CBSE Test paper 04

Chapter 02 Acids Bases and Salts

1. On adding a drop of given solution on a pH paper, a student noticed that the pH paper turned blue. From this observation, it was inferred that the given solution was **(1)**

   a. dilute ethanoic acid
   b. dilute solution of sodium bicarbonate
   c. dilute hydrochloric acid
   d. concentration hydrochloric acid

2. Zn + 2NaOH → **(1)**

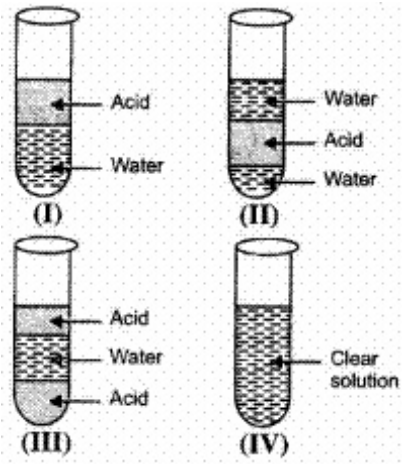
   a. $Na_2ZnO_2 + H_2$
   b. $Na_2ZnO + H_2$
   c. $NaZnO + H_2$
   d. $NaZnO_2 + H_2$

3. Which of the following salts contains water of crystallization? **(1)**

   I. Gypsum
   II. Epsom salt
   III. Blue vitriol
   IV. Glauber's salt

   a. III and IV
   b. I, II, III, IV
   c. I and II
   d. II and IV

4. 5 mL of acetic acid was added to equal volume of water and the mixture was shaken well for one minute and allowed to settle. The correct representation of the observation made would be as given in test tube **(1)**



a. III
b. I
c. II
d. IV

5. A teacher gave two test tubes, one containing water and the other containing sodium hydroxide solution, to the students and asked them to identify the test tube containing sodium hydroxide solution. Which one of the following can be used for correctly indentifying the test tube containing sodium hydroxide solution ? **(1)**

   a. Sodium carbonate solution
   b. Blue litmus
   c. Dilute carbonate solution
   d. Red litmus

6. Name the acid present in vinegar. **(1)**

7. What are acids ? **(1)**

8. What is use of pH scale ? **(1)**

9. A student has four samples A, B, C, D containing dil. HCl, aqueous KCl, dil. NaOH and distilled water respectively. Which two samples would show an equal value of pH? **(1)**

10. Describe an activity to show that acid solution in water conducts electricity. **(3)**

11. Justify HNO_3 and KOH are respectively strong and weak acid and bas **(3)**

12. A compound X of sodium is commonly used in kitchen for making crispy pakoras. It is also used for curing acidity in the stomach. Identify 'X'. What is its chemical formula? State the reaction that takes places when it is heated during cooking? **(3)**

13. Metal compound A reacts with dilute hydrochloride acid to produce effervescence. The gas evolved extinguished a burning candle. Write a balanced chemical equation for the reaction if one of the compounds formed is calcium chloride. **(3)**

14. a. Why does an aqueous solution of acid conduct electricity?
    b. How does the concentration of hydrogen ions $[H_3O]^+$ changes when the solution of an acid is diluted with water?
    c. Which has higher pH. A concentrated or dilute solution of HCL?
    d. What would you observe on adding dil HCL acid to **(5)**
        i. Sodium bicarbonate placed in a test tube.
        ii. Zinc metal in a test tube.

15. A metal carbonate X on reacting with an acid gives a gas which when passed through a solution Y gives the carbonate back. On the other hand, a gas G that is obtained at anode during electrolysis of brine is passed on dry Y, it gives a compound Z, used for disinfecting drinking water. Identify X, Y, G, and Z. **(5)**

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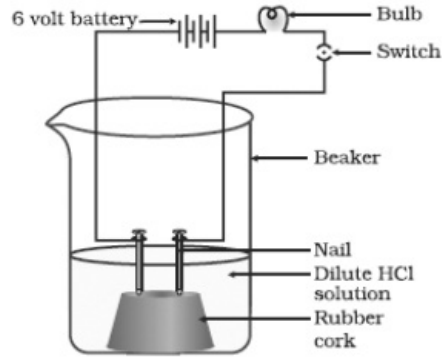
Answers

1. b. dilute solution of sodium bicarbonate
   Explanation: Dilute solution of $NaHCO_3$ is basic in nature. It will turn pH paper blue.
2. a. $Na_2ZnO_2 + H_2$
   Explanation: NaOH reacts with zinc to form sodium zincate and hydrogen
   $Zn(s) + 2NaOH(aq) \xrightarrow{Heat} Na_2ZnO_2(s) + H_2 \uparrow$
3. b. I, II, III, IV
   Explanation: All the above salts contain water of crystallisation and their chemical formulae are given below:
   Gypsum - $CaSO4.2H_2O$ - (2 molecules of water of crystallisation)
   Epsom salt- $MgSO_4.7H_2O$ - (7 molecules of water of crystallisation)
   Blue vitriol - $CuSO_4.5H_2O$ - (5 molecules of water of crystallisation)
   Glauber's salt - $Na_2SO_4.10H_2O$ - (10 molecules of water of crystallisation)
4. d. IV
   Explanation: Acetic acid dissolves in water forming clear solution.
5. d. Red litmus
   Explanation: Red litmus will turn blue when a drop of sodium hydroxide solution is put on it.
6. The acid present in vinegar is **ethanoic acid** (acetic acid).
7. Acids are compound which on dissolving in water gives hydronium ion [H_3O^+] as the only positively charged ions.
8. pH scale is used to indicate whether the given aqueous solution is acidic, basic or neutral.
9. Samples B and D, both have neutral pH. Sample B is the salt of a strong acid HCl and a strong base KOH. So, the aqueous solution is nuetral.

10. Solution of HCl is taken in the beaker and a cork with two nails fixed on it, is put in this beaker. The nails are connected to the two terminals of a 6 V battery through a bulb and a switch as shown in the fig.



Now switch on the current. The bulb is found to glow.

This shows that HCl in aqueous media forms H^+ ions which are responsible for electrical conductance in the solution.

11. HNO_3 is a strong acid since in aqueous medium it gives a large number of H^+ ions.

KOH is a weak base since in aqueous medium it furnishes a less number of OH ions.

12. Compound 'X', which is a compound of sodium and is used in kitchen, is a constituent of baking powder. It is **baking soda**. Baking powder is a mixture of **baking soda** and a mild edible acid like tartaric acid. On heating, it produces carbon dioxide gas which causes bread or cake to rise making it soft and spongy. Baking soda is also used as an antacid for curing acidity.

Chemically, compound 'X' is **sodium hydrogen carbonate**. It is represented by the formula $NaHCO_3$.

Upon heating during cooking, compound 'X' decomposes and releases CO_2 gas.

$2NaHCO_3(s) \rightarrow Na_2CO_3(s) + H_2O(l) + CO_2(g)$

13. A + HCl(dil) → $CaCl_2$ + Gas

Since the gas is formed with effervescence and extinguishes a burning candle so the gas is carbon dioxide.

A + HCl(dil) → $CaCl_2$ + CO_2

Since the metal compound reacts with dil. HCl to produce CO_2, the metal compound is a carbonate. Because $CaCl_2$ is one of the products so the metal salt is $CaCO_3$:

$CaCO_3$ + HCl(dil) → $CaCl_2$ + CO_2 + H_2O

Balancing the equation, we get

$CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2\uparrow + H_2O$

14. a. An aqueous solution of an acid conducts electricity because in water an acid (HCl) dissociates to give ions. Since the current is carried out by the movement of ions, an aqueous solution of acid conducts electricity.

    b. During dilution, more of acid dissociates into ions. Thus concentration of $[H_3O]^+$ ions will increase on dilution.

    c. Even on increasing $[H_3O]^+$ ions, the number of ions per unit volume decreases. Therefore ph will increases on dilution.

    d. i. CO_2 gas will evolves accompanied by brick effervescence.

    $$NaHCO_3(s) + HCl(aq) \rightarrow NaCl(aq) + CO_2(g) + H_2O(aq)$$

    ii. H_2 gas will evolves accompanied by brick effervescence

    $$Zn(s) + 2HCl(aq) \rightarrow ZnCl(aq) + H_2O(g)$$

15. The gas that is evolved at anode during the electrolysis of brine is chlorine. Hence, G is chlorine.

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

When chlorine gas is passed over dry slaked lime - $Ca(OH)_2$, it produces bleaching powder which is used for disinfecting drinking water. Hence, Y is slaked lime (calcium hydroxide) and Z is calcium oxy-chloride (bleaching powder).

$$\underset{Slaked\ lime}{Ca(OH)_2}.2H_2O \rightarrow \underset{\substack{Bleaching\\ Powder}}{CaOCl_2} + H_2O$$

Since Y and Z are calcium salts, therefore X is also a calcium salt. Since, X is a metal carbonate, it is calcium carbonate. Carbonates react with acids to produce carbon dioxide gas which when through a solution of slaked lime (Y) forms insoluble calcium carbonate.

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

$$Ca(OH)_2(aq) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(l)$$

X	Calcium carbonate
Y	Slaked lime (Calcium hydroxide)
G	Chlorine
Z	Calcium oxy-chloride (Bleaching powder)