

### Point to Remember

- Although a number of chemists attempted to classify the elements but Dmitri Mendeleev gave the most useful and comprehensive classification.
- In Mendeleev's periodic table the elements were arranged according to the ascending order of their atomic masses.
- The modern periodic law states "if the elements are arranged in ascending order of their atomic numbers, their chemical properties repeat in a periodic manner."
- In modern periodic table elements with similar properties are placed in eight vertical columns called groups. Each group is divided into two subgroups A and B. Normal or typical elements are placed in subgroups A and transition elements are placed in subgroups B.
- The seven horizontal rows of the periodic table are called "periods". 6. Metals of subgroups I and IIA are called Alkali metals and Alkaline-earth metals, respectively. Members of subgroup VIIA are called halogens.
- Due to their less reactivity the elements shown in subgroup VIII A are called noble gases. 8. Elements of periodic table can also be classified into s-block, p-block, d-block and f-block elements depending upon the valence orbital which is in the process of completion.
- Elements of periodic table can also be divided into metals, non-metals and metalloids depending upon their properties.
- Atomic radii increase from top to bottom in a group and decrease along a period.
- Positive ions are always smaller than their parent atoms while the negative ions are usually larger than the atoms from which they are formed.
- Ionization energies increase along a period and decrease down the group.
- Electron affinities generally increase with increasing atomic number within a period and decrease from lighter to heavier elements in a given group.
- Metallic character of elements increases down the group and decreases along a period.
- The oxidation state of a typical element is directly or indirectly related to the group number to which the element belongs in the periodic table.
- The electrical conductance of an element depends upon the number of free or moveable electrons.
- There are three types of halides: ionic, polymeric and covalent. Halides of group IA are ionic in nature, have three dimensional lattices with high melting and boiling points.
- There are three types of hydrides formed by the elements of periodic table: ionic, intermediate and covalent.
- Highly polar hydrides show hydrogen bonding in them.
- Oxides may be divided on the basis of their acidic, basic or amphoteric character.
- Metallic oxides are basic in character, non-metallic oxides are acidic in character and oxides of less electropositive elements like Zn and Pb are amphoteric.
- Hydrogen is unique element of the periodic table. Due to similarities in properties it can be placed at the top of group IA or IVA or VIIA.

**Q.NO.1.** Define alkali metals and alkaline earth metals?

**OR Why are the elements of group I-A are called Alkali metals and that of group II-A alkaline earth metals?**

**OR Why s-block elements are called as alkali and alkaline earth metals?**

**OR What are s-block elements are called Alkaline Earth Metals?**

**Ans.** **Alkali Metals:** The element of group IA except hydrogen are called Alkali metals, because of their property to form strong alkalis with water.



**Alkaline Earth Metals:** The elements of group IIA are known as Alkaline Earth Metals, because they produce alkalis in water and are widely distributed in earth's crust.

s-block elements are the metals in Group 1-A and group II-A of the periodic table. They are called the s-block elements because S-orbitals are being filled in their outermost shells.

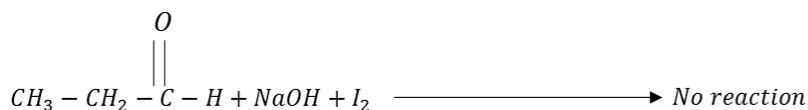
**Q.NO.2.** How will you distinguish between ethanol and propanol?

**Ans.** Both can be distinguished by locus form test.

Reaction 1:



Reaction 2:



**Q.NO.3.** Write formulas of Borax and Chile Saltpeter?

**Ans.** Formulas:

Borax ( $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ ) (ii) Chile saltpeter ( $\text{NaNO}_3$ )

**Q.NO.4.** Give two similar properties of Lithium and Magnesium?

**Ans.** Similarities between Li and Mg:

Being very reactive both, Li and Mg do not occur in free state. Both Li and Mg react with nitrogen on heating giving nitride. i.e.;



**Q.NO.5.** Give formulas of Natron and Halite.

**Ans.** Natron  $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$  and Halite (Rock Salt)  $\text{NaCl}$

**Q.NO.6.** Give the name and formula of common minerals of Be?

**Ans.** Common minerals of Be:

i Beryl  $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$

ii Chrysoberyl  $\text{Al BeO}_2$

**Q.NO.7.** Write chemical formulas of the following minerals? Beryl and Barite?

**Ans.** Beryl  $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$  and Barite  $\text{BaSO}_4$

**Q.NO.8.** Give formulas of the given minerals: a) Phosphorite and b) Chile Salt petre

**Ans.** a) Phosphorite  $\text{Ca}_3(\text{PO}_4)_2$  b) Chile Salt petre  $\text{NaNO}_3$

**Q.NO.9.** Write formulas of Beryl and Sylvite?

**Ans.** Beryl  $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$  and Sylvite  $\text{KCl}$

**Q.NO.10.** What happened when (i) Lithium carbonate is heated (b) Lithium hydroxide is heated to red.

**Ans.** (i) Lithium Carbonate:



(ii) Lithium Hydroxide:



**Q.NO.11.** Write any two points of difference of Be with its family members.

**OR** Write two points to show the peculiar behavior of beryllium.

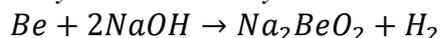
**Ans.** The two difference of Be with its family members are

i The melting and boiling points of Be are higher than other alkaline earth metals.

ii Be-metal is Harder than other alkaline earth glass.

**Q.NO.12.** What happens when Beryllium is treated with sodium Hydroxide?

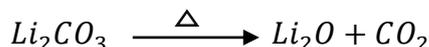
**Ans.** Beryllium is the only alkaline earth metal which reacts with  $\text{NaOH}$  to liberate hydrogen.



$\text{Na}_2\text{BeO}_2$  (sod beryllate)

**Q.NO.13.** Why Lithium carbonate decomposes on heating while other alkali metal carbonates remain unaffected?

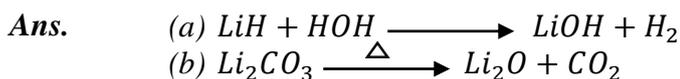
**Ans.** Lithium carbonate decomposes on heating to form oxide because the electrostatic attraction towards oxide formation is high.



While other metal carbonates do not decompose because the electrostatic attraction towards oxide formation is very low.

**Q.NO.14.** What happens when?

(a) Lithium Hydride is treated with water

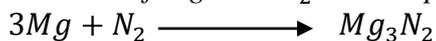
**(b) Lithium carbonate is heated**

**Q.NO.15. Alkali metals are strong reducing agent, Give reason.**

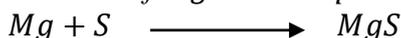
Ans. Alkali metals have large size and the attraction between the nucleus and valence shell electrons is low i.e. why they have low ionization energy, tend to donate electron easily. This makes them strong reducing agents.

**Q.NO.16. Give reactions of Mg with N<sub>2</sub> and Sulphur?**

Ans. i Reaction of Mg with N<sub>2</sub> and Sulphur?



ii Reaction of Mg with Sulphur:

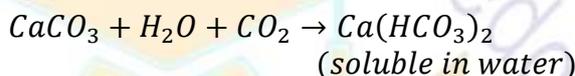


**Q.NO.17. Why lime water turns milky with CO<sub>2</sub> but becomes clear with excess of CO<sub>2</sub>?**

Ans. Lime water turns milky because CaCO<sub>3</sub> is produced. When CO<sub>2</sub> is passed through it, CaCO<sub>3</sub> is water insoluble so suspension is produced and we say that solution of lime turns milky.



Excess CO<sub>2</sub> converts CaCO<sub>3</sub> to Ca(HCO<sub>3</sub>)<sub>2</sub>, which is water soluble. So milky of lime water disappears.



**Q.NO.18. Why aqueous solution of Na<sub>2</sub>CO<sub>3</sub> is alkaline in nature?**

Ans. Nature of Na<sub>2</sub>CO<sub>3</sub>: the solution of Na<sub>2</sub>CO<sub>3</sub> in water is basic due to hydrolysis of carbonate ion. i.e.;



**Q.NO.19. Prove Decomposition of lithium nitrate, give different products than nitrates of other alkali metals?**

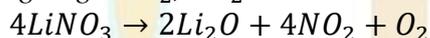
**OR What happens, when**

(a) Lithium Nitrates is heated up

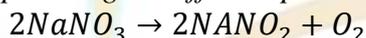
(b) Sodium Nitrate is heated up

Ans. Nitrates:

Nitrates of Li, decompose on heating to give O<sub>2</sub>, NO<sub>2</sub> and the metallic oxide. i.e.

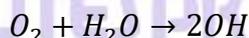


Whereas nitrates of Na and K decompose to give different products like.

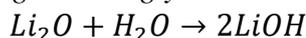


**Q.NO.20. The oxides of alkali metals are basic, give reason?**

Ans. The oxides of alkali metals are basic because they contain O<sup>-2</sup> ions. The O<sup>-2</sup> ion has high affinity for proton and cannot exist alone in an aqueous solution. Therefore, it immediately takes proton from water and forms OH<sup>-</sup> ion.



Alkali metal oxides dissolve in water to give strongly alkaline solutions e.g.;



**Q.NO.21. What is milk of magnesia? Give its uses.**

Ans. Milk of Magnesia: A suspension of Mg(OH)<sub>2</sub> in water is called milk of magnesia.

USE: it is used for treatment of acidity in stomach.

**Q.NO.22. Solubility of alkaline Earth metal Hydroxides increases down the group, Give reason?**

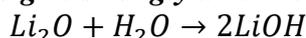
Ans. If hydration energy is greater than lattice energy then the compound is soluble in water. In case of these hydroxides as we move down the group the difference between the hydration energy and lattice energy goes on increasing thus making the hydroxides more easily soluble.

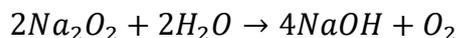
The size of the metal ion increases in the order Be < Mg < Ca < Ba. So, the lattice enthalpy goes on decreasing from Be(OH)<sub>2</sub> to Ba(OH)<sub>2</sub>. Also, at the same time the hydration energy increases from Be(OH)<sub>2</sub> to Ba(OH)<sub>2</sub> is most soluble in water.

**Q.NO.23. Write a note on oxides of alkali of metals?**

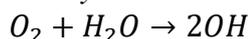
Ans. Oxides of alkali of metals:

Alkali metal oxides dissolve in water to give strongly alkaline solutions.





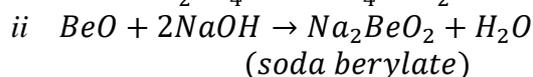
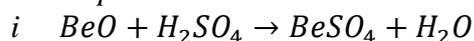
The reaction of an alkali metal oxide with water is an acid base reaction. The reaction simply involves the decomposition of water molecule by an oxide ion.



The basic character of alkali metal oxides increase down the group.

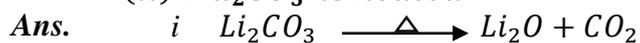
**Q.NO.24. BeO is amphoteric oxide. Show with two suitable reactions.**

**Ans.** BeO is amphoteric in nature since it react with both acids and bases.



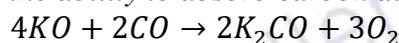
**Q.NO.25. What happens when (i)  $\text{Li}_2\text{CO}_3$  is heated**

**(ii)  $\text{Na}_2\text{CO}_3$  is heated**

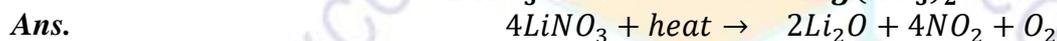


**Q.NO.26. Why potassium superoxide is used in breathing equipment for mountaineer and in space crafts?**

**Ans.**  $\text{KO}_2$  has a very interesting use in breathing equipment's for mountaineers and in space crafts. It has the ability to absorb carbon dioxide while giving out oxygen at the same time.



**Q.NO.27. Complete and balanced equations**



**Q.NO.28. Why aqueous solution of NaOH is more basic than LiOH?**

**Ans.** Solubility of NaOH is greater in water as compared to LiOH due to lower lattice energy of NaOH. As NaOH produce more OH ions in water so solution of NaOH is more basic than that of LiOH.

**Q.NO.29. What is the chemical nature of lime water and milk of magnesia?**

**Ans.** Lime water: A saturated solution of  $\text{Ca(OH)}_2$  in water is called lime water and is used as a test for  $\text{CO}_2$ .

Milk of Magnesia: A suspension of  $\text{Mg(OH)}_2$  in water is called milk of magnesia and it is used for treatment of acidity in stomach.

**Q.NO.30. What are advantage of Down's cell for the preparation of sodium on commercial scale?**

**Ans.** These are as follows:

i The metallic fog is not produced.

ii Liquid sodium can easily be collected at  $600\text{C}^0$

iii Material of the cell is not attacked by the products formed during the electrolysis.

**Q.NO.31. Why is  $\text{CaCl}_2$  added in NaCl is Down's cell?**

**Ans.** Melting point of NaCl is  $801\text{C}^0$ , some amount of  $\text{CaCl}_2$  is added into it to lower its melting point and to permit the surface to operate at about  $600\text{C}^0$ .

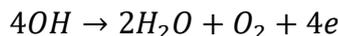
**Q.NO.32. What are the two major problems faced during the working of diagram cell?**

**Ans.** There are two major problems during working of diagram cell.

i Chlorine produce can react with hydroxide ions in cold to give hydrochloride ions.



ii Hydroxide ions may be attracted towards anode, where they can be discharged releasing oxygen gas. This oxygen gas may contaminate the chlorine and renders it impure.



**Q.NO.33. Why gypsum is added in cement?**

**Ans.** 2% gypsum is added in cement in order to prevent the cement from hardening too rapidly. It means that gypsum is added in order to increase the setting time of cement.

**Q.NO.34. What are main uses of plaster of Paris?**

**Ans.** i Plaster of Paris bandages are used for holding in place fractured bones after they have been set.

ii It is used for making plaster wall, casts of statuary, coins etc.

**Q.NO.35. What is cement plaster and hard finish plaster? OR What is hard –finish plaster?**

**Ans.** **Cement Plaster:** it is plaster of Paris to which usually glue or other oils have been added as retarders to prolong the time of setting.

**Hard finish plasters:** these are made by the calcination of the anhydrous sulphate with alum or Borax. These plasters set very slowly but give a hard finish.

**Q.NO.36. What is the importance of Sulphur of plants?**

**Ans.** Sulphur has been recognized as an essential constituent of plants. For centuries, Sulphur compounds had been applied to soils because of their observed beneficial effect on plant growth aside from serving as a constituent of protein and various other compounds in plant, Sulphur has an influence on chlorophyll development in plants leaves. Although not a constituent of chlorophyll, plants deficient in Sulphur exhibits a pale green color.

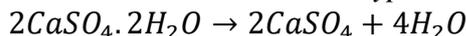
Rots system of plants has been observed to be greatly enlarged by the application of Sulphur.

**Q.NO.37. What is the action of heat on gypsum? OR How gypsum is /can be converted into plaster of Paris?**

**Ans.** When gypsum is heated under carefully controlled conditions, it loses three quarters of water of crystallization. The resulting product is called plaster of Paris.



Dead burnt Gypsum: Gypsum must not be heated too strongly as the anhydrous salt during manufacturing of slowly. Such plaster is called Dead Burnt Gypsum.



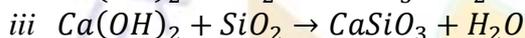
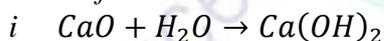
**Q.NO.38. How lime mortar is prepared ? Explain with chemical equations?**

**Ans.** Preparation of Lime mortar:

It is prepared by mixing freshly prepared slaked lime (one Volume) with sand ( three or four volumes) and water to form a thick paste.

Uses: it is placed between the stones and bricks harden or set, thus binding the blocks firmly together.

Equations for the chemical reactions.



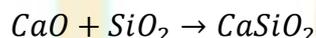
**Q.NO.39. Why lime is added to acidic soil?**

**Ans.** Role of lime in acidic soil:

Large quantities of lime are used in agriculture in order to neutralizing acidic soils. When lime is added to acidic soil, increase the amount of readily soluble phosphorus.

**Q.NO.40. How lime and sand are used to make glass?**

**Ans.** Lime and sand are reacted together at high temperature to form calcium silicate which is used in manufacture of glass.



**Aslamu Alaikum Wa Rahma TULLAH !**

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**Regards,**

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