Topics: Acids, Bases and Salts
Subtopics:Chemical Properties of Acids and Bases

Questions

Q1. Which gas is usually liberated when an acid reacts with a metal ? How will you test for the presence of this gas ?

Q2.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.

Q3.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 filing

Q4. Write a balanced chemical equation for any neutralisation reaction, mentioning the physical state of the reactants and the products.

Q5.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. In which test tube will the fizzing occur more vigorously and why ?

Q6.Write a balanced chemical equation for the reaction between sodium carbonate and hydrochloric acid indicating the physical state of the reactants and the products.

Q7. Name the products formed in each case when
(a) hydrochloric acid reacts with caustic soda.
(b) granulated zinc reacts with caustic soda.

Q8.Ammonia is a base but does not contain hydroxyl group.Give reason.

Q9. What is the colour of litmus in a solution of ammonium hydroxide?

Q10.Define olfactory indicators. Name two substances which can be used as olfactory indicator.

Answers

1.Hydrogen (H_2) gas is liberated when an acid reacts with a metal.

Test for H_2 gas

H_2 gas is not soluble in water. When passed through soap solution, it gets trapped into bubbles.Bring a burning candle near the soap bubble filled with gas. The soap bubble bursts and hydrogen gas burns with a pop sound.

2. As the end product is calcium chloride and the gas formed is carbon dioxide, the metal compound A must be calcium carbonate. Therefore, the reaction between calcium carbonate and hydrochloric acid is

$$\underset{\text{Calcium carbonate}}{CaCO_3\,(s)} + 2HCl\,(aq) \longrightarrow \underset{\text{Calcium chloride}}{CaCl_2\,(aq)} + CO_2\,(g) + H_2O\,(l)$$

3.

(a) Zinc + dilute sulphuric acid → Zinc sulphate + Hydrogen

$Zn\,(s) + H_2SO_4\,(aq) \rightarrow ZnSO_4\,(aq) + H_2\,(g)$

(b) Magnesium ribbon + dil. Hydrochloric acid → Magnesium chloride + Hydrogen

$Mg\,(s) + 2\,HCl\,(aq) \rightarrow MgCl_2\,(aq) + H_2\,(g)$

(c) Aluminium powder + dil. Sulphuric acid > Aluminium sulphate + Hydrogen

$2Al\,(s) + 3H_2SO_4\,(aq) \rightarrow Al_2\,(SO_4)_3\,(aq) + 3H_2\,(g)$

(d) Iron filings + Dilute hydrochloric acid > Ferric chloride + Hydrogen

$2Fe\,(s) + 6HCl\,(aq) \rightarrow 2FeCl_3\,(aq) + 3H_2\,(g)$

4.

$$NaOH(aq) + HCl(aq) \longrightarrow NaCl(aq) + H_2O(l)$$

5.Fizzing will occur more vigorously in test tube A. Hydrochloric acid (HCl) is a strong acid whereas acetic acid (CH_3COOH) is a weak acid. Being strong acid, the hydrochloric acid solution contains a much greater amount of hydrogen ions in it due to which the fizzing will occur more vigorously in test tube A (containing hydrochloric acid). The fizzing is due to the evolution of hydrogen gas which is formed by the action of acid on the magnesium metal of magnesium ribbon.

6.

$$Na_2CO_3(s) + 2HCl(aq) \longrightarrow 2NaCl(aq) + CO_2(g) + H_2O(l)$$

7.

(*a*) Sodium chloride and water are formed.

$$\underset{\text{Sodium hydroxide}}{NaOH(aq)} + \underset{\text{Hydrochloric acid}}{HCl(aq)} \longrightarrow \underset{\text{Sodium chloride}}{NaCl(aq)} + \underset{\text{Water}}{H_2O(l)}$$

(*b*) Sodium zincate and $H_2(g)$ are formed.

$$\underset{\text{Zinc}}{Zn(s)} + \underset{\text{Sodium hydroxide}}{2NaOH(aq)} \longrightarrow \underset{\text{Sodium zincate}}{Na_2ZnO_2(aq)} + \underset{\text{Hydrogen gas}}{H_2(g)}$$

8. Ammonia dissolves in water and forms OH– Therefore, it is basic in nature.

9.Red litmus will turn blue in ammonium hydroxide.

10. Those substances whose smell (odour) changes in acidic or basic solution are called olfactory indicators, e.g. onion and vanilla.