SHORT QUESTIONS

Q.1 What is the difference between slaked lime and un-slaked lime?

Ans. $Ca(OH)_2$ is called slaked lime and CaO is called un-slaked lime. It is also called quick lime.

Q.2 What is the effect of heat on gypsum?

Ans. When gypsum is heated at 100°C, it changes into plaster of Paris.

$$2CaSO_4 . 2H_2O \xrightarrow{100°C} (CaSO_4)_2H_2O + 3H_2O$$

On heating at 400°C, it changes into dead burnt gypsum (anydrous $CaSO_4$).

$$CaSO_4 . 2H_2O \xrightarrow{400°C} CaSO_4 + 2H_2O$$

Q.3 Why lithium shows peculiar behaviour from other alkali metals?

Ans. Atomic number of Li is very small as compared to the other members of IA. The ionic radius of Li^+ is 60 Pm and that of Na^+ is 95 Pm. Li^+ has greater charge density. The nuclear charge of lithium atom is screened by only two electrons of K-shell. Therefore, the properties of Li differ from the other members of the group.

Q.4 Shows that BeO is amphoteric in nature (acidic and basic).

Ans. It reacts with acids and bases to form salt and H_2O.

$$BeO + H_2SO_4 \longrightarrow BeSO_4 + H_2O$$

$$BeO + 2NaOH \longrightarrow Na_2BeO_2 + H_2O$$

Q.5 What is the difference between peroxides and superoxides?

Ans. In the peroxides (H_2O_2, Na_2O_2), the oxidation state of O is -1 and in superoxides (KO_2, RbO_2), the oxidation state of O is $-\frac{1}{2}$.

Per oxides dissolve in H_2O to form NaOH and O_2

$$2Na_2O_2 + 2H_2O \longrightarrow 4NaOH + O_2$$

Superoxides dissolve in H_2O to form hydroxides, hydrogen peroxide and O_2.

$$2KO_2 + 2H_2O \longrightarrow 2KOH + H_2O_2 + O_2$$

Q.6 What is the formula of milk of magnesia and milk of lime, washing soda, soda ash and pearl ash, baking soda?

Ans. Milk of magnesia $Mg(OH)_2$

Milk of lime $Ca(OH)_2$

Washing soda	$Na_2CO_3 . 10H_2O$
Soda ash	Na_2CO_3
Pearl ash	K_2CO_3
Baking soda	$NaHCO_3$

Q.7 What is the action of heat on the following KNO_3, $NaNO_3$, $LiNO_3$, $Ca(NO_3)_2$, $Mg(NO_3)_2$, $CaCO_3$, $Ca(HCO_3)_2$?

Ans. $2KNO_3 \xrightarrow{\Delta} 2KNO_2 + O_2$

$2NaNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2$

$4LiNO_3 \xrightarrow{\Delta} 2Li_2O + 4NO_2 + O_2$

$2Ca(NO_3)_2 \xrightarrow{\Delta} 2CaO + 4NO_2 + O_2$

$2Mg(NO_3)_2 \xrightarrow{\Delta} 2MgO + 4NO_2 + O_2$

$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$

$Ca(HCO_3)_2 \xrightarrow{\Delta} CaCO_3 + CO_2 + H_2O$

Q.8 How the melting point of NaCl is decreased?

Ans. The melting point of NaCl is 801°C. It is decreased by adding $CaCl_2$ as impurity the melting point of NaCl is decreased to 600°C by adding $CaCl_2$.

Q.9 Which is spectator ion in the Nelson's cell?

Ans. The ion present in the cell and is not oxidised or reduced is called spectator ion. In the Nelson's cell, Na^+ ion is spectator ion.

In the Nelson's cell, H_2O is reduced instead of Na^+. The over all reaction is

$$2NaCl + 2H_2O \longrightarrow 2NaOH + H_2 + Cl_2$$

Q.10 What are two problems faced during the working of Nelson's cell?

Ans. (i) Cl_2 produced can react with OH^- ions in the cold state giving hypochlorite ions.

$$Cl_{2(g)} + 2OH^-_{(aq)} \longrightarrow OCl^-_{(aq)} + Cl^-_{(aq)} + H_2O$$

(ii) OH^- ions may be attracted towards anode where they can be discharged releasing oxygen which can contaminate chlorine and render it impure.

$$4OH^- \longrightarrow 2H_2O + O_2 + 4e^-$$

Q.11 What is the solution of the two problems faced in the Nelson's cell?

Ans. (i) The first problem is solved by using asbestos diaphragm. This keeps the two solutions separate while allowing Na^+ ions to move towards the cathode which keeps the current flowing through the external circuit.

(ii) The second problem is solved by keeping the level of brine towards anode compartment slightly higher which prevents the possibility of OH^- ions to reach the anode.

Q.12 What are uses of plaster of Paris?

Ans. (i) It is used for making plaster walls and roofs.

(ii) It is used for making plaster bandages.

(iii) It is used to make casts for statuary.

Q.13 What is the function of calcium in plants?

Ans. (i) Calcium present in plants stimulates the development of roots, hairs and entire root system of plants.

(ii) It is also required for development of leaves.

(iii) It is also essential for the optimum activity of microorganisms that produce nitrates.

Q.14 Give three uses of lime?

Ans. (i) It is used to prepare CaC_2 which is used to prepare acetylene gas for welding.

(ii) It is used in the extraction and refining of metals.

(iii) Lime is used for the manufacture of bleaching powder.

Q.15 Why sodium metal is stored in kerosene oil?

Ans. Sodium is highly reactive with air oxygen and moisture.

$$2Na + O_2 \longrightarrow Na_2O_2$$

$$2Na + 2H_2O \longrightarrow 2NaOH + H_2$$

It is stored in kerosene oil, which is mixture of hydrocarbons. Sodium metal does not react with hydrocarbons and does not contact with air oxygen or moisture.

Q.16 What are two similar behaviours of Li and Mg?

Ans. (i) Li and Mg both react with O_2 to form normal oxides:

$$4Li + O_2 \longrightarrow 2Li_2O$$

$$2Mg + O_2 \longrightarrow 2MgO$$

(ii) Both Li and Mg react with N_2 to form nitrides:

$$6Li + N_2 \longrightarrow 2Li_3N$$

$$3Mg + N_2 \longrightarrow Mg_3N_2$$

Q.17 Write the formula of the ores of alkali metals and alkaline earth metals.

Ans.

Spodumene	$LiAl(SiO_3)_2$
Halite (rock salt)	$NaCl$
Chile saltpeter	$NaNO_3$
Natron	$Na_2CO_3 . H_2O$
Trona	$Na_2CO_3 . 2NaHCO_3 . 2H_2O$
Borax	$Na_2B_4O_7 . 10H_2O$
Carnallite	$KCl . MgCl_2 . 6H_2O$
Sylvite	KCl

Alunite	$K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 4Al(OH)_3$
Beryl	$Be_3Al_2(SiO_3)_6$ / $3BeO \cdot Al_2O_3 \cdot 6SiO_2$ (Oxide ore)
Chrysoberyl	Al_2BeO_4
Magnesite	$MgCO_3$
Dolmite	$MgCO_3 \cdot CaCO_3$
Epsom salt	$MgSO_4 \cdot 7H_2O$ (Epsomite)
Soap stone (talc)	$H_2Mg_3(SiO_3)_4$
Asbestos	$CaMg_3(SiO_3)_4$
Calcite / Aragonite	$CaCO_3$
Gypsum	$CaSO_4 \cdot 2H_2O$
Strontionite	$SrCO_3$
Barite	$BaSO_4$
Whetherite	$BaCO_3$
Phosphrite	$Ca_3(PO_4)_2$ (Phosphate rock)

Q.18 What is lime mortar? Give its function.

Ans. It is made by mixing slaked lime with sand (three volumes) and water to make a thick paste. This material when placed between the stones and bricks hardens or sets, thus building the blocks firmly together.

$$CaO + H_2O \longrightarrow Ca(OH)_2$$

$$Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$$

$$Ca(OH)_2 + SiO_2 \longrightarrow CaSiO_3 + H_2O$$