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| **Karan Arora**  **R.L. Institute M: 9416974837**  **Class : XI**  **“ s – BLOCK ELEMENTS”** |

**N.C.E.R.T INTEXT QUESTIONS**

1. What is the oxidation state of K in KO2 ?
2. The E˚ for Cl – /Cl2 is + 1.36 , for I – /I2 is + 0.53 , for Ag+ /Ag is + 0.79 , Na+ /Na is – 2.71 and for Li+/Li is – 3.04 V. Arrange the following species in decreasing order of reducing strength.

I – , Ag , Cl – , Li , Na

1. Why is KO2 paramagnetic ?
2. Why does the solubility of alkaline earth metal hydroxides in water increase down the group ?
3. Why does the solubility of alkaline earth metal carbonates and sulphates in water decrease down the group ?

**N.C.E.R.T EXERCISE**

1. What are the common physical and chemical features of alkali metals ?
2. Discuss the general characteristics and gradation in properties of alkaline earth metals.
3. Why are alkali metals not found in nature ?
4. Find out the oxidation of Na in Na2O2.
5. Explain why is sodium less reactive than potassium ?
6. Compare the alkali metals and alkaline earth metals with respect to (i) ionization enthalpy (ii) basicity of oxides and (iii) solubility of hydroxides.
7. In what ways Lithium Shows similarities to magnesium in its chemical behavior ?
8. Explain why can alkali metals and alkaline earth metals not be obtained by chemical reduction methods ?
9. Why are potassium and Caesium, rather than lithium used in photoelectric cells ?
10. When an alkali metal dissolves in liquid ammonia, the solution can acquire different colours. Explain the reason for this type of colour change.
11. Beryllium and magnesium do not give colour to flame whereas alkaline earth metals do so. Why ?
12. Discuss the various reactions occur in the Solvay process.
13. Potassium carbonate cannot be prepared by Solvay process. Why ?
14. Why is Li2CO3 decomposed at a lower temperature whereas Na2CO3 at higher temperature ?
15. Compare the solubility and thermal stability of the following compounds of the alkali metals with those of alkaline earth metals : (a) Nitrates (b) Carbonates (c) Sulphates.
16. Starting with sodium chloride how would you proceed to prepare (i) sodium metal (ii) sodium hydroxide (iii) sodium peroxide and (iv) sodium carbonate ?
17. What happens when (i) magnesium is burnt in air (ii) quick lime is heated with silica (iii) chlorine reacts with slaked lime (iv) calcium nitrate is heated ?
18. Describe two important uses of each of the following : (i) caustic soda, (ii) sodium carbonate (iii) quick lime.

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1. Draw the structure of (i) BeCl2 (vapour) (ii) BeCl2 (solid).
2. The hydroxides and carbonates of sodium and potassium are easily soluble in water while the corresponding salts of magnesium and calcium are sparingly soluble in water. Explain.
3. Describe the importance of the following : (i) Limestone (ii) cement (iii) plaster of Paris.
4. Why are Lithium salts commonly hydrated and those of the other alkali metal ions usually anhydrous ?
5. Why is LiF almost insoluble in water whereas LiCl is soluble not only in water but also in acetone ?
6. Explain the significance of sodium , potassium , magnesium and calcium in biological fluids.
7. What happens when (i) sodium metal is dropped in water ?

(ii) sodium metal is heated in free supply of air ?

(iii) sodium peroxide dissolves in water ?

1. Comment on each of the following observations : (a) The mobilities of the alkali metal ions in aqueous solution are Li+ < Na+ < K+ < Rb+ < Cs+.

(b) Lithium is the only alkali metal which forms nitride directly.

(c) E˚ for M2+ (aq) + 2 → M (s) (where M = Ca, Sr or Ba) is nearly constant.

1. State as to why : (a) a solution of Na2CO3 is alkaline ?

(b) alkali metals are prepared by electrolysis of their fused chlorides ?

(c) sodium is found to be more useful than potassium ?

1. Write balanced equations for the reactions between (a) Na2O2 and water (b) KO2 and water (c) Na2O and CO2.
2. How would you explain :

(i) BeO is insoluble but BeSO4 is soluble in water.

(ii) BeO is soluble but BaSO4 is insoluble in water.

(iii) LiI is more soluble than KI in ethanol.

1. Which of the alkali metal is having least melting point ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Na | b) K | c) Rb | d) Cs |

1. Which one of the following alkali metals gives hydrated salts ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Li | b) Na | c) K | d) Cs |

1. Which one of the following alkaline earth metal carbonates is thermally the most stable ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) MgCO3 | b) CaCO3 | c) SrCO3 | d) BaCO3 |

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**Karan Arora** **M:9416974837**

**COMPETITION FOCUS – 1**

1. The alkali metals are low melting. Which of the following alkali metal is expected to melt if the room temperature rises to 30˚C ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Na | b) K | c) Rb | d) Cs |

1. Alkali metals react with water vigorously to form hydroxides and dihydrogen. Which of the following alkali metals reacts with water least vigorously ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Li | b) Na | c) K | d) Cs |

1. The reducing power of a metal depends on various factors. Suggest the factor which make Li, the strongest reducing agent in aqueous solution.

|  |  |  |  |
| --- | --- | --- | --- |
| a) Sublimation enthalpy | b) Ionisation enthalpy | c) Hydration enthalpy | d) Electron-gain enthalpy |

1. Metal carbonates decompose on heating to give metal oxide and carbon dioxide. Which of the metal carbonates is most stable thermally ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) MgCO3 | b) CaCO3 | c) SrCO3 | d) BaCO3 |

1. Which of the carbonates given below is unstable in air and is kept in CO2 atmosphere to avoid decomposition.

|  |  |  |  |
| --- | --- | --- | --- |
| a) BeCO3 | b) MgCO3 | c) CaCO3 | d) BaCO3 |

1. Metals form basic hydroxides. Which of the following metal hydroxide is the least basic ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Mg(OH)2 | b) Ca(OH)2 | c) Sr(OH)2 | d) Ba(OH)2 |

1. Some of the Group 2 metal halides are covalent and soluble in organic solvents. Among the following metal halides, the one which is soluble in ethanol is

|  |  |  |  |
| --- | --- | --- | --- |
| a) BeCl2 | b) MgCl2 | c) CaCl2 | d) SrCl2 |

1. The order of decreasing ionization enthalpy in alkali metals is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Na > Li > K > Rb | b) Rb < Na < K < Li | c) Li > Na > K > Rb | d) K < Li < Na < Rb |

1. The solubility of metal halides depends on their nature, lattice energy and hydration enthalpy of the individual ions. Amongst fluorides of alkali metals, the lower solubility of LiF in water due to

|  |  |
| --- | --- |
| a) Ionic nature of lithium fluoride | b) High lattice enthalpy |
| c) High hydration enthalpy for lithium ion | d) Low ionisation enthalpy of lithium atom |

1. Amphoteric hydroxides react with both alkalies and acids. Which of the following Group 2 metal hydroxides is soluble in sodium hydroxide ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Be(OH)2 | b) Mg(OH)2 | c) Ca(OH)2 | d) Ba(OH)2 |

1. In the synthesis of sodium carbonate, the recovery of ammonia is done by treating NH4Cl with Ca(OH)2. The by product obtained in this process is

|  |  |  |  |
| --- | --- | --- | --- |
| a) CaCl2 | b) NaCl | c) NaOH | d) NaHCO3 |

1. When sodium is dissolved in liquid ammonia, a solution of deep blue colour is obtained. The colour of the solution is due to

|  |  |
| --- | --- |
| a) ammoniated electron | b) sodium ion |
| c) sodium amide | d) ammoniated sodium ion |

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1. By adding gypsum to cement

|  |  |
| --- | --- |
| a) setting time of cement becomes less | b) setting time of cement increases |
| c) Colour of cement becomes light | d) shining surface is obtained |

1. Which of the following element does not form hydride by directing heating with dihydrogen ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Be | b) Mg | c) Sr | d) Ba |

1. The formula of soda ash is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Na2CO3.10H2O | b) Na2CO3.2H2O | c) Na2CO3.H2O | d) Na2CO3 |

1. A substance which giveS brick red flame and breaks down on heating to give oxygen and a brown gas is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Magnesium nitrate | b) Calcium nitrate | c) Barium nitrate | d) Strontium nitrate |

1. Which of the following statement is true about Ca(OH)2 ?

|  |  |
| --- | --- |
| a) It is used in the preparation of bleaching powder. | b) It is a light blue solid. |
| c) It does not possess disinfectant property. | d) It is used in the manufacture of cement. |

**(More than one option)**

1. Which of the following compounds are readily soluble in water ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) BeSO4 | b) MgSO4 | c) BaSO4 | d) SrSO4 |

1. When zeolite, which is hydrated sodium aluminium silicate is treated with hard water, the sodium ions are exchanged with which of the following ion(s) ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) H+ ions | b) Mg2+ ions | c) Ca2+ ions | d) ions |

1. Identify the correct formula of halides of alkaline earth metals from the following.

|  |  |  |  |
| --- | --- | --- | --- |
| a) BaCl2.2H2O | b) BaCl2.4H2O | c) CaCl2.6H2O | d) SrCl2.4H2O |

1. Choose the correct statement from the following.

a) Beryllium is not readily attacked by acids because of the presence of an oxide film on the surface of the metal.

b) Beryllium sulphate is readily soluble in water as the greater hydration enthalpy of Be2+ overcomes the Lattice enthalpy factor.

c) Beryllium exhibits coordination number more than four

d) Beryllium oxide is purely acidic in nature.

1. Which of the following are the correct reasons foe anomalous behaviour of lithium ?

|  |  |
| --- | --- |
| a) Exceptionally small size of its atom. | b) Its high polarizing power |
| c) It has high degree of hydration . | d) Exceptionally low ionization enthalpy |

**Answers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1. d | 2. a | 3. c | 4. d | 5. a | 6. a | 7. a |
| 8. c | 9. b | 10. a | 11. a | 12. a | 13. b | 14. a |
| 15. d | 16. b | 17. a | 18. a , d | 19. b , c | 20. a , c | 21. a , b |
| 22. a , b , c |  |  |  |  |  |  |

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**Karan Arora** **M:9416974837**

**COMPETITION FOCUS – 2**

1. Which alkali metals emits longest wavelength light in flame test ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Na | b) K | c) Cs | d) Li |

1. Which of the following does not form double salts ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Li2SO4 | b) Na2SO4 | c) K2SO4 | d) Rb2SO4 |

1. Which of the following is not known ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) KO3 | b) KO4 | c) KO2 | d) K2O2 |

1. Which of the following act as reducing as well as oxidising agent ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) NaNO3 | b) Na2O | c) Na2O2 | d) KNO3 |

1. The salt that is added to table salt to make it flow freely in rainy season is

|  |  |  |  |
| --- | --- | --- | --- |
| a) KCl | b) KI | c) Ca3(PO4)2 | d) Na3PO4 |

1. Which of the following alkaline earth metal sulphates is least soluble in water ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) BaSO4 | b) MgSO4 | c) SrSO4 | d) CaSO4 |

1. Which of the following alkali metal halides has the lowest lattice energy ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) LiF | b) NaCl | c) KBr | d) CsI |

1. The hydration energy of Mg2+ is greater than that of

|  |  |  |  |
| --- | --- | --- | --- |
| a) Al3+ | b) Na+ | c) Be2+ | d) Mg3+ |

1. Gypsum on heating to 390 K gives

|  |  |  |  |
| --- | --- | --- | --- |
| a) CaSO4.2H2O | b) CaSO4 | c) CaSO4.1/2H2O | d) SO3 and CaO |

1. The by-product of Solvay ammonia process is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Carbon dioxide | b) Ammonia | c) Calcium chloride | d) Calcium carbonate |

1. The drying agent which absorbs carbon dioxide and reacts violently with water is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Sodium carbonate | b) Alcohol | c) Conc. H2SO4 | d) Calcium oxide |

1. The active constituent of bleaching powder is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Ca(OCl)2 | b) Ca(OCl)Cl | c) Ca(ClO2)2 | d) Ca(ClO2)Cl |

1. KO2 (potassium superoxide) is used in oxygen cylinders in space and submarines because it

|  |  |
| --- | --- |
| a) absorbs CO2 and increases O2 content | b) eliminates moisture |
| c) absorbs CO2 | d) produces ozone |

1. A metal M readily forms water soluble sulphate MSO4 , water insoluble hydroxide M(OH)2 and oxide MO which become inert on heating. The hydroxide is soluble in NaOH. The metal M is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Be | b) Mg | c) Ca | d) Sr |

1. On dissolving moderate amount of sodium metal in liquid NH3 at low temperature, which one of the following does not occur ?

a) Blue coloured solution is obtained.

b) Na+ ions are formed in the solution

c) Liquid ammonia becomes good conductor of electricity.

d) Liquid ammonia remains diamagnetic.

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1. In curing cement plasters, which is sprinkled from time to time. This helps in

a) Converting sand to silicic acid

b) Keeping it cool

c) Developing interlocking needle like crystals of hydrated silicates.

d) Hydrating sand and gravel mixed with cement

1. The substance not likely to contain CaCO3 is

|  |  |  |  |
| --- | --- | --- | --- |
| a) dolomite | b) a marble statue | c) calcined gypsum | d) sea shells |

1. Mg and Li are similar in their properties due to

|  |  |  |  |
| --- | --- | --- | --- |
| a) same e/m ratio | b) same electron affinity | c) same group | d) same ionic potential |

1. A sodium salt of unknown anion when treated with MgCl2 gives white precipitate only on boiling. The anion is

|  |  |  |  |
| --- | --- | --- | --- |
| a) | b) | c) | d) |

1. One mole of magnesium nitride on reaction with an excess of water gives

|  |  |
| --- | --- |
| a) one mole of ammonia | b) one mole of nitric acid |
| c) two moles of ammonia | d) two moles of nitric acid |

1. Dead burnt plaster is

|  |  |  |  |
| --- | --- | --- | --- |
| a) CaSO4.2H2O | b) MgSO4.2H2O | c) CaSO4.1/2H2O | d) CaSO4 |

1. Photoelectric effect is maximum in

|  |  |  |  |
| --- | --- | --- | --- |
| a) Cs | b) Na | c) K | d) Li |

1. Brine solution on electrolysis will not give

|  |  |  |  |
| --- | --- | --- | --- |
| a) NaOH | b) Cl2 | c) H2 | d) O2 |

1. The correct order of increasing thermal stability of K2CO3 , MgCO3 , CaCO3 and BeCO3 is :

|  |  |
| --- | --- |
| a) K2CO3 < MgCO3 < CaCO3 < BeCO3 | b) BeCO3 < MgCO3 < K2CO3 < CaCO3 |
| c) BeCO3 < MgCO3 < CaCO3 < K2CO3 | d) MgCO3 < BeCO3 < CaCO3 < K2CO3 |

1. When CaC2 is heated in atmospheric nitrogen in an electric furnace the compound formed is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Ca(CN)2 | b) Ca3N2 | c) CaNC2 | d) CaNCN |

1. The solubility of alkali metal hydroxide follows the order :

|  |  |
| --- | --- |
| a) LiOH < NaOH < KOH < RbOH < CsOH | b) LiOH > NaOH > KOH > RbOH > CsOH |
| c) LiOH > CsOH > RbOH > NaOH > KOH | d) none of these |

1. Which pair of following chlorides do not impart colour to the flame

|  |  |  |  |
| --- | --- | --- | --- |
| a) BeCl2 and SrCl2 | b) BeCl2 and MgCl2 | c) CaCl2 and BaCl2 | d) BaCl2 and SrCl2 |

1. The sequence of ionic mobility in aqueous solution is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Rb+ > K+ > Cs+ > Na+ | b) Na+ > K+ > Rb+ > Cs+ | c) K+ > Na+ > Rb+ > Cs+ | d) Cs+ > Rb+ > K+ > Na+ |

1. The alkali metals form salt like hydrides by the direct synthesis at elevated temperature. The thermal stability of these hydrides decreases in which of the following orders ?

|  |  |
| --- | --- |
| a) NaH > LiH > KH > RbH > CsH | b) LiH > NaH > KH > RbH > CsH |
| c) CsH > RbH > KH > NaH > LiH | d) KH > NaH > LiH > CsH > RbH |

1. In case of alkali metals, the covalent character decreases in the order :

|  |  |  |  |
| --- | --- | --- | --- |
| a) MI > MBr > MCl > MF | b) MCl > MI > MBr > MF | c) MF > MCl > MBr > MI | d) MF > MCl > MI > MBr |

1. The set representing the correct order of ionic radii is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Na+ > Li+ > Mg2+ > Be2+ | b) Li+ > Na+ > Mg2+ > Be2+ | c) Mg2+ > Be2+ > Li+ > Na+ | d) Li+ > Be2+ > Na+ > Mg2+ |

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**Karan Arora** **M:9416974837**

1. Among the following, the least thermally stable is

|  |  |  |  |
| --- | --- | --- | --- |
| a) K2CO3 | b) Na2CO3 | c) BaCO3 | d) Li2CO3 |

1. Which of the following oxides is most acidic in nature ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) BeO | b) MgO | c) CaO | d) Bao |

1. Plaster of Paris is hardened by

|  |  |  |  |
| --- | --- | --- | --- |
| a) Liberating CO2 | b) Hydration | c) Dehydration | d) changing into CaCO3 |

1. The characteristic not related to alkali metals is

|  |  |
| --- | --- |
| a) their ions are isoelectronic with noble gases | b) low melting point |
| c) Low electronegativity | d) high ionization enthalpy |

1. The least ionic chloride if formed by

|  |  |  |  |
| --- | --- | --- | --- |
| a) Mg | b) Ca | c) Be | d) Sr |

1. The reaction of Cl2 with X gives bleaching powder. X is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Cao | b) Ca(OH)2 | c) Ca(OCl)2 | d) Ca(ClO3)2 |

1. Which of the following alkaline earth metals sulphates has hydration enthalpy higher than the lattice enthalpy ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) SrSO4 | b) CaSO4 | c) BeSO4 | d) BaSO4 |

1. Property of the alkaline earth metal that increases with their atomic number is

|  |  |
| --- | --- |
| a) Solubility of their hydroxides in water | b) Solubility of their sulphates in water |
| c) Ionization enthalpy | d) Electronegativity |

1. A compound A on heating gives a colourless gas and a residue that is dissolve in water to obtain B. Excess of CO2 is bubbled through aqueous solution of B, C is formed which is recovered in the solid form. Solid C on gentle heating gives back A. The compound is

|  |  |  |  |
| --- | --- | --- | --- |
| a) CaCO3 | b) Na2CO3 | c) K2CO3 | d) CaSO4.2H2O |

1. Which of the following carbonates is the most stable ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) MgCO3 | b) CaCO3 | c) SrCO3 | d) BaCO3 |

1. For alkali metal, which of he following trends is incorrect ?

|  |  |
| --- | --- |
| a) Hydration energy : Li > Na > K > Rb | b) Ionization energy : Li > Na > K > Rb |
| c) Density : Li < Na < K < Rb | d) Atomic size : Li < Na < K < Rb |

1. Which of the following compound is most stable ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) LiF | b) LiCl | c) LiBr | d) LiI |

1. Which of the following sets will have highest hydration enthalpy and highest ionic radii ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Na and Li | b) Li and Rb | c) K and Na | d) Cs and Na |

1. RbO2 is

|  |  |
| --- | --- |
| a) Peroxide and paramagnetic | b) Peroxide and diamagnetic |
| c) Superoxide and paramagnetic | d) Superoxide and diamagnetic |

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**(More than one option)**

1. Flame test is not given by

|  |  |  |  |
| --- | --- | --- | --- |
| a) Be | b) K | c) Sr | d) Mg |

1. Which of the following groups of elements have properties that are most similar ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) Na , K , Cs | b) Mg , Sr , Ba | c) Be , Al , Ca | d) Be , Ra , Cs |

1. Magnesium burns in the atmosphere of the following gases ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) CO2 | b) N2O | c) N2 | d) SO2 |

1. Which of the following elements form peroxides when heated in excess of air ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) K | b) Na | c) Ba | d) Ca |

1. The alkaline earth metals forming ionic oxides are

|  |  |  |  |
| --- | --- | --- | --- |
| a) BeO | b) MgO | c) CaO | d) SrO |

1. Which of the following chlorides are soluble in pyridine ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) LiCl | b) CsCl | c) NaCl | d) BeCl2 |

1. Which are correct statements for Be and Al ?

|  |  |
| --- | --- |
| a) Both are rendered passive by conc. H2SO4 | b) Both have sp-hybridisation in their compounds |
| c) Both form amphoteric oxides | d) Both form ionic hydrides |

**Answers**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. b | 2. a | 3. b | 4. c | 5. c | 6. a | 7. d | 8. b | 9. c |
| 10. c | 11. d | 12. a | 13. a | 14. a | 15. c | 16. c | 17. c | 18. d |
| 19. b | 20. c | 21. d | 22. a | 23. d | 24. c | 25. d | 26. a | 27. b |
| 28. d | 29. b | 30. a | 31. a | 32. d | 33. a | 34. b | 35. d | 36. c |
| 37. b | 38. c | 39. a | 40. a | 41. d | 42. c | 43. a | 44. b | 45. c |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 46. a , d | 47. a , b , c | 48. a , b , c , d | 49. b , c , d | 50. b , c , d | 51. a , d | 52. a , c |

s-BLOCK ELEMENTS Page No. 8

**Comprehension Type Questions**

**Comprehension 1 :** Alkali and alkaline earth metals along with hydrogen and helium constitute s-block elements. They have low ionisation enthalpies and hence exhibit characteristic flame colorations. They have highly negative electrode potentials and hence are strong reducing agents. Their solutions in liquid ammonia are conducting and also act as strong reducing agents. Being strong reducing agents than hydrogen, they are usually prepared by electrolysis of their fused chlorides. Their oxides are basic and the basic strength increases down the group. The solubility of carbonates and sulphates of alkali and alkaline earth metals show opposite trends. The carbonates of alkaline earth metals and lithium carbonate decompose on heating while the carbonates of other alkali metals do not decompose on heating. The bicarbonates of both alkali and alkaline earth metals on heating give carbonates.

1. The basic character of the oxides, MgO , SrO , K2O , NiO and Cs2O increases in the order :

|  |  |
| --- | --- |
| a) MgO > SrO > K2O > NiO > Cs2O | b) Cs2O < K2O < MgO < SrO < NiO |
| c) NiO < MgO < SrO < K2O < Cs2O | d) K2O < NiO < MgO < SrO < Cs2O |

1. Which of the following are arranged in increasing order of solubilities ?

|  |  |
| --- | --- |
| a) CaCO3 < KHCO3 < NaHCO3 | b) NaHCO3 < KHCO3 < CaCO3 |
| c) KHCO3 < NaHCO3 < CaCO3 | d) CaCO3 < NaHCO3 < KHCO3 |

1. The compound insoluble in acetic acid is

|  |  |  |  |
| --- | --- | --- | --- |
| a) calcium oxide | b) calcium carbonate | c) calcium oxalate | d) calcium hydroxide |

1. The metal that produces red-violet colour in the non-luminous flame is

|  |  |  |  |
| --- | --- | --- | --- |
| a) Ba | b) Rb | c) Mg | d) K |

**Comprehension 2 :** According to Fajan rules, the percentage of covalent character in an ionic compound increases if the cation is highly charged or the cation is small and the anion is large or the cation has pseudo inert gas configuration. As a result of increased covalent character, the melting point decreases and solubility in less polar solvent increases.

1. Which of the following has the lowest melting point ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) LiCl | b) NaCl | c) KCl | d) RbCl |

1. The correct order of increasing ionic character is

|  |  |
| --- | --- |
| a) BeCl2 < MgCl2 < CaCl2 < BaCl2 | b) BeCl2 < MgCl2 < BaCl2 < CaCl2 |
| c) BeCl2 < BaCl2 < MgCl2 < CaCl2 | d) BaCl2 < CaCl2 < MgCl2 < BeCl2 |

1. The correct sequence of increasing covalent character is represented by

|  |  |  |  |
| --- | --- | --- | --- |
| a) BeCl2 < NaCl < LiCl | b) NaCl < LiCl < BeCl2 | c) BeCl2 < LiCl < NaCl | d) LiCl < NaCl < BeCl2 |

1. Based on lattice energy and other considerations, which one of the following alkali metal chlorides is expected to have the highest melting point ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) LiCl | b) NaCl | c) KCl | d) RbCl |

1. The highest lattice energy corresponds to

|  |  |  |  |
| --- | --- | --- | --- |
| a) MgO | b) CaO | c) SrO | d) BaO |

**Answers**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. c | 2. d | 3. c | 4. b | 5. a | 6. a | 7. b | 8. b | 9. a |

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**Matching Type Questions**

1. Column I Column II

|  |  |
| --- | --- |
| (A) Used as a source of O2 in submarines, space shuttles and  oxygen masks | (p) Mg(ClO4)2 |
| (B) Used in obtaining the X-ray of the stomach | (q) CaH2 |
| (C) Used as a drying agent | (r) KO2 |
| (D) React with water to produce H2 | (s) BaSO4 |

a) A-r ; B-p ; C- q ; D-s b) A-r ; B-s ; C- p ; D-q c) A-s ; B-q ; C- r ; D-p d) A-p ; B-r ; C- s ; D-q

1. Column I Column II

|  |  |
| --- | --- |
| (A) Strongest reducing agent in aqueous solution | (p) Magnesium |
| (B) Does not give flame colouration | (q) Caesium |
| (C) Forms peroxides on heating with excess O2 | (r) Lithium |
| (D) Used in photoelectric cells | (s) Sodium |

a) A-s ; B-q ; C- p ; D-r b) A-q ; B-r ; C- p ; D-s c) A-r ; B-p ; C- s ; D-q d) A-p ; B-s ; C- q ; D-r

**Answers**

1. b 2. c

**Integer Type Questions**

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | C | D |
| ① | ① | ① | ① |
| ② | ② | ② | ② |
| ③ | ③ | ③ | ③ |
| ④ | ④ | ④ | ④ |
| ⑤ | ⑤ | ⑤ | ⑤ |
| ⑥ | ⑥ | ⑥ | ⑥ |
| ⑦ | ⑦ | ⑦ | ⑦ |
| ⑧ | ⑧ | ⑧ | ⑧ |
| ⑨ | ⑨ | ⑨ | ⑨ |

**DIRECTIONS :** The answer to each of the following questions in a single

digit integer, ranging from 0 to 9. If the correct answers to the question numbers A, B, C and D (say) are 4, 0, 9 and 2 respectively, then the correct darkening of bubbles should be as shown on the side :

1. How many of the following s-block elements do not give characteristic colours

in the flame test ? Li , Be , Ca , Ba , Sr , Mg , Na , K

1. How many of the following hydroxides is/are amphoteric in character ?

CsOH, LiOH, Ca(OH)2, Be(OH)2, Mg(OH)2, Sr(OH)2, Ba(OH)2, KOH, NaOH

1. Out of Li , Na, K, Rb, Cs , How many of them directly form superoxides heating

with dioxygen ?

1. How many of the following metals when heated in an atmosphere of N2 gas form

Nitrides ? Li , Na , K , Rb , Cs , Mg , Ca , Sr , Ba

**Answers**

A. 2 B. 1 C. 3 D. 5

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**Assertion-Reason Type Questions**

**Type – 1**

**DIRECTIONS :** In each of the following questions, a statement of Assertion (A) is given followed by a corresponding statement of Reason (R) just below it. Of the statements, mark the correct answer as:

1. If both assertion and reason are true, but reason is the true explanation of the assertion.
2. If both assertion and reason are true, but reason is not the true explanation of the assertion.
3. If assertion is true, but reason is false.
4. If assertion is false, but reason is true.
5. **Assertion:** Alkali metals dissolve in liquid ammonia to give blue solutions.

**Reason:** Alkali metals in liquid ammonia give solvated species of the type []+ . (M = alkali metals)

1. **Assertion:** Sodium metal is softer than potassium metal.

**Reason:** Metallic bonding in potassium is weaker than sodium.

1. **Assertion:** Among the alkali metals, caesium salts exhibit the maximum electrical conductance in aqueous solutions.

**Reason:** The radius of hydrated caesium ion is the highest among alkali metals.

1. **Assertion:** Be(OH)2 is soluble in both HCl and NaOH.

**Reason:** Be(OH)2 is amphoteric in nature.

1. **Assertion:** Sodium reacts with oxygen o forms Na2O2 but potassium reacts with oxygen to form KO2.

**Reason:** Potassium is more reactive than sodium.

1. **Assertion:** Be and Mg give characteristic flame colourations.

**Reason:** As compared to other alkaline earth metals, ionisation enthalpy of Be and Mg is high.

1. **Assertion:** CuCl is more covalent than NaCl.

**Reason:** Na+ ion is more polarizing than Cu+ ion.

1. **Assertion:** Be forms [BeF4]2 – but Al forms [AlF6]3 – .

**Reason:** Be does not have d-orbitals in the valence shell but Al has.

**Type – 2**

**DIRECTIONS :** In each of the following questions, a statement of Assertion (A) is given followed by a corresponding statement of Reason (R) just below it. Of the statements, mark the correct answer as:

1. If both assertion and reason are true, but reason is the true explanation of the assertion.
2. If both assertion and reason are true, but reason is not the true explanation of the assertion.
3. If assertion is true, but reason is false.
4. If both assertion and reason are false.
5. **Assertion:** Li2CO3 and Na2CO3 are thermally stable.

**Reason:** Both the carbonates are salts of large cations and large anions.

1. **Assertion:** In rainy season, common salt becomes damp after sometime on keeping in air.

**Reason:** Common salt is NaCl which is hygroscopic in nature.

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1. **Assertion:** Magnesium keeps on burning in CO2.

**Reason:** Magnesium reduces CO2 to C.

1. **Assertion:** Li resembles Mg.

**Reason:** Li+ has approximately the same size as Mg2+.

1. **Assertion:** Na2SO4 is soluble in water while BaSO4 is insoluble.

**Reason:** Lattice energy of barium sulphate exceeds its hydration energy.

1. **Assertion:** Alkali metals impart colour to the flame.

**Reason:** Their ionization energies are low.

1. **Assertion:** Sulphur is estimated as BaSO4 and not as MgSO4.

**Reason:** The ionic radius of Mg2+ is smaller than that of Ba2+.

1. **Assertion:** LiCl is predominantly covalent compound.

**Reason:** Electronegativity difference between Li and Cl is too small.

1. **Assertion:** Mg is not present in enamel of human teeth.

**Reason:** Mg is an essential element for biological functions of human.

**Answers**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. b | 2. d | 3. c | 4. a | 5. b | 6. d | 7. c | 8. a | 9. d |
| 10. c | 11. a | 12. a | 13. a | 14. a | 15. b | 16. c | 17. b |  |

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