1. Identify the odd one out and justify.

(a) Chloride, nitrate, hydride, ammonium.

Ammonium

Others are anions.

(b) Hydrogen chloride, sodium hydroxide, calcium oxide, ammonia.

Hydrogen chloride

Others are bases.

(c) Acetic acid, carbonic acid, hydrochloric acid, nitric acid.

Acetic acid

Others are inorganic acids.

(d) Ammonium chloride, sodium chloride, potassium nitrate, sodium sulphate.

Ammonium chloride

Others are neutral salts.

(e) Sodium nitrate, sodium carbonate, sodium sulphate, sodium chloride.

Sodium carbonate

Others are neutral salts.

(f) Calcium oxide, magnesium oxide, zinc oxide, sodium oxide.

Zinc oxide

Others are basic oxides.

(g) Crystalline blue vitriol, crystalline common salt, crystalline ferrous sulphate, crystalline sodium carbonate.

Crystalline common salt

Others are crystalline substances contain water of crystallization.

(h) Sodium chloride, potassium hydroxide, acetic acid, sodium acetate

Acetic acid

Others are electrolytes.

2. Write down the changes that will be seen in each instance and explain the reason behind it.

(a) 50 ml water is added to 50 ml solution of copper sulphate.

When 50 ml water is added to 50 ml solution of copper sulphate, the blue colour of aqueous solution of copper sulphate fades and also the concentration of copper sulphate solution decreases.

(b) Two drops of the indicator phenlphthalein were added to 10 ml solution of sodium hydroxide.

When two drops of the indicator phenolphthalein were added to 10 ml of NaOH, it develplops light pink colour.

(c) Two or three filings of copper were added to 10ml dilute nitric acid and stirred.

When two or three filings of copper were added to 10 ml dilute nitric acid, it forms copper nitrate and hydrogen gas.

(d) A litmus paper was dropped into 2 ml dilute HCl. Then 2 ml concentrated NaOH was added to it and stirred.

A piece of litmus paper was added into 2 ml dilute HCl, blue litmus turns red. When in the same solution 2 ml concentrate NaOH was added and stirred, then the red litmus turned blue.

(e) Magnesium oxide was added to dilute HCl and magnesium oxide was a added to dilute NaOH.

(1) When magnesium oxide was added to dil. HCl, it forms magnesium chloride and water, Magnesium oxide being basic in nature in neutralizes acid.

(2) There is no reaction between magnesium oxide and dil. NaOH, as both are basic in nature.

(f) Zinc oxide was added to dilute HCl and zinc oxide was added to dilute NaOH.

When zinc oxide was added to dilute HCl, it forms zinc chloride and water. In this reaction, zinc oxide is a basic oxide. When zinc oxide was added to dilute NaOH, it froms sodium zincate and water. In this reaction, zinc oxide is an acidic oxide. Therefore, zinc oxide is an amphoteric oxide because it shows both acidic and basic properties.

(g) Dilute HCl was added to limestone.

When dilute HCl was added to lime stone, it forms calcium chloride, water and carbon dioxide gas.

(h) Pieces of blue vitriol were heated in a test tube. On cooling, water was added to it.

When pieces of blue vitriol were heated in a test tube, the crystalline structure of blue vitriol broke down to form colourless powder and water evaporates. On cooling when water was added to colourless powder, blue vitriol regains its blue colour. All the above changes are physical changes.

(i) Dilute H_2SO_4 was taken in an electrolytic cell and electric current was passed through it.

When electric current was passed through dilute H_2SO_4 in an electrolytic cell, H_2 gas was formed at the cathode and O_2 gas was formed at the anode.

3. Classify the following oxides into three types and name the types.

$CaO,\ MgO,\ CO_2\ ,\ SO_3\ ,$

$Na_2O,\ ZnO,\ Al_2O_3\ ,\ Fe_2O_3$

Basic oxides

$CaO,\ MgO,\ Na_2O,\ Fe_2O_3$

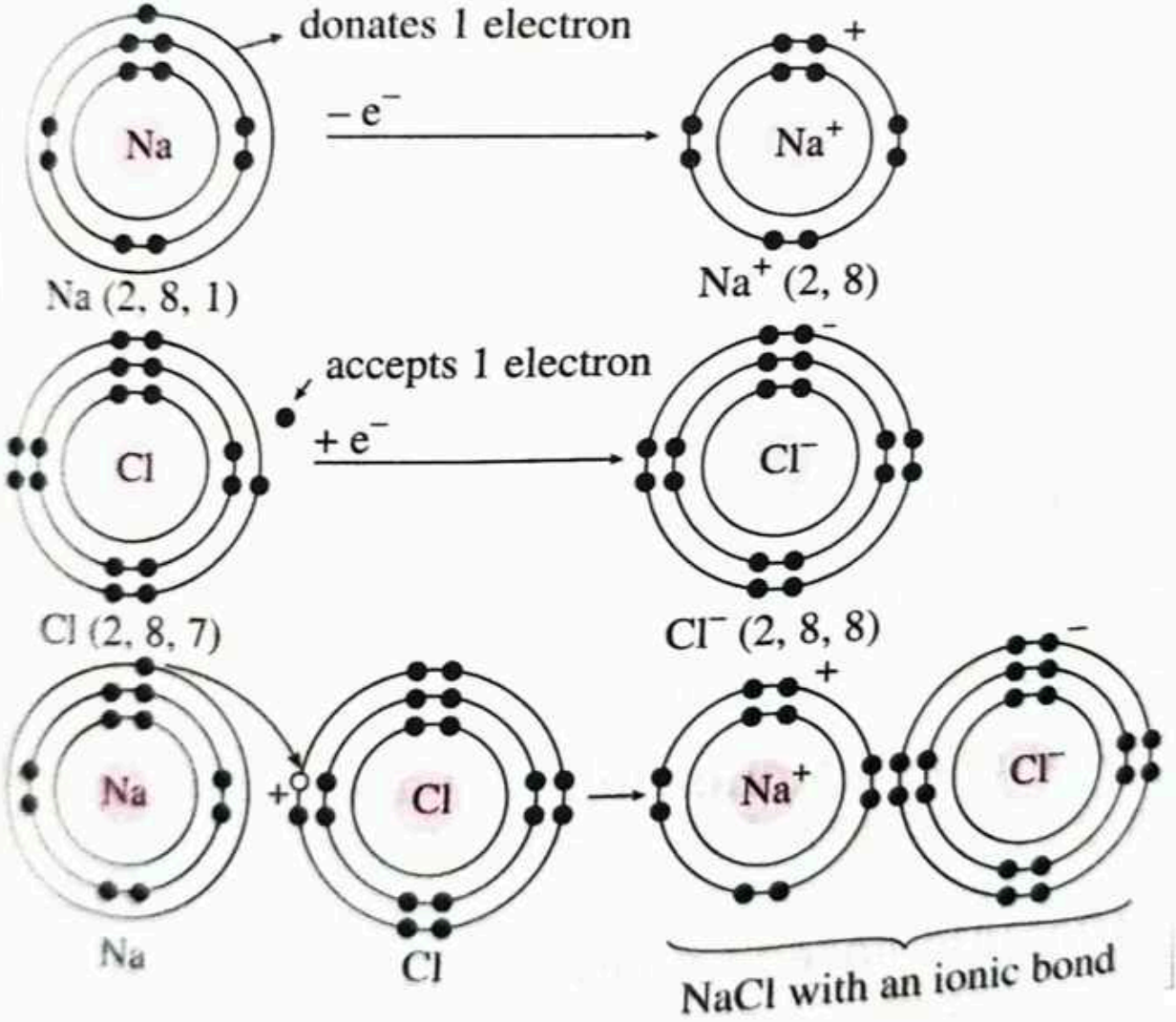
CaO, MgO, CO_2 , SO_3 ,

Na_2O, ZnO, Al_2O_3 , Fe_2O_3

Acidic oxides

CO_2 , SO_3

4. Explain by drawing a figure of the electronic configuration.



Formation of the compound NaCl

(1) An atom of sodium has one electron in its outermost orbit.

(2) An atom of chlorine has seven electrons in its outermost orbit.

(3) When these two atoms come close together, the sodium atom donates its electron and the chlorine atom accepts it, thus, both acquire octet state.

(4) Due to this, the sodium and chlorine atoms become positive and negative ions respectively. This results in the formation of an ionic bond between the two ions, due to electrostatic force of attraction, giving rise to ionic compound sodium chloride.

$$Na \longrightarrow Na^{+} + e^{-} \; ; \; Cl + e^{-} \longrightarrow Cl^{-}$$

(2, 8, 1) (2, 8) (2, 8, 7) (2, 8, 8)

$$Na^{+} + Cl^{-} \longrightarrow NaCl$$

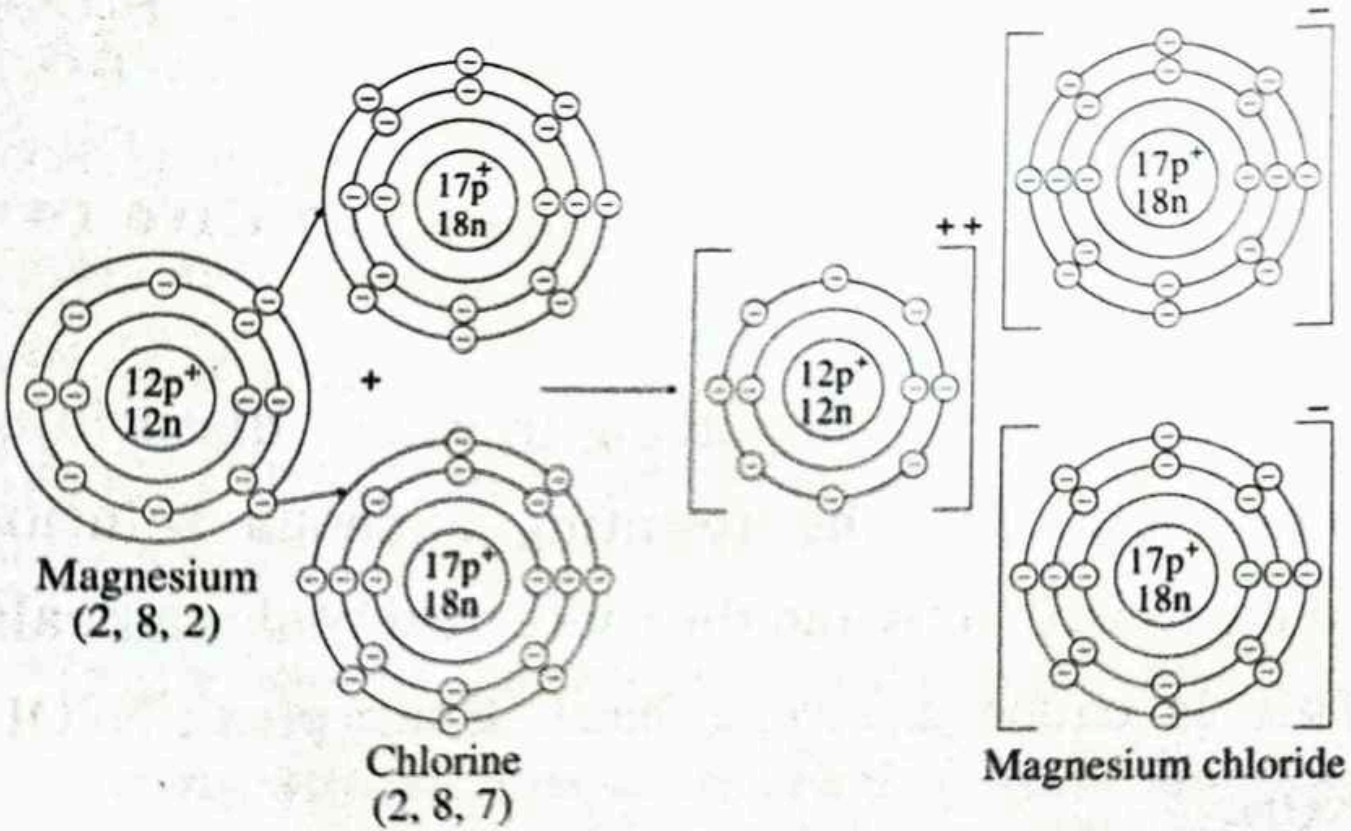
b. Formation of a magnesium chloride from magnesium and chlorine.

Magnesium chloride

(1) The magnesium atom has 2 electrons in it's outermost orbit. It gives electrons from its outermost orbit and gets converted into a positive ion with 2 unit positive charge.

(2) The chlorine atom has 7 electrons in its outermost orbit. So, each chlorine atom needs only one electron to establish the octet state of its outermost orbit and thereby gets converted into a negatively charged chloride ion with a unit negative charge.

Magnesium chloride



(3) So two chlorine atoms accept one electron each from a magnesium atom and consequently two chloride ions and a magnesium ion are formed.

(4) Due to the electrostatic force of attraction an ionic bond is fromed and this results in the formation of magnesium chloride molecule.

Magnesium chloride

$$Mg \longrightarrow Mg^{++} + 2e^{-} \quad ; \quad 2Cl + 2e^{-} \longrightarrow 2Cl^{-}$$

(2, 8, 2) (2, 8) (2, 8, 7) (2, 8, 8)

$$Mg^{++} + 2Cl^{-} \longrightarrow MgCl_2$$

5. Show the dissociation of the following compounds on dissolving in water, with the help of chemical equation and write whether the proportion of dissociation is small or large.

Hydrochloric acid

$$HCl \xrightarrow{\text{Water}} H^{+} + Cl^{-}$$ dissociation is large

Sodium chloride

$$NaCl \xrightarrow{\text{Water}} Na^{+} + Cl^{-}$$ dissociation is large

Potassium hydroxide

$$KOH \xrightarrow{\text{Water}} K^{+} + OH^{-}$$ dissociation is large

Ammonia

$$NH_3 \xrightarrow{\text{Water}} NH_4^{+} + OH^{-}$$ dissociation is small

Acetic acid

$$CH_3COOH \xrightarrow{\text{Water}} CH_3COO^- + H^+$$ dissociation is small

Magnesium chloride

$$MgCl_2 \xrightarrow{\text{Water}} Mg^{2+} + 2Cl^-$$ dissociation is small

Copper sulphate

$$CuSO_4 \xrightarrow{\text{Water}} Cu^{2+} + SO_4^{2-}$$ dissociation is large

6. Write down the concentration of each of the following solutions in g/L and mol/L.

a. 7.3g HCl in 100ml solution

b. 2g NaOH in 50ml solution

c. 3g CH_3COOH in 100ml solution

d. 4.9g H_2SO_4 in 200ml solution

Solute			Quantity of solute		Volume of solute	Concentration of solution	
A Name	B Molecular formula	C Molecular mass (u)	D Gram (g)	$E = \frac{D}{C}$ Mole (mol)	F Litre (L)	$G = \frac{D}{F}$ Gram/ litre(g/l)	$H = \frac{E}{F}$ Morality (M) mol/L
Hydro-chloric acid	HCl	36.5 u	7.3 g	0.2 mol	100 ml (01. L)	73 g/L	2 mol/L
Sodium hydro-xide	NaOH	40 u	2 g	0.05 mol	50 ml (0.05 L)	40 g/L	1 mol/L

Solute			Quantity of solute		Volume of solute	Concentration of solution	
A Name	B Molecular formula	C Molecular mass (u)	D Gram (g)	E = $\frac{D}{C}$ Mole (mol)	F Litre (L)	G = $\frac{D}{F}$ Gram/ litre(g/l)	H = $\frac{E}{F}$ Morality (M) mol/L
Acetic acid	CH_3COOH	60 u	3 g	0.05 mol	100 ml (01. L)	30 g/L	0.5 mol/L
Sulphu-ric acid	H_2SO_4	98 u	4.9 g	0.05 mol	200 ml (0.2 L)	24.5 g/L	0.25 mol/L

a. Classify the acids according to their basicity and give one example of each type.

Basicity of acids

The number of H^+ ions obtainable by the dissociation of one molecule of an acid is called iis basicity.

Examples

Dibasic acid

H_2SO_4, H_2CO_3

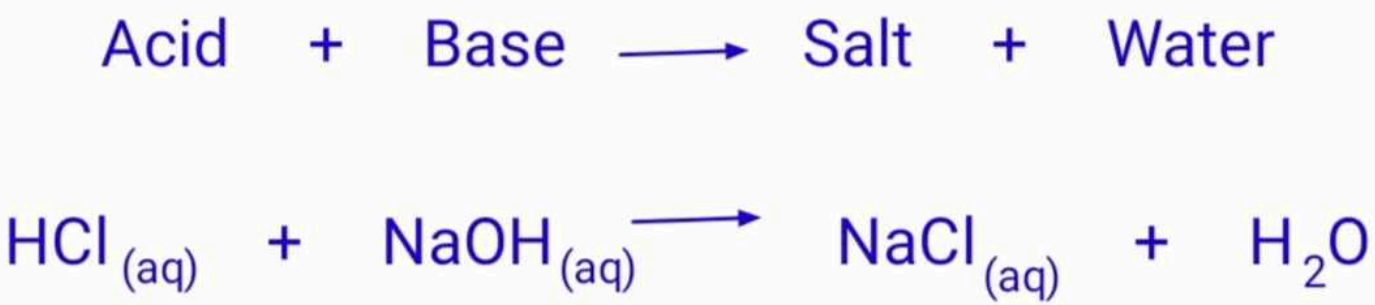
Examples

Tribasic acid

H_3BO_3 , H_3PO_4

b. What is meant by neutralization ? Give two examples from everyday life of the neutralization reaction

An acid reacts with a base to form a salt and water is called the neutralization.


Acid + Base → Salt + Water
HCl (aq) + NaOH (aq) → NaCl (aq) + H2O

H^+ ions are formed from an acid
and OH^- ions are formed from a base.

$$H^+_{(aq)} + OH^-_{(aq)} \longrightarrow H_2O_{(l)}$$

H^+ ions of an acid react with OH^- ions of a base to form unionised water, this is called the neutralization.

Examples from everyday life

(1) The person is suffering from acidity. The stomach of a person produces dilute acid which helps in digestion of food that he eats. When the production of acid is more than the required amount, the person suffers from acidity which causes burning sensation of the stomach. In order to cure burning sensation of the stomach, people use basic substances called antacids. These antacids neutralize the excess acid in the stomach.

(2) Before we brush our teeth, the pH of saliva is less than 7 i.e. acidic. Therefore, the presence of an alkaline substance in a toothpaste, neutralizes the acid produced in the mouth and prevents tooth decay.

c. Explain what is meant by electrolysis of water. Write the electrode reactions and explain them.

When electric current is passed through water containing a few drops of an acid or a few drops of a base, it dissociates to give H^+ ions and OH^- ions. Hydrogen gas is formed near the cathode and oxygen gas near the anode. This is called electrolysis of water.

Cathod reaction : $2H_2O_{(l)} + 2e^- \longrightarrow H_{2(g)} + 2OH^-_{(aq)}$

Anode reaction : $2H_2O_{(l)} + O_{2(g)} \longrightarrow 4H^+_{(aq)} + 4e^-$

8. Write the chemical equations for the following activities.

(a) NaOH solution was added to HCl solution.

When NaOH solution was added to HCl solution, it forms sodium chloride and water. It is a neutralization reaction.

$$HCl_{(aq)} + NaOH_{(aq)} \longrightarrow NaCl_{(aq)} + H_2O_{(l)}$$

Hydrochloric acid	Sodium hydroxide	Sodium chloride

(b) Zinc dust was added to dilute H_2SO_4.

When zinc dust was added to dil. H_2SO_4 , it forms zinc sulphate and hydrogen gas.

$$Zn + H_2SO_4 \longrightarrow ZnSO_{4(aq)} + H_{2(g)}$$

Zinc

Zinc sulphate

(c) Dilute nitric acid was added to calcium oxide.

When dilute nitric acid was added to calcium oxide, it forms calcium nitrate and water.

$$CaO + 2HNO_3 \longrightarrow Ca(NO_3)_{2(aq)} + H_2O$$

Calcium Oxide	dil. nitric acid	Calcium nitrate

(d) Carbon dioxide gas was passed through KOH solution.

When carbon dioxide gas was passed through KOH solution, it forms potassium carbonate and water.

$$CO_{2(g)} + 2KOH_{(aq)} \longrightarrow K_2CO_{3(aq)} + H_2O$$

Carbon dioxide

Potassium carbonate

(e) Dilute HCl was poured on baking soda.

When dilute HCl was poured on baking soda, it forms sodium chloride and carbon dioxide gas.

$$NaHCO_{3(s)} + HCl_{(aq)} \longrightarrow NaCl_{(aq)} + H_2O_{(l)} + CO_{2(g)}$$

Baking soda

Sodium chloride

Carbon dioxide

Acids	Bases
Acids have sour taste.	Bases have bitter taste.
Acids have ond more H^+ ions.	Bases have one or more OH^- ions.
Acids turn blue litmus red.	Bases turn red litmus blue.
Oxides of non-metals form acids.	Oxides of metals from bases.
It neutralizes a base to give salt and water.	It neutralizes an acid to give salt and water.
Examples : HCl, H_2SO_4, H_3PO_4	Examples : NaOH, $Ca(OH)_2$

Cation	Anion
Positively charged ions are called cations.	Negatively charged ions are called anions.
Cations are attracted towards a cathode.	Anions are attracted towards an anode.
Usually cations are obtained from metals and hydrogen.	Usually anions are obtained from non-metals.
Examples : Na^+, H^+, Mg^{2+}	Examples : Cl^-, Br^-, SO_4^{2-}

Negative electrode	Positive electrode
The negatively charged electrode is called a cathode.	The positively charged electrode is called an anode.
Cations are attracted towards a cathode.	Anions are attracted towards a anode.
Electrons enter the solution at a cathode or a cathode supplies electrons.	Electrons are accepted by an anode.

10. Classify aqueous solutions of the following substances according to their pH into three groups : 7, more than 7, less than 7

Common salt, sodium acetate, hydrochloric acid, carbon dioxide, potassium bromide, calcium hydoxide, ammonium chloride, vinegar, sodium carbonate, ammonia, sulphur dioxide

pH	Aqueous solution of the substance
7	Common salt
Less than 7	Hydrochloric acid, carbon dioxide, ammonium chloride, vinegar, sulphur dioxide.
More than 7	Sodium acetate, potassium bromide, calcium hydroxide, sodium carbonate, ammonia.