Answer Key-

➢ Multiple Choice Answers:

1. (d) (ii) and (iv)
2. (c) absorb moisture from the gas
3. (b) Baking soda
4. (a) Water < Acetic acid < Hydrochloric acid
5. (b) Sodium zincate and hydrogen gas
6. (d) Oxalic acid
7. (c) aqueous solution of sodium chloride
8. (a) washing soda
9. (b) 100°C
10. (d) 2

➢ Very Short Answers:

1. Answer: Dilute Hydrochloric(HCl) acid reacts with sodium carbonate(Na_2CO_3) to produce sodium chloride (NaCl), carbon dioxide(CO_2), and water(H_2O). Brisk effervescence is seen due to the formation of carbon dioxide gas.

   The balanced chemical reaction is as follows:

   $2HCl(aq)+Na2CO3(aq)\longrightarrow 2NaCl(aq)+CO2(g)+H2O(l)$
2. Answer: Baking soda acts as a bit like preservative. It makes milk a bit alkaline so as to reduce the pace of bacteria acting on it ,as they add acids (e.g. lactic acid) to the milk and turn it sour. this keeps the milk from becoming sour for a long time.
3. Answer: Slaked lime is hydrated calcium hydroxide whereas lime water is a saturated solution of calcium hydroxide. Furthermore, slaked lime has calcium hydroxide in its unsaturated form while lime water has calcium hydroxide in its saturated form in the chemical nature of each these solutions. Similarly, we produce slaked lime from calcium oxide whereas we produce lime water from calcium hydroxide. Below inforgraphic presents more details on the difference between slaked lime and lime water in tabular form.
4. Answer: Lactic Acid or milk acid is an organic acid with chemical formula $C_3H_6O_3$. When milk sugar or lactose undergoes fermentation, the product obtained is lactic acid. It is found in cottage cheese, leban, sour milk, yogurt, and Koumiss.
5. Answer: Potassium iodide and potassium iodate are commonly added to table salt to prevent iodine deficiency and associated thyroid disease.
6. Answer: Normal distilled water has a pH of less than 7.0 and acidic because it dissolves carbon dioxide from the air. pH value of sodium chloride (common

salt) in a solution (i.e) common salt solution is about equal to 7.

7. Answer: Sodium hydroxide is a byproduct of chloralkali process. When it is kept in open, it absorbs moisture and turns sticky.

   When sodium hydroxide is treated with carbon dioxide, it gives sodium carbonate. It is important to remember that carbon dioxide is an acidic oxide.

   $2NaOH+CO_2 \rightarrow Na_2CO_3+H_2O$

   Since this reaction is between a basic compound and an acidic compound, hence it is a neutralization reaction.

   B is sodium hydroxide.

8. Answer: Alkalis can be defined as bases that are soluble in water. All alkalis are bases, but all bases are not Alkalis. Example: Sodium hydroxide. They are recognized to comprise of high pH value, i.e., above 7.

9. Answer: A knife, which is used to cut a fruit, was immediately dipped into water containing drops of blue litmus solution. If the colour of the solution is changed to red, what inference can be drawn about the nature of the fruit and why?

10. Answer: H+ ions do not exist independently, it gains the unshared electron pairs on the oxygen in the water molecule to form a hydronium ion.

    $H^+ + H_2O \longrightarrow H_3O^+$

    Hence H^+ ions in water are found as hydronium ions.

➢ Short Answer:

1. Answer:

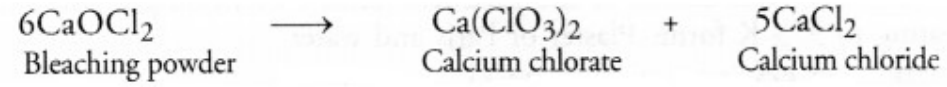
   (a) Take about 5mL of the given sample of lemon juice in a test tube.

   (b) Dip a strip of the universal pH paper in the tube.

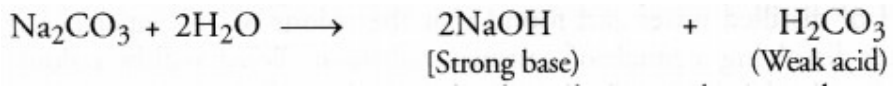
   (c) Take out the strip and note its colour. It will acquire a orange red colour.

   (d) On comparison with pH paper chart, the pH of the solution falls in the range between 2 and 3.

2. Answer: Bleaching powder if kept even in an airtight container, will slowly decompose of its own and form calcium chlorate and calcium chloride. The reaction is called auto-oxidation. This will result in decrease in its chlorine contents.



3. Answer: Sodium carbonate reacts with water to form sodium hydroxide and carbonic acid.



Since the base is strong while acid is weak, the solution is basic and not acidic.

4. Answer: The old person was suffering from acute acidity. Antacid tablet contains sodium hydrogen carbonate ($NaHCO_3$). It reacts with the acid (HCl) formed because of acidity and neutralizes its effect. That is how the old person got relief.
5. Answer: The pH of fresh milk is nearly 6. Baking soda is sodium hydrogen carbonate ($NaHCO_3$). On adding it to fresh milk, the medium becomes alkaline and its pH therefore, increases.
6. Answer: The solution A is basic in nature and phenolphthalein has imparted pink colour to it. The solution B is of an acid which has ultimately made solution A colourless by neutralising its basic effect.
7. Answer: The compound is Plaster of Paris ($CaSO_4.½\ H_2O$). It is formed from Gypsum ($CaSO_2.2H_2O$) upon heating to a temperature of 373 K and also changes back to Gypsum on adding water. Plaster of Paris is used for setting fractured bones.

$$\underset{\text{Gypsum}}{CaSO_4.2H_2O} \longrightarrow \underset{\text{Plaster of Paris}}{CaSO_4½H_2O} + {}^3/_2H_2O$$

$$CaSO_4.½H_2O + {}^3/_2H_2O \longrightarrow CaSO_4.2H_2O$$

8. Answer: The metal oxide (MO) is of basic in nature. It dissolves in water to form metal hydroxide as follows:

   $MO + H_2O \rightarrow M(OH)_2$

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

➢ Long Answer:

1. Answer:

   (a) The solution with pH 7 is neutral. Its pH can be increased by adding a small amount of base like sodium hydroxide. Basic solutions have pH more than 7. Similarly, pH can be decreased by adding small amount of acid like hydrochloric acid. Acidic solutions have pH less than 7.

   (b) The change in colour of litmus from red to blue indicates that the solution is of basic nature with pH more than 7.

   (c) Carbon dioxide can be liberated by reacting sodium carbonate solution with acid like dilute hydrochloric acid. This shows that the solution is of acidic nature with pH less than 7.

2. Answer:

   (i) Common salt contains the impurity of magnesium chloride ($MgCl_2$) which is of deliquescent nature. When exposed to atmosphere, it becomes moist. Therefore, common salt becomes sticky during the rainy reason.

   (ii) Blue vitriol ($CUSO_4.5H_2O$) upon heating changes to anhydrous copper sulphate ($CUSO_4$) which is white in colour.

(iii) Concentrated sulphuric acid is highly hygroscopic. It absorbs moisture from air and gets diluted. Since the volume increases, the acid starts flowing out of the bottle.

3. Answer:

(a) The raw materials used are: NaCl, lime stone or $CaCO_3$ and NH_3.

(b) Sodium hydrogen carbonate ($NaHCO_3$) is sparingly soluble or less soluble in water and gets separated as a preciptate while NH_4Cl remains in solution. The precipitate is removed by filtration.

(c) Sodium hydrogen carbonate is converted to sodium carbonate upon heating.

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

➢ Assertion Reason

1. (c) A is true, but R is false.

Explanation:

The process of dissolving an acid or a base in water is highly exothermic reaction. Acid must always be added slowly to water with constant stirring.

2. (c) A is true, but R is false.

Explanation:

Higher the H^+ ion concentration, lower is the pH value. The pH value less than 7 represents an acidic solution and value more than 7 represents a basic solution.

➢ Case Study Answer:

1.

i. (d) All of these.

ii. (d) All of these.

iii. (b) Gives chlorine on exposure to atmosphere.

Explanation:

Bleaching powder gives chlorine on exposure to air by reacting with CO_2.

$$CaClO_2 + CO \longrightarrow CaCO + Cl_2$$

iv. (d) All of these.

v. (a) $CaOCl_2$

Explanation:

$$Ca(OH)_2 + Cl_2 \longrightarrow CaOCl_2 + H_2O$$

2.

i. (b) $NaHCO_3$

Explanation:

$$Na_2CO_3 + H_2O + CO_2 \longrightarrow 2NaHCO_3$$

ii. (b) (I), (II) and (III).

Explanation:

$$NaHCO_3 + CH_3COOH \longrightarrow CH_3COONa + CO_2\uparrow + H_2O$$

Carbon dioxide gas is evolved which turns lime water milky. It extinguishes a burning splinter since it is not a supporter of combustion. It dissolves in sodium hydroxide solution and it is an odourless gas.

iii. (c) It is used in soda-acid fire extinguishers.

Explanation:

$$2NaHCO_3 \xrightarrow{\text{Heat}} Na_2CO_3 + H_2O + CO_2$$

$NaHCO_3$ is soluble in water.

iv. (b) Solid X is sodium bicarbonate and the gas evolved is CO_2.

Explanation:

$$NaHCO_3 + CH_3COOH \longrightarrow CH_3COONa + CO_2 + H_2O$$

v. (c) I, II and IV only.

Explanation:

It is not used in manufacture of soap.