

## S Block Metals

## 1. Elemental Properties of Alkali Metals

- Q 1. The ionic radius of  $\text{Li}^+$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Rb}^+$  in its aqueous solution is  
(A)  $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+$  (B)  $\text{Li}^+ > \text{Na}^+ > \text{K}^+ > \text{Rb}^+$   
(C)  $\text{Na}^+ < \text{Li}^+ < \text{K}^+ < \text{Rb}^+$  (D)  $\text{K}^+ > \text{Rb}^+ > \text{Na}^+ > \text{Li}^+$
- Q 2. The ionic mobility of alkali metal ion in aqueous solution is maximum for [AIEEE 2005]  
(A)  $\text{Li}^+$  (B)  $\text{Na}^+$  (C)  $\text{K}^+$  (D)  $\text{Rb}^+$
- Q 3. The metallic luster exhibited by sodium is explained by [IIT 1986]  
(A) diffusion of sodium ions  
(B) existence of body centered cubic lattice  
(C) oscillations of loose electrons  
(D) excitation of free proton
- Q 4. The pair of compound which cannot exist together in solution is [IIT 1987]  
(A)  $\text{NaHCO}_3$  &  $\text{NaOH}$  (B)  $\text{Na}_2\text{CO}_3$  &  $\text{NaHCO}_3$   
(C)  $\text{Na}_2\text{CO}_3$  &  $\text{NaOH}$  (D)  $\text{NaHCO}_3$  &  $\text{NaCl}$
- Q 5. The following compounds have been arranged in order of their increasing thermal stability. Identify the correct order. [IIT-1996]  
 $\text{K}_2\text{CO}_3$  (I)  $\text{MgCO}_3$  (II)  
 $\text{CaCO}_3$  (III)  $\text{BeCO}_3$  (IV)  
(A)  $\text{I} < \text{II} < \text{III} < \text{IV}$  (B)  $\text{IV} < \text{II} < \text{III} < \text{I}$   
(C)  $\text{IV} < \text{II} < \text{I} < \text{III}$  (D)  $\text{II} < \text{IV} < \text{III} < \text{I}$
- Q 6.  $\text{Na}^+$  and  $\text{Ag}^+$  differ in  
(A)  $\text{Na}_2\text{CO}_3$  is thermally stable  $\text{Ag}_2\text{CO}_3$  decomposes into  $\text{Ag}$ ,  $\text{CO}_2$  and  $\text{O}_2$   
(B)  $\text{Ag}^+$  forms complexes,  $\text{Na}^+$  does not  
(C)  $\text{NaCl}$  is water soluble,  $\text{AgCl}$  is insoluble  
(D)  $\text{NaCl}$  and  $\text{AgCl}$  both give colour in flame when ignited
- Q 7. Sodium oxide cannot be obtained by heating  
(A)  $\text{Na}_2\text{CO}_3$  (B)  $\text{NaNO}_3$   
(C)  $\text{NaHCO}_3$  (D)  $\text{NaOCl}$
- Q 8. There is loss in weight when mixture of  $\text{Li}_2\text{CO}_3$  and  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  is heated strongly. This loss is due to  
(A)  $\text{Li}_2\text{CO}_3$  (B)  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$   
(C) both (a) and (b) (D) none of these
- Q 9. Alkali Metal reacts vigorously with water to form Hydroxide & Hydrogen gas. Which of the following alkali metal reacts with water least vigorously? [NCERT Exemplar]  
(A)  $\text{Li}$  (B)  $\text{Na}$  (C)  $\text{K}$  (D)  $\text{Cs}$

- Q 10. The reducing power of  $\text{Li}$  is highest due to  
(A) Highest hydration energy of  $\text{Li}^+$  ion  
(B) Lowest Hydration energy of  $\text{Li}^+$  ion  
(C) Highest Ionisation energy of  $\text{Li}$  – atom  
(D) None of these
- Q 11. The aqueous solutions lithium salts are poor conductor of electricity rather than other alkali metals because of  
(A) high ionisation energy  
(B) high electronegativity  
(C) lower ability of  $\text{Li}^+$  ions to polarize water molecules  
(D) higher degree of hydration of  $\text{Li}^+$  ions
- Q 12. Alkali metal gives characteristic colour in flame test due to ?  
(A) Low excitation energy  
(B) High excitation energy  
(C) No excitation energy  
(D) Low ionization energy
- Q 13. Explain why alkali and alkaline earth metals are not obtained by chemical reduction method? [NCERT]
- Q 14. Alkali Metals are extracted by  
(A) Carbon reduction process  
(B) Hydrometallurgy  
(C) Electrometallurgy  
(D) Pryometallurgy
- Q 15. Why does alkali metals not found in nature? [NCERT]

## 2. Compounds of Alkali Metals

- Q 1. Based on lattice energy and other considerations which one of the following alkali metal chlorides is expected to have highest melting point? [AIEEE 2005]  
(A)  $\text{RbCl}$  (B)  $\text{KCl}$   
(C)  $\text{NaCl}$  (D)  $\text{LiCl}$
- Q 2.  $\text{LiF}$  is least soluble in water due to [NCERT Exemplar]  
(A) Ionic nature of  $\text{LiF}$   
(B) High Lattice Energy

- (C) High Hydration enthalpy of Li ion  
(D) Low ionization enthalpy of Li atom
- Q 3. Which of the following is preferentially formed on reaction of oxygen and potassium?  
(A)  $K_2O_2$  (B)  $KO_2$   
(C)  $K_2O$  (D)  $K_2O_3$
- Q 4. Which of the following is best  $CO_2$  absorber as well as source of  $O_2$  in submarines  
(A)  $KO_2$  (B)  $K_2O_2$   
(C)  $KOH$  (D)  $LiOH$
- Q 5.  $KO_2$  is used in oxygen cylinders in space and submarines because [AIIMS 2015]  
(A) absorbs  $CO_2$   
(B) produce Ozone  
(C) eliminates moisture  
(D) absorbs  $CO_2$  & increases  $O_2$  content
- Q 6. The correct order of stability of the superoxides is  
(A)  $KO_2 > RbO_2 > CsO_2$   
(B)  $KO_2 > CsO_2 > RbO_2$   
(C)  $CsO_2 > RbO_2 > KO_2$   
(D)  $RbO_2 > CsO_2 > KO_2$
- Q 7. **Assertion (A):** Generally, Alkali and alkaline earth metals form superoxide  
**Reason(R):** There is a single bond present between O & O in superoxides. [AIIMS 2016]  
(A) Both A & R are true and R is the correct explanation of A  
(B) Both A & R are true and R is NOT correct explanation of A  
(C) if A is true but R is false  
(D) if both A & R are false
- Q 8. Which is not correctly matched?  
(1) Strength of oxides  $\rightarrow$   
 $Cs_2O < Rb_2O < K_2O < Na_2O < Li_2O$   
(2) Stability of peroxides  $\rightarrow$   
 $Na_2O_2 < K_2O_2 < Rb_2O_2 < Cs_2O_2$   
(3) Stability of bicarbonates  $\rightarrow$   
 $LiHCO_3 < NaHCO_3 < KHCO_3 < RbHCO_3 < CsHCO_3$   
(4) Melting points  $\rightarrow NaF < NaCl < NaBr < NaI$   
(A) 1 and 4 (B) 1 and 3  
(C) 1 and 2 (D) 2 and 3
- Q 9. Metallic sodium dissolves in liquid ammonia to form a deep blue coloured solution. The deep blue colour is due to the formation of  
(A) solvated electron,  $e(NH_3)^- : Na^+ + xNH_3 \rightarrow Na^+ + e(NH_3)_x^-$   
(B)  $Na^- : 2Na \rightarrow Na^+ + Na^-$   
(C)  $NH_2^- : Na + NH_3 \rightarrow Na^+ + NH_2^- + \frac{1}{2} H_2$   
(D) solvated atomic sodium,  $Na(NH_3)_y \rightarrow (1/x)(Na)_x + yNH_3 \rightarrow Na(NH_3)_y$
- Q 10. Solution of Na metal in liquid  $NH_3$  is a strong reductant due to the presence of  
(A) sodium atoms (B) solvated electrons  
(C) sodium amides (D) sodium hydride
- Q 11. Which one of the following is liberated when the blue solutions of alkali metals in liquid ammonia decompose very slowly?  
(A) Ammonia (b) Hydrogen azide  
(c) Hydrogen (d) Nitrogen
- Q 12. Which of the alkali metal directly react with  $N_2$  to form nitrides?  
(A) Li (B) Na (C) K (D) Rb
- Q 13. Which of the following alkali metal has greatest affinity for complex formation?  
(A) K (B) Na (C) Li (D) Rb
- Q 14. Which of the property is not anomalous behavior of Lithium?  
(A) Li is least reactive metal among IA Metals  
(B) Only  $Li_2CO_3$  is thermally stable  
(C)  $LiCl$  is soluble in organic solvent unlike other IA metal chloride  
(D)  $Li_2SO_4$  does form alum
- Q 15. Which of the following does not illustrate the anomalous properties of Li?  
(A) The m.p and b.p of Li are comparatively high  
(B) Li is much softer than other I group metals  
(C) Li forms a nitride  $Li_3$  unlike group I metals  
(D) The ion of Li and its compounds are more heavily hydrated than those of rest of the group

### 3. Na & its Compounds

- Q 1. Which of the following alkali metals give Hydrated salt? [NCERT]  
(A) Li (B) Na (C) K (D) Cs
- Q 2. Alum is the name used for all double salts having the composition  $M_2^I SO_4 \cdot M_2^{II} (SO_4)_3 \cdot 24H_2O$ . Where  $M^I$  stands for  
(A)  $Li^+, Cu^+, Ag^+$  (B)  $Li^+, NH_4^+, Na^+$   
(C)  $Na^+, K^+, Rb^+$  (D)  $Ca^{2+}, Mg^{2+}, Sr^{2+}$

- Q 3. The sodium is prepared by the electrolysis of a molten mixture of about 40% NaCl and 60% CaCl<sub>2</sub> because [CBSE PMT 1995]  
 (A) CaCl<sub>2</sub> helps in conduction of electricity  
 (B) Ca<sup>++</sup> can reduce NaCl to Na  
 (C) Ca<sup>++</sup> can displace Na from NaCl  
 (D) This mixture has lower M.P. temp. than NaCl
- Q 4. In Caster – Kellener Process, Hg cathode is used because  
 (A) Na Atom has higher affinity for Hg  
 (B) Na Atom has lower affinity for Hg  
 (C) Cathode must be made of solid substance  
 (D) To maintain ionic Neutrality
- Q 5. NaOH is manufactured by electrolysis of brine solution. The products of the reaction are  
 (A) Cl<sub>2</sub> (B) Cl<sub>2</sub> and Na- Hg  
 (C) Cl<sub>2</sub> and Na (D) Cl<sub>2</sub> and O<sub>2</sub>
- Q 6. Aq. NaOH + P<sub>4</sub> (white) → PH<sub>3</sub> + X .  
 Compound X is :  
 (A) NaH<sub>2</sub>PO<sub>2</sub> (B) NaHPO<sub>4</sub>  
 (C) Na<sub>2</sub>CO<sub>3</sub> (D) NaHCO<sub>3</sub>
- Q 7. In the reaction  
 $X_2 + NaOH(Conc.) \longrightarrow NaX + Y + H_2O$   
 The compound Y is  
 (A) NaXO (B) NaXO<sub>3</sub>  
 (C) NaXO<sub>2</sub> (D) None of these
- Q 8. Soda lime is  
 (A) NaOH (B) CaO  
 (C) NaOH and CaO (D) Na<sub>2</sub>CO<sub>3</sub>
- Q 9. Which of the following mixture is called fusion mixture? [CBSE PMT 1994]  
 (A) Mixture of Na<sub>2</sub>CO<sub>3</sub> & NaHCO<sub>3</sub>  
 (B) Na<sub>2</sub>CO<sub>3</sub>.10H<sub>2</sub>O  
 (C) Mixture of K<sub>2</sub>CO<sub>3</sub> & Na<sub>2</sub>CO<sub>3</sub>  
 (D) NaHCO<sub>3</sub>
- Q 10. A sodium salt on treatment with MgCl<sub>2</sub> gives white precipitate only on heating. The anion of the sodium salt is [IIT JEE - 2004S]  
 (A) HCO<sub>3</sub><sup>-</sup> (B) CO<sub>3</sub><sup>2-</sup>  
 (C) NO<sub>3</sub><sup>-</sup> (D) SO<sub>4</sub><sup>2-</sup>
- Q 11. Which one is formed in the solvay process?  
 (A) Na<sub>2</sub>CO<sub>3</sub> (B) NaHCO<sub>3</sub>  
 (C) CaCl<sub>2</sub> (D) All
- Q 12. The useful by-products obtained in the solvay process of manufacture of sodium Carbonate are  
 (A) Quick lime & CO<sub>2</sub> (B) NaHCO<sub>3</sub>  
 (C) NH<sub>4</sub>Cl & quick lime (D) NaHCO<sub>3</sub>
- Q 13. CO<sub>2</sub> + NH<sub>3</sub> + H<sub>2</sub>O → X  
 X + NaCl → Y + NH<sub>4</sub>C  
 2Y → Z + H<sub>2</sub>O + CO<sub>2</sub>. 'Z' is  
 (A) NH<sub>4</sub>HCO<sub>3</sub> (B) NaHCO<sub>3</sub>  
 (C) (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub> (D) Na<sub>2</sub>CO<sub>3</sub>
- Q 14. K<sub>2</sub>CO<sub>3</sub> is not prepared by solvay process because  
 (A) KHCO<sub>3</sub> is less soluble in water  
 (B) KHCO<sub>3</sub> is more soluble in water  
 (C) K<sub>2</sub>CO<sub>3</sub> is less soluble in water  
 (D) K<sub>2</sub>CO<sub>3</sub> is more soluble in water

#### 4. Compounds of Na

- Q 1. The compound(s) formed upon combustion of sodium metal in excess air is(are) [IIT 2009]  
 (A) Na<sub>2</sub>O<sub>2</sub> (B) Na<sub>2</sub>O  
 (C) NaO<sub>2</sub> (D) NaOH
- Q 2. Compound A is a pale yellow powder. It turns white in contact with moist air. It is used for purifying air in submarines. 'A' is  
 (A) Na<sub>2</sub>O (B) Na<sub>2</sub>O<sub>2</sub> (C) Li<sub>2</sub>O (D) K<sub>2</sub>O
- Q 3. Baking soda is  
 (A) Na<sub>2</sub>CO<sub>3</sub> (B) NaHCO<sub>3</sub>  
 (C) Na<sub>2</sub>SO<sub>4</sub> (D) Na<sub>2</sub>SO<sub>4</sub>
- Q 4. Soda ash is  
 (A) Na<sub>2</sub>CO<sub>3</sub>.H<sub>2</sub>O (B) NaOH  
 (C) Na<sub>2</sub>CO<sub>3</sub> (D) NaHCO<sub>3</sub>
- Q 5. Sodium carbonate reacts with SO<sub>2</sub> in aqueous medium to give  
 (A) NaHSO<sub>3</sub> (B) Na<sub>2</sub>SO<sub>3</sub>  
 (C) CaCl<sub>2</sub> (D) Na<sub>2</sub>SO<sub>4</sub>
- Q 6. CO<sub>2</sub> gas along with solid (Y) is obtained when sodium salt (X) is heated. (X) is again obtained when CO<sub>2</sub> gas is passed into aqueous solution (Y). (X) and (Y) are [AIIMS 2017]  
 (A) Na<sub>2</sub>CO<sub>3</sub>, Na<sub>2</sub>O (B) Na<sub>2</sub>CO<sub>3</sub>, NaOH  
 (C) NaHCO<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub> (D) Na<sub>2</sub>CO<sub>3</sub>, NaHCO<sub>3</sub>
- Q 7. Chemical A is used for softening of water, to remove temporary hardness. A reacts with Na<sub>2</sub>CO<sub>3</sub> to produce caustic soda, when CO<sub>2</sub> is bubbled through A, it turns cloudy. Chemical A is [AIIMS 1999]

- (A) CaO (B) CaCO<sub>3</sub>  
(C) Ca(HCO<sub>3</sub>)<sub>2</sub> (D) Ca(OH)<sub>2</sub>
- Q 8. In the reaction sequence  
 $NaOH(aqs) \xrightarrow{S/\Delta} Na_2S + Salt(S)$   
 $Salt(S) \xrightarrow{AgNO_3/\Delta} P$ , Product (P) is  
 (A) White ppt. (B) Black ppt.  
 (C) white turbidity (D) Clear Solution
- Q 9. The inside surface of glass containing NaOH becomes dull because  
 (A) NaOH cause corrosion to glass  
 (B) NaOH reacts with SiO<sub>2</sub> to form Na<sub>2</sub>SiO<sub>3</sub>  
 (C) NaOH is a corrosive liquid  
 (D) NaOH is a strong base
- Q 10. When NO<sub>2</sub> reacts with KOH, products formed are  
 (A) KNO<sub>2</sub> (B) KNO<sub>3</sub>  
 (C) Both A & B (D) KOH doesn't react
- Q 11. When NO is passed into KOH sol, products are  
 (A) N<sub>2</sub> (B) N<sub>2</sub>O  
 (C) Both A & B (D) none of these
- Q 12. Which of the following match the description given below?  
 (1) It is a chrome yellow powder.  
 (2) It dissolves in water giving H<sub>2</sub>O<sub>2</sub> and O<sub>2</sub>.  
 (A) KO<sub>2</sub> (B) K<sub>2</sub>O  
 (C) K<sub>2</sub>O<sub>3</sub> (D) Na<sub>2</sub>O<sub>2</sub>
- Q 13. Which of the following alkali metals is used photoelectric cells?  
 (A) Li (B) Na (C) K (D) Cs
- Q 14. Molten sodium is used in nuclear reactors to  
 (A) absorb neutron in order to control the chain reaction  
 (B) slow down the fast neutron  
 (C) absorb the heat generated by nuclear fission  
 (D) extract radio- isotopes produce radicals may be present?
- Q 15. Na<sup>+</sup> present inside blood plasma & interstitial fluid outside the cell & it doesn't work as  
 (A) Sending the nerve signal  
 (B) Regulate passage of H<sub>2</sub>O in cell membrane  
 (C) to control the passage of Amino Acids in cell  
 (D) Activate the enzyme
- Q 16. Which ion activate the oxidation of glucose to form ATP?  
 (A) Na<sup>+</sup> (B) K<sup>+</sup> (C) Li<sup>+</sup> (D) Ca<sup>2+</sup>
- 5. Alkaline earth Metal**
- Q 1. Which of the following metal is not Alkaline earth Metal?  
 (A) Ca (B) Mg (C) Be (D) Ba
- Q 2. Be has similar Properties as that of  
 (A) Mg (B) Ca (C) Sr (D) Al
- Q 3. Which of the following halides form hydrated salt?  
 (A) NaCl (B) CaCl<sub>2</sub>  
 (C) KCl (D) None of these
- Q 4. Which is most stable out of the following  
 (A) [Be(H<sub>2</sub>O)<sub>4</sub>]<sup>2+</sup> (B) [Mg(H<sub>2</sub>O)<sub>4</sub>]<sup>2+</sup>  
 (C) [Ca(H<sub>2</sub>O)<sub>4</sub>]<sup>2+</sup> (D) [Sr(H<sub>2</sub>O)<sub>4</sub>]<sup>2+</sup>
- Q 5. Which is/are true statements?  
 (A) the heats of hydration of the dipositive alkaline earth metal ions decreases with an increase in their ionic size  
 (B) hydration of alkali metal ions is less than that of II A  
 (C) alkaline earth metal ions, because of their much larger charge to size ratio, exert a much stronger electrostatic attraction on the oxygen of water molecule surrounding them  
 (D) 1<sup>st</sup> I.E. of IA Metal is more than that of IIA Metal
- Q 6. Alkaline earth metals have higher melting points than alkali metals. This is due to  
 (A) stronger metallic bonds  
 (B) higher ionisation energy  
 (C) smaller size  
 (D) stable electronic configuration
- Q 7. The most probable reason that alkaline earth metals always form dipositive ion instead of monopositive ions is  
 (A) the values of first and second ionisation energies are not very much different.  
 (B) the compounds of unipositive valence of these metals are not stable.  
 (C) the compounds with dipositive ion have more lattice energy than those with unipositive ions.  
 (D) the dipositive ions have more charge on it than the unipositive ions.
- Q 8. the Correct statements for Alkaline earth metals have/are  
 (A) larger sized atoms and ions compared to alkali metals.

- (B) more dense and harder than alkali metals  
 (C) stronger metallic bonding than in alkali metals  
 (D) more electropositive compared to corresponding alkali metals.
- Q 9. Which of the following metal does not give flame Test ?  
 (A) Be (B) Mg (C) Sr (D) Ca
- Q 10. The correct order of density of IIA Metal is  
 (A)  $Be < Mg < Ca < Sr < Ba$   
 (B)  $Ba > Sr > Ca > Mg > Be$   
 (C)  $Ca < Mg < Be < Sr < Ba$   
 (D)  $Be < Ca < Mg < Sr < Ba$
- Q 11. Which of the following relation is correct?  
 (A)  $I.E._{IA Metal} > I.E._{IIA Metal}$   
 (B)  $I.E._{IIA Metal} < I.E._{IIA Metal}$   
 (C)  $E.N._{IA Metal} > E.N._{IIA Metal}$   
 (D)  $E.A._{IA Metal} > E.A._{IIA Metal}$
- Q 12. Which of the following metal displaces  $H_2$  gas from caustic soda solution?  
 (A) Mg (B) Ca (C) Be (D) Fe
- Q 13. Which IIA metal has least abundance in lithosphere?  
 (A) Mg (B) Be (C) Sr (D) Ba
- 6. Compounds of IIA Metals**
- Q 1. Which of the following metal is extracted by carbon reduction method?  
 (A) Be (B) Ca (C) Sr (D) Ba
- Q 2. Property of all the alkaline earth metals that increases with their atomic number is  
 (A) Ionisation energy (B) solubility of oxides  
 (C) electronegativity (D) solubility of sulphate
- Q 3. Which one of the following is most basic?  
 (A)  $Al_2O_3$  (B) MgO  
 (C)  $Sr(OH)_2$  (D)  $Be(OH)_2$
- Q 4. The solubilities of hydroxides of alkaline earth metals is in the order  
 (A)  $Mg(OH)_2 < Be(OH)_2 < Ca(OH)_2 < Ba(OH)_2$   
 (B)  $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2 < Ba(OH)_2$   
 (C)  $Ba(OH)_2 < Ca(OH)_2 < Mg(OH)_2 < Be(OH)_2$   
 (D)  $Ba(OH)_2 < Ca(OH)_2 < Be(OH)_2 < Mg(OH)_2$
- Q 5. Which of the following sulphates have highest solubility in water (Hydration energy is greater than Lattice Energy)?  
 [AIIMS 2012/JEE Main 2015]  
 (A)  $BeSO_4$  (B)  $MgSO_4$   
 (C)  $CaSO_4$  (D)  $BaSO_4$
- Q 6. Which of the following statement is correct in reference of solubility of  $MgSO_4$  in water?  
 [CBSE PMT 1996]  
 (A)  $SO_4^{2-}$  ions mainly contributes towards hydration energy  
 (B) Size of  $Mg^{2+}$  and  $SO_4^{2-}$  are similar  
 (C) Hydration energy of  $MgSO_4$  is higher than its lattice energy  
 (D) Ionic Potential (Charge/radius) of  $Mg^{2+}$  is very low
- Q 7. Choose the wrong statement/s among the following.  
 (A)  $Be(OH)_2$  is very highly basic.  
 (B) IIA Metal oxides have NaCl structure.  
 (C)  $Mg(OH)_2$  is a mild base in aqs suspension.  
 (D) The solubility of hydroxides decreases from  $Mg(OH)_2$  to  $Ba(OH)_2$ .
- Q 8. What is the product of reaction between  $Ba(OH)_2$  dilute solution with  $H_2O_2 + ClO_2$  [AIIMS 2018]  
 (A) HOCl (B)  $Ba(OCl)_2$   
 (C)  $Ba(OCl_3)_2$  (D)  $Ba(OCl)_2$
- Q 9. Which of the following are ionic carbides?  
 (A)  $CaC_2$  (B)  $Al_4C_3$   
 (C) SiC (D)  $Be_2C$
- Q 10. Which of the following has highest electrode potential?  
 (A) Be (B) Mg (C) Ca (D) Ba
- Q 11. Alkaline earth metal compounds are less soluble in water than the corresponding alkali metal Compounds because the former have  
 (A) lower lattice energies  
 (B) higher ionization energies  
 (C) higher covalent character  
 (D) lower covalent character
- Q 12. Which of the following fluorides/chlorides has the lowest melting points? [AIIMS 2011]  
 (A)  $BaF_2$  (B)  $SrF_2$   
 (C)  $CaF_2$  (D)  $BeF_2$
- Q 13. Hydrolysis of Beryllium carbide produces

[AIIMS 1996]

- (A) Acetylene (B) Methane  
(C) Ethene (D) None of these
- Q 14. Which of the following pairs can be distinguished by the action of heat?  
(i)  $\text{Na}_2\text{CO}_3$  and  $\text{CaCO}_3$   
(ii)  $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$  and  $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$   
(iii)  $\text{Ca}(\text{NO}_3)_2$  and  $\text{NaNO}_3$   
A) i and ii (B) ii and iii  
(C) i, ii and iii (D) i only
- Q 15.  $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$  when heated gives [AIIMS 1994]  
(A)  $\text{MgCl}_2$  (B)  $\text{MgO}$   
(C)  $\text{MgOCl}$  (D) None of these
- Q 16. Anhydrous  $\text{MgCl}_2$  is obtained by heating hydrated salt with ..... [IIT JEE 1980]
- Q 17. Some of IIA metal halides are covalent and soluble in organic solvents. Among the following metal halides, the one which is soluble in ethanol is [NCERT Exemplar]  
(A)  $\text{BeCl}_2$  (B)  $\text{MgCl}_2$   
(C)  $\text{CaCl}_2$  (D)  $\text{SrCl}_2$
- Q 18. Dehydration of hydrates of Halides of Ca, Ba & Sr i.e.  $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ ,  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ ,  $\text{SrCl}_2 \cdot 2\text{H}_2\text{O}$  can be achieved by heating. These become wet on keeping in air. Which of the following statements is correct for these halides? [NCERT Exemplar]  
(A) act as dehydrating agent  
(B) can absorb moisture from air  
(C) tendency to form hydrates decreases from Ca to Ba  
(D) all of these

### 7. Compounds of IIA Metals – II

- Q 1. **Assertion (A):** Beryllium carbonate is kept in presence of  $\text{CO}_2$ .  
**Reason (R):**  $\text{BeCO}_3$  is unstable and decomposes to give  $\text{BeO}$  and  $\text{CO}_2$  [NCERT Exemplar]  
(A) Both A & R are true and R is the correct explanation of A  
(B) Both A & R are true and R is NOT correct explanation of A  
(C) if A is true but R is false  
(D) if both A & R are false

- Q 2. The decomposition temperatures of alkaline earth metal carbonates are given below:  
 $\text{BeCO}_3$   $\text{MgCO}_3$   $\text{CaCO}_3$   $\text{SrCO}_3$   $\text{BaCO}_3$   
 $100^\circ\text{C} < \text{-----} < 900^\circ\text{C} < \text{-----} < 1300^\circ\text{C}$   
The decomposition temperatures of  $\text{MgCO}_3$  and  $\text{SrCO}_3$  are respectively  
(A)  $540^\circ\text{C}$ ,  $1290^\circ\text{C}$  (B)  $1290^\circ\text{C}$ ,  $540^\circ\text{C}$   
(C)  $540^\circ\text{C}$ ,  $800^\circ\text{C}$  (D)  $1290^\circ\text{C}$ ,  $1200^\circ\text{C}$
- Q 3. On heating, which of the following releases  $\text{CO}_2$  more readily? [CBSE PMT 2015]  
(A)  $\text{Na}_2\text{CO}_3$  (B)  $\text{K}_2\text{CO}_3$   
(C)  $\text{MgCO}_3$  (D)  $\text{CaCO}_3$
- Q 4. A substance gives brick red flame & breaks down on heating to give oxygen & a brown gas is [NCERT Exemplar]  
(A)  $\text{Mg}(\text{NO}_3)_2$  (B)  $\text{Ca}(\text{NO}_3)_2$   
(C)  $\text{Ba}(\text{NO}_3)_2$  (D)  $\text{Sr}(\text{NO}_3)_2$
- Q 5. In solid state,  $\text{BeCl}_2$  exist in polymeric form through  
(A) 3 C – 2e bond (B) 3 C – 4 e bond  
(C) 3 C – 6e bond (D) 2 C – 2 e bond
- Q 6. Which of the following metal combines with  $\text{N}_2$  gas directly?  
(A) Be (B) Mg (C) Ca (D) Ba
- Q 7. In the reaction  
$$X + C + \text{Cl}_2 \xrightarrow{T=1000\text{K}} Y + \text{CO}$$
  
$$Y + 2\text{H}_2\text{O} \longrightarrow Z + 2\text{HCl}$$
  
Compound Y is found in polymeric chain structure and is an electron deficient molecule. Y must be  
(A)  $\text{BeO}$  (B)  $\text{BeCl}_2$   
(C)  $\text{Be}(\text{OH})_2$  (D)  $\text{BeO} \cdot \text{Be}(\text{OH})_2$
- Q 8.  $\text{BeH}_2$  is prepared by action of  $\text{BeCl}_2$  with  
(A)  $\text{NaH}$  (B)  $\text{LiAlH}_4$   
(C)  $\text{CaH}_2$  (D) None of these
- Q 9. In the context of Be, which one of the following statements is incorrect? [NEET 2016]  
(A) it is rendered passive by Nitric Acid  
(B) it forms  $\text{Be}_2\text{C}$   
(C) its salts rarely hydrolyse  
(D) its hydride is electron deficient & polymeric
- Q 10. Reducing property of Be Metal is due to  
(A) High Hydration energy  
(B) Large enthalpy of atomization  
(C) High Ionisation energy

- (D) Both A & B
- Q 11. Separate Equimolar solution of which of the following were prepared in water has highest pH value? [CBSE PMT 2008]  
 (A)  $\text{SrCl}_2$  (B)  $\text{BaCl}_2$   
 (C)  $\text{MgCl}_2$  (D)  $\text{CaCl}_2$
- Q 12. A metal M readily forms its sulphate  $\text{MSO}_4$  which is water soluble. It forms its oxide  $\text{MO}$  which becomes inert on heating. It forms an insoluble hydroxide  $\text{M(OH)}_2$  which is soluble in  $\text{NaOH}$  solution. The metal M is [AIIEE 2002]  
 (A) Be (B) Ba  
 (C) Ca (D) Be
- Q 13. A substance absorbs  $\text{CO}_2$  and violently reacts with water. The substance is [IIT JEE 1984]  
 (A)  $\text{CaCO}_3$  (B)  $\text{CaO}$   
 (C)  $\text{H}_2\text{SO}_4$  (D)  $\text{ZnO}$
- Q 15. A sodium salt on treatment with  $\text{MgCl}_2$  gives white precipitate only on heating. The anion of sodium salt is [IIT JEE 2004S]  
 (A)  $\text{HCO}_3^-$  (B)  $\text{CO}_3^{2-}$   
 (C)  $\text{NO}_3^-$  (D)  $\text{SO}_4^{2-}$
- Q 15.  $\text{MgSO}_4$  on reaction with  $\text{NH}_4\text{OH}$  and  $\text{Na}_2\text{HPO}_4$  forms a white precipitate. What is its formula? [IIT JEE 2005]  
 (A)  $\text{Mg(NH}_4\text{)PO}_4$  (B)  $\text{Mg}_3(\text{PO}_4)_2$   
 (C)  $\text{MgCl}_2 \cdot \text{MgSO}_4$  (D)  $\text{MgSO}_4$
- (A) Mg alloy used in aircraft body  
 (B) Mg is used in flash powders and bulb  
 (C)  $\text{Mg(OH)}_2$  is used as antacid  
 (D) Mg is used to remove air from vacuum tube
- Q 5. The pair whose both species are used in antacid in medicinal preparation is [AIIMS 2006]  
 (A)  $\text{NaHCO}_3$  &  $\text{Mg(OH)}_2$   
 (B)  $\text{Na}_2\text{CO}_3$  &  $\text{Ca(HCO}_3\text{)}_2$   
 (C)  $\text{Ca(HCO}_3\text{)}_2$  &  $\text{Mg(OH)}_2$   
 (D)  $\text{Ca(OH)}_2$  &  $\text{NaHCO}_3$
- Q 6. Which of the following is not anomalous property of Be?  
 (A) It has strong tendency for complex formation  
 (B) It becomes passive in presence of  $\text{HNO}_3$   
 (C) Be has highest M.P. & B.P.  
 (D) It evolves  $\text{H}_2$  gas easily with  $\text{HCl}$  (aq)
- Q 7.  $\text{CaO}$  is used as refractory material because it  
 (A) is amorphous (B) has high Melting Point  
 (C) absorbs moisture (D) absorbs  $\text{CO}_2$
- Q 8. Milk of lime is  
 (A) aqueous solution of  $\text{Ca(OH)}_2$   
 (B) aqueous solution of  $\text{CaO}$  Solution  
 (C) suspension of  $\text{Ca(OH)}_2$   
 (D) Suspension of  $\text{CaO}$  Solution
- Q 9. Which of the following pair of species react with water to produce a pure colourless gas that gives white fumes with  $\text{HCl}$ ? [AIIMS 2016]  
 (A)  $\text{CaH}_2$  &  $\text{CaC}_2$  (B)  $\text{CaC}_2$  &  $\text{Al}_3\text{N}_2$   
 (C)  $\text{Mg}_3\text{N}_2$  &  $\text{Ca}_3\text{N}_2$  (D)  $\text{Ca}_3\text{P}_2$  &  $\text{CaCN}_2$
- Q 10. Bleaching powder is formed by action of  $\text{Cl}_2$  on  
 (A)  $\text{Ca(OH)}_2$  (B)  $\text{CaCO}_3$   
 (C)  $\text{CaSO}_4$  (D)  $\text{NaOH}$
- Q 11. Galuber's salt is [IIT JEE 1985]  
 (A)  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$  (B)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$   
 (C)  $\text{FeSO}_4 \cdot 5\text{H}_2\text{O}$  (D)  $\text{Na}_2\text{SO}_4 \cdot 5\text{H}_2\text{O}$
- Q 12.  $\text{CaCO}_3 + \text{H}_2\text{SO}_4 \longrightarrow \text{CaSO}_4 + \text{H}_2\text{O} + \text{CO}_2$  occur because  
 (A)  $\text{H}_2\text{SO}_4$  is stronger acid than  $\text{H}_2\text{CO}_3$   
 (B)  $\text{H}_2\text{SO}_4$  is weaker acid than  $\text{H}_2\text{CO}_3$   
 (C)  $\text{CO}_2$  gas is produced  
 (D)  $\text{CaCO}_3$  is insoluble solid
- Q 13.  $\text{Y} \xleftarrow{250^\circ\text{C}} \text{CaSO}_4 \cdot 2\text{H}_2\text{O} \xrightarrow{150^\circ\text{C}} \text{X}$   
 In above reaction X and Y are respectively  
 (A) plaster of paris, dead burnt plaster

- (B) dead burnt plaster, plaster of paris  
(C) CaO and plaster of paris  
(D) plaster of paris, mixture of gases
- Q 14. Dead burnt Plaster is [NCERT Exemplar]  
(A)  $\text{CaSO}_4$  (B)  $\text{CaSO}_4 \cdot \frac{1}{2} \text{H}_2\text{O}$   
(C)  $\text{CaSO}_4 \cdot \text{H}_2\text{O}$  (D)  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- Q 15. Setting (Hardening) of plaster of Paris involves  
(A) Oxidation with atmospheric oxygen  
(B) endothermic reaction  
(C) neither exothermic nor endothermic  
(D) none
- Q 16. Which of the following is correct statement :  
(A)  $\text{Ca}_3(\text{PO}_4)_2$  in part of bones  
(B)  $3\text{Ca}_3(\text{PO}_4)_2 \cdot \text{CaF}_2$  is part of enamel on teeth  
(C)  $\text{Ca}^{2+}$  ions are important in blood clotting  
(D) all are correct
- Q 17. Slaked lime is used in the manufacture of  
(A) Cement (B) Fire bricks  
(C) Pigment (D) medicine
- Q 18. Portland cement is manufactured by using  
(A) Limestone, clay and sand  
(B) Limestone, gypsum and sand  
(C) Limestone, gypsum and alumina  
(D) Limestone, clay and gypsum
- Q 19. The function of sand in mortar is  
(A) To prevent excessive shrinkage which might result in cracks.  
(B) To decrease the plasticity of the mass.  
(C) To make the mass compact.  
(D) To decrease the hardness.
- Q 20. In setting of cement plasters, water is sprinkled from time to time. It helps in [AIIEE 2003]  
(A) developing interlocking needle like crystal of hydrated silicates  
(B) hydrating sand and gravel mixed with cement  
(C) converting sand into silicic acid  
(D) Keeping its cool
- Q 17. A chemical 'A' is used for preparation of washing soda to recover ammonia. When  $\text{CO}_2$  gas is bubbled through an aqueous solution of A, the solution turns milky. It is used in white washing due to disinfectant nature. What is the chemical formula of A? [NCERT Exemplar]  
(A)  $\text{Ca}(\text{HCO}_3)_2$  (B) CaO  
(C)  $\text{Ca}(\text{OH})_2$  (D)  $\text{CaCO}_3$
- 9. Compounds of Ca, Use of IIA metals**
- Q 1. Gas (X) turns lime water milky. (x) can be :  
(A)  $\text{CO}_2$  (B)  $\text{SO}_2$   
(C) Both (A) & (B) (D) None of these
- Q 2. The species present in solution when  $\text{CO}_2$  is dissolved in water are [IIT JEE 2006]  
(A)  $\text{CO}_2, \text{H}_2\text{CO}_3, \text{HCO}_3^-, \text{CO}_3^{2-}$   
(B)  $\text{H}_2\text{CO}_3, \text{CO}_3^{2-}$   
(C)  $\text{HCO}_3^-, \text{CO}_3^{2-}$   
(D)  $\text{CO}_2, \text{H}_2\text{CO}_3$
- Q 3. The metal that can be extracted from sea water is  
(A) Cl (B) Ca  
(C) Mg (D) Zn
- Q 4. Bone ash contains  
(A) CaO (B)  $\text{CaSO}_4$   
(C)  $\text{Ca}_3(\text{PO}_4)_2$  (D)  $\text{Ca}(\text{H}_2\text{PO}_4)_2$
- Q 5. Solutions of the following are mixed. In which case would a precipitate be least likely to form?  
(A)  $\text{NH}_4\text{Cl}$  &  $\text{MgSO}_4$  (B)  $\text{Na}_2\text{S}$  &  $\text{CuCl}_2$   
(C)  $\text{AlCl}_3$  &  $\text{KOH}$  (D)  $\text{Ca}(\text{NO}_3)_2$  &  $\text{Na}_2\text{CO}_3$
- Q 6. The active constituent of bleaching powder is  
(A)  $\text{Ca}(\text{OCl})_2$  (B)  $\text{Ca}(\text{OCl})\text{Cl}$   
(C)  $\text{Ca}(\text{ClO}_2)_2$  (D)  $\text{Ca}(\text{ClO}_2)\text{Cl}$
- Q 7. **Assertion (A):** Bleaching powder is a mixed salt  
**Reason(R):** In presence of  $\text{CaCl}_2$ , bleaching powder decompose to give  $\text{CaCl}_2$  &  $\text{O}_2$ . [AIIMS 2009]  
(A) Both A & R are true and R is the correct explanation of A  
(B) Both A & R are true and R is NOT correct explanation of A  
(C) if A is true but R is false  
(D) if both A & R are false
- Q 8. What is obtained when calcium carbide is heated in nitrogen at  $1000^\circ\text{C}$ ? [AIIMS 2014]  
(A) Urea  
(B) Calcium cyanamide (Nitrolym)  
(C) Calcium cyanide  
(D) Cyanamide
- Q 9. The reaction of calcium cyanamide with water yields  
(A)  $\text{Ca}(\text{OH})_2$  &  $\text{N}_2$  (B)  $\text{CaC}_2$  &  $\text{N}_2\text{H}_4$   
(C)  $\text{CaCO}_3$  &  $\text{NH}_3$  (D)  $\text{CaCO}_3$  &  $\text{NH}_4\text{OH}$



- Q 10. Regular use of which of the following fertilizers would increase the acidity of soil?  
 (A) Superphosphate of lime (B) Urea  
 (C) potassium nitrate (D) Ammonium sulphate
- Q 11. Chemical composition of pearl is  
 (A) calcium carbonate  
 (B) calcium sulphate  
 (C) calcium carbonate and magnesium carbonate  
 (D) calcium chloride
- Q 12. Chlorophyll contains  
 (A) Be (B) Mg (C) Ca (D) Sr
- Q 13. **Assertion (A):** Mg is not present in enamel of human teeth.  
**Reason(R):** Mg is an essential element for biological functions of human. [AIIMS 2004]
- (A) Both A & R are true and R is the correct explanation of A  
 (B) Both A & R are true and R is NOT correct explanation of A  
 (C) if A is true but R is false  
 (D) if both A & R are false
- Q 14. Enzyme that utilizes ATP in phosphate transfer require which metal as co-factor?  
 (A) Mg (B) Ca (C) Sr (D) Ba
- Q 15. The concentration of Ca in Plasma is about  
 (A) 10 mg/lit (B) 100 mg/lit  
 (C) 10 g/lit (D) 1000 mg/lit

## Answer Key

### 1. Elemental Properties of Alkali Metals

- (1). B (2). A (3). B  
 (4). A (5). B (6). A, B, C  
 (7). All (8). C (9). A  
 (10). A (11). D (12). A  
 (13). Highly electropositive (14). C  
 (15). More reactive & compounds are soluble in water

### 2. Compounds of Alkali Metals

- (1). C (2). B (3). B  
 (4). A (5). D (6). C  
 (7). D (8). A (9). A  
 (10). B (11). C (12). A  
 (13). C (14). D (15). B

### 3. Na & its Compounds

- (1). A (2). C (3). D  
 (4). A (5). A (6). A  
 (7). B (8). C (9). C  
 (10). A (11). D (12). C  
 (13). D (14). B

### 4. Compounds of Na

- (1). A (2). B (3). B  
 (4). C (5). A (6). C  
 (7). D (8). B (9). B  
 (10). C (11). C (12). A  
 (13). D (14). C (15). D  
 (16). B

**5. Alkaline earth Metal**

- (1). C      (2). D      (3). B  
(4). A      (5). D      (6). A  
(7). C      (8). B, C      (9). A, B  
(10). C      (11). D      (12). C  
(13). B

**6. Compounds of IIA Metals**

- (1). A      (2). B      (3). B  
(4). B      (5). A      (6). C  
(7). A, D      (8). D      (9). A  
(10). B      (11). C      (12). C  
(13). D      (14). C      (15). B  
(16). Anhydrous HCl      (17). A  
(18). D

**7. Compounds of IIA Metals – II**

- (1). A      (2). A      (3). C  
(4). B      (5). B      (6). C  
(7). B      (8). B      (9). C  
(10). D      (11). B      (12). D  
(13). B      (14). A      (15). A

**8. Compounds of Ca**

- (1). C      (2). C      (3). C  
(4). D      (5). A      (6). D  
(7). B      (8). C      (9). C  
(10). A      (11). D      (12). A  
(13). A      (14). A      (15). D  
(16). D      (17). A      (18). D  
(19). A      (20). A      (21). C

**9. Compounds of Ca, Use of IIA metals**

- (1). C      (2). A      (3). C  
(4). C      (5). A      (6). A  
(7). B      (8). B      (9). D  
(10). D      (11). A      (12). B  
(13). B      (14). A      (15). B