Ans 6: pH of A will be less than 7 and that of B will be more than 7.

Ans 7: (a) By dipping a strip of blue litmus paper in to the sample of river water. If the colour changes to red this means that some acid has gone in to the river.

(b) Corrosion.
(c) Iron reacts with acid to evolve hydrogen gas.

Ans 8:

$$\underset{\text{X}}{2NaCl(aq)} + 2H_2O(l) \rightarrow \underset{\text{Y}}{2NaOH(aq)} + \underset{\text{B}}{Cl_2(g)} + \underset{\text{A}}{H_2(g)}$$

Ans 9:

$$\underset{\text{Y}}{Ca(OH)_2} + \underset{\text{X}}{Cl_2} \rightarrow CaOCl_2 + H_2O$$

Ans 10:

$$NaCl + H_2O + CO_2 + NH_3 \rightarrow \underset{\text{(Ammonium chloride)}}{NH_4Cl} + \underset{\text{(Sodium hydrogencarbonate)}}{NaHCO_3}$$

`X` `Y`

$$\underset{\text{(Sodium hydrogencarbonate)}}{2NaHCO_3} \xrightarrow{\text{Heat}} \underset{\text{(Sodium carbonate)}}{Na_2CO_3} + H_2O + CO_2$$

`Z`

Ans 11.

$$\underset{\text{(Plaster of Paris)}}{CaSO_4 . \frac{1}{2} H_2O} + 1\frac{1}{2} H_2O \rightarrow \underset{\text{(Gypsum)}}{CaSO_4 . 2H_2O}$$

`B` `A`

Ans. 12: Sol `A` is basic in nature as phenolphthalein has imparted pink colour to it. Sol `B` is an acid it has made solution A colourless by neutralizing by its basic effect.

Ans 13: (a) White
(b) Yes
(c) Copper sulphate crystals which seem to be dry contain water of crystallization.

Ans 14:

$$\underset{\text{(Sodium hydrogencarbonate)}}{2NaHCO_3} \xrightarrow{\text{Heat}} \underset{\text{(Sodium carbonate)}}{Na_2CO_3} + H_2O + CO_2$$

`X`

(i) When CO2 gas escapes as bubbles it leaves behind pores which make the cake or bread soft and spongy.

(ii) It is a salt of strong base so the pH of the solution will be more than 7.0

PRACTICE QUESTIONS

1. A substance changed its colour on heating in a closed vessel but regained it after sometime when allowed to cool and exposed to air. Name the substance. Explain the phenomenon involved.
2. What do you understand by the term Hyperacidity in a patient? What is the remedy for it?
3. A person caused burns while adding water into a concentrated acid. What was the reason behind it?
4. Why are same perishable food preserved in vinegar?
5. A doctor applied surgical bandages on fractured bones of a patient after making them wet. What changes are likely to occur?
6. Tooth enamel is one of the hardest substances in our body yet damage occurs when chocolates & sweets are eaten? Why? What will you do to prevent it?
7. An important chemical which is used in manufacture of glass, soap, paper and is also used as a cleansing agent for domestic purposes. Name it; write formula and also its chemical name.
8. Why curd or sour substance should not be kept in brass or copper container?
9. Name two synthetic indicators? What are its effects in a acidic and basic solutions?
10. Name the substance present in
    1) Bee sting 2) Stinging hair of nettle leaves.
    What should be the nature of substance for its remedy?