
UNIT : 14 S - Block ELEMENTS

Important Points

Group-1 (alkali metals) and group-2 (alkaline earth metals) are included in the s-block elements of the periodic table. They are known like this because their oxides and hydroxides are alkaline in nature. Alkali metals possess one and alkaline earth metals possess two s-electrons. They are highly electropositive metals and form monovalent cations (M^+) and divalent cations (M^{2+}) respectively.

With the increase in atomic number, the physical and chemical properties of alkali metals show regular trend. The atomic and ionic sizes increase on going down in the group and ionization enthalpies decrease in alkali metals. The same type of trend is observed in alkaline earth metals.

The first element of each of these two groups, namely, lithium in group-1 and beryllium in group-2 show similarities with the element of the next group viz. Li-Mg and Be-Al. This is called diagonal relationship. In fact, the first element of each group shows difference with other elements in the same group i.e their behaviour is anomalous.

Alkali elements are bright white, soft metals melting at low temperatures. Li and Na are obtained by electrolysis. They are very active and their compounds are ionic. Their oxides and hydroxides are soluble in water and give strong alkaline solution. Amongst important compounds of sodium are sodium carbonate, sodium hydrogen-carbonate, sodium hydroxide, NaOH is produced by Castner Kellner process and sodium carbonate by Solvay ammonia soda process.

The chemistry of alkaline earth metals is similar to that of alkali metals. Even then some differences are there, because the atomic and ionic sizes of alkaline earth metals decrease and the charge of the cation increases. Their oxides are less basic than those of alkali metals.

Amongst the industrially important compounds of sodium are caustic soda, washing soda and those of calcium are calcium oxide, calcium hydroxide, plaster of Paris, calcium carbonate and Portland cement. The production of cement can be carried out by grinding the mixture of lime stone and clay and heating it in rotary kiln. The clinker obtained is mixed with gypsum (2-3%) which gives fine powder of cement. All these substances have many uses.

Monovalent sodium and potassium ions and divalent magnesium and calcium ions are found in larger proportion in biological fluid in a human being. These ions carry out important biological functions like maintenance of ionic equilibrium and nerve impulse conduction which is known as sodium-potassium pump.

M.C.Q.

- (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
- (2) The reducing power of a metal depends on various factors. Suggest the factor which makes Li, the strongest reducing agent in aqueous solution.
(a) Sublimation enthalpy (b) Ionisation enthalpy
(c) Hydration enthalpy (d) Electron - gain enthalpy
- (3) Metal carbonates decompose on heating to give metal oxide and carbon dioxide. Which of the metal carbonates is most stable thermally ?
(a) MgCO_3 (b) CaCO_3 (c) SrCO_3 (d) BaCO_3
- (4) 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
- (5) 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) BeCl_2 (b) MgCl_2 (c) CaCl_2 (d) SrCl_2
- (6) The order of decreasing ionisation enthalpy in alkali metal is
(a) $\text{Na} > \text{Li} > \text{K} > \text{Rb}$ (b) $\text{Li} > \text{Na} > \text{K} > \text{Rb}$
(c) $\text{Rb} > \text{Na} > \text{K} > \text{Li}$ (d) $\text{K} < \text{Li} < \text{Na} < \text{Rb}$
- (7) The solubility of metal halides depends on their nature, lattice enthalpy and hydration enthalpy of the individual ions. Among the fluorides of alkali metals, the lowest solubility of LiF in water is 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.
- (8) 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
- (9) In the synthesis of sodium carbonate, the recovery of ammonia is done by treating NH_4Cl with Ca(OH)_2 . The by product obtained in this process is ...
(a) NaCl (b) NaOH (c) CaCl_2 (d) NaHCO_3
- (10) When sodium is dissolved in liquid ammonia, a solution of deep blue colour is obtained. The colour of the solution is due to ...
(a) sodium ion (b) ammoniated electron
(c) sodium amide (d) ammoniated sodium ion
- (11) 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

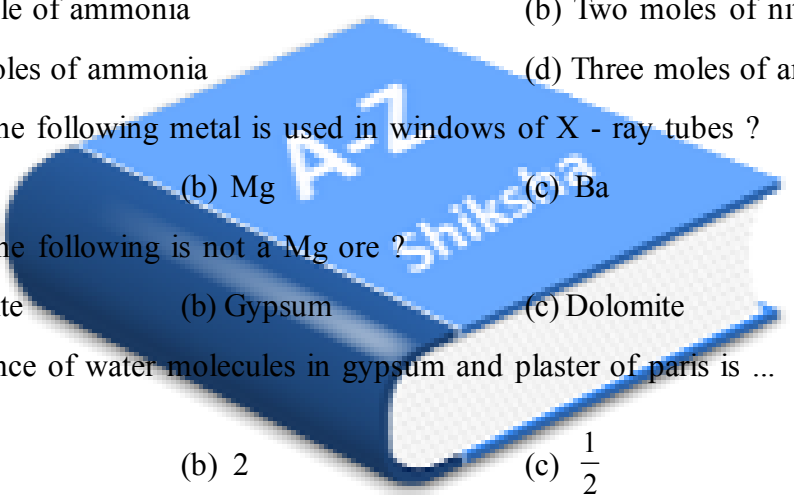
- (12) Dead burnt plaster is ...
 (a) CaSO_4 (b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$ (c) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ (d) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
- (13) A substance which gives crimson red flame and breaks on heating to give oxygen and a brown gas is ..
 (a) Magnesium nitrate (b) Calcium nitrate (c) Barium nitrate (d) Strontium nitrate
- (14) The formula of sodash is ...
 (a) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ (b) $\text{Na}_2\text{CO}_3 \cdot 2\text{H}_2\text{O}$ (c) Na_2CO_3 (d) $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$
- (15) Which of the following compounds are readily soluble in water ?
 (a) BeSO_4 (b) MgSO_4 (c) BaSO_4 (d) both (a) and (b)
- (16) Identify the correct formula of halides of alkaline earth metals from the following.
 (a) $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ (b) $\text{BaCl}_2 \cdot 4\text{H}_2\text{O}$ (c) $\text{CaCl}_2 \cdot 4\text{H}_2\text{O}$ (d) $\text{SrCl}_2 \cdot 4\text{H}_2\text{O}$
- (17) Which of the following statement is true about $\text{Ca}(\text{OH})_2$?
 (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.
- (18) Match the elements given in Column - I with the colour they impart to the flame given in Column - II.
- | Column - I | Column - II |
|------------|-----------------|
| (A) Cs | (P) Apple green |
| (B) Sr | (Q) Brick red |
| (C) K | (R) Blue |
| (D) Ca | (S) Crimson red |
| (E) Ba | (T) Violet |
- (a) A-P, B-Q, C-S, D-R, E-T (b) A-Q, B-P, C-R, D-S, E-T
 (c) A-R, B-S, C-T, D-Q, E-P (d) A-S, B-R, C-Q, D-P, E-T
- (19) When water is added to compound (A) of calcium, solution of compound (B) is formed. When CO_2 is passed into the solution, it turns milky due to the formation of compound (C). If excess of carbon dioxide is passed into the solution, milky disappears due to the formation of compound (D). Identify the compound (D).
 (a) CaO (b) $\text{Ca}(\text{OH})_2$ (c) CaCO_3 (d) $\text{Ca}(\text{HCO}_3)_2$
- (20) Which alkali metal emits longest wavelength light in Flame test ?
 (a) Na (b) K (c) Cs (d) Li

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- (21) Which of the following is not known ?
(a) KO_3 (b) KO_4 (c) KO_2 (d) K_2O_2
- (22) Which of the following acts as reducing as well as oxidising agent ?
(a) NaNO_3 (b) Na_2O_2 (c) Na_2O (d) KNO_3
- (23) The salt that is added to table salt to make it flow freely in rainy season is ...
(a) KCl (b) KI (c) $\text{Ca}_3(\text{PO}_4)_2$ (d) Na_3PO_4
- (24) Which of the following alkaline earth metal sulphates is least soluble in water ?
(a) MgSO_4 (b) CaSO_4 (c) BaSO_4 (d) SrSO_4
- (25) The hydration energy of Mg^{2+} is greater than that of
(a) Al^{3+} (b) Be^{2+} (c) Na^+ (d) Mg^{3+}
- (26) 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) $\text{Ca}(\text{ClO}_2)\text{Cl}$
- (27) KO_2 is used in oxygen cylinders in space and submarines because it...
(a) absorbs CO_2 and increases O_2 content (b) eliminates moisture
(c) produces ozone (d) None of the above
- (28) A metal M readily forms water soluble sulphate MSO_4 , water insoluble hydroxide and oxide MO which becomes inert on heating. The hydroxide is soluble in NaOH . The metal M is...
(a) Be (b) Ca (c) Mg (d) Sr
- (29) Which of the following is sparingly soluble in water ?
(a) NaOH (b) KOH (c) LiOH (d) RbOH
- (30) Photo electric effect is maximum in ...
(a) Cs (b) K (c) Na (d) Li
- (31) Among the following compounds of cement which is present in the highest amount ?
(a) Ca_2SiO_4 (b) Al_2O_3 (c) Ca_3SiO_5 (d) $\text{Ca}_3\text{Al}_2\text{O}_6$
- (32) Which pair of the following chlorides do not impart colour to the flame ?
(a) BeCl_2 and SrCl_2 (b) BeCl_2 and MgCl_2
(c) BaCl_2 and CaCl_2 (d) MgCl_2 and CaCl_2
- (33) The sequence of hydration enthalpy in following ion is ...
(a) $\text{Rb}^+ > \text{K}^+ > \text{Cs}^+ > \text{Na}^+ > \text{Li}^+$ (b) $\text{Li}^+ > \text{Na}^+ > \text{K}^+ > \text{Rb}^+ > \text{Cs}^+$
(c) $\text{K}^+ > \text{Na}^+ > \text{Rb}^+ > \text{Cs}^+ > \text{Li}^+$ (d) $\text{Cs}^+ > \text{Rb}^+ > \text{K}^+ > \text{Na}^+ > \text{Li}^+$

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- (34) In case of alkali metals, the covalent character increases in the order :
- (a) $MI > MBr > MCl < MF$ (b) $MF < MCl < MBr < MI$
(c) $MBr < MCl < MI < MF$ (d) $MF < MBr < MCl < MI$
- (35) Among the following the least thermally stable is ?
- (a) K_2CO_3 (b) Na_2CO_3 (c) $BaCO_3$ (d) Li_2CO_3
- (36) Which of the following oxides is amphoteric in nature ?
- (a) MgO (b) BeO (c) CaO (d) BaO
- (37) Which of the following characteristics is not related to alkali metals ?
- (a) Their ions are iso electronic with noble gases.
(b) low melting point (c) low electronegativity (d) high ionisation energy
- (38) Fill in the blanks with proper option given below for the following statement.
“All the halides of alkaline earth metals with exception of “_____” are ionic in nature.”
- (a) Barium halide (b) Strontium halide (c) Beryllium halide (d) Calcium halide
- (39) K_2CO_3 can not be prepared by solvay ammonia process because ...
- (a) K_2CO_3 is fairly soluble in water. (b) It has no water of crystallization.
(c) $KHCO_3$ is highly soluble in water. (d) K_2CO_3 decomposes in H_2O .
- (40) The reaction of Cl_2 with X gives bleaching powder X is
- (a) CaO (b) $Ca(OH)_2$ (c) $Ca(OCl)_2$ (d) $Ca(O_3Cl)_2$
- (41) Which of the following alkaline earth metal sulphates has hydration enthalpy higher than the lattice enthalpy ?
- (a) $SrSO_4$ (b) $MgSO_4$ (c) $CaSO_4$ (d) $BaSO_4$
- (42) A compound (A) on heating gives a colourless gas and a residue that is dissolved in water to obtain (B). Excess of CO_2 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) $CaCO_3$ (b) K_2CO_3 (c) Na_2CO_3 (d) $CaSO_4 \cdot 2H_2O$
- (43) For alkaline metal, which of the following trends is incorrect ?
- (a) Hydration enthalpy : $Be > Mg > Ca > Sr$
(b) Second Ionization enthalpy: $Be > Mg > Ca > Sr$
(c) Density : $Sr > Be > Mg > Ca$
(d) Atomic size : $Sr > Ca > Mg > Be$
- (44) Which of the following compounds is most stable ?
- (a) $LiCl$ (b) LiI (c) $LiBr$ (d) LiF

- (45) Flame test is not given by ...
 (a) Be (b) Sr (c) K (d) Ca
- (46) The alkaline earth metals forming ionic oxides are ...
 (a) MgO (b) BeO (c) CaO (d) (a) and (c)
- (47) 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
- (48) 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
- (49) The compound insoluble in acetic acid is ...
 (a) Calcium oxide (b) Calcium carbonate
 (c) Calcium oxalate (d) Calcium hydroxide
- (50) Which of the following has the lowest melting point ?
 (a) LiCl (b) KCl (c) NaCl (d) RbCl
- (51) The correct order of decreasing ionic character is ...
 (a) BeCl₂ > MgCl₂ > CaCl₂ > BaCl₂ (b) BeCl₂ > MgCl₂ > BaCl₂ > CaCl₂
 (c) BeCl₂ > BaCl₂ > MgCl₂ > CaCl₂ (d) BaCl₂ > CaCl₂ > MgCl₂ > BeCl₂
- (52) The highest lattice energy corresponds to ...
 (a) MgO (b) CaO (c) SrO (d) BaO
- (53) 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, Ba
 (a) 3 (b) 4 (c) 2 (d) 5
- (54) How many of the following sulphates of metals dissolve in the water ?
 SrSO₄, K₂SO₄, BeSO₄, Li₂SO₄, MgSO₄, BaSO₄, Na₂SO₄, CaSO₄, Rb₂SO₄
 (a) 6 (b) 4 (c) 3 (d) 5
- (55) 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.
 (a) 1 (b) 4 (c) 5 (d) 3
- (56) Out of Li, Na, K, Rb and Cs how many of them directly form superoxides on heating with oxygen ?
 (a) 5 (b) 2 (c) 3 (d) 4

- (57) How many of the following metals when heated in an atmosphere of N_2 gas form nitrides ?
Li, Na, K, Rb, Cs, Mg, Ca, Sr, Ba
(a) 9 (b) 5 (c) 3 (d) 6
- (58) Which of the following is not correct for workfunction of Na^+ ions in human body ?
(a) An important role in nerve signal transmission.
(b) Control of flow of water between cell membrane.
(c) For transport of sugar and amino acid in cell.
(d) They activate the enzyme.
- (59) Which of the following is not correct ?
(a) $2Li_2O \xrightarrow[673k]{heat} Li_2O_2 + 2Li$ (b) $2K_2O \xrightarrow[673k]{heat} K_2O_2 + 2K$
(c) $2Na_2O \xrightarrow[673k]{heat} Na_2O_2 + 2Na$ (d) $2Rb_2O \xrightarrow[673k]{heat} Rb_2O_2 + 2Rb$
- (60) Which of the following has maximum lattice energy ?
(a) Li_2O (b) Na_2O (c) MgO (d) BaO
- (61) Which of the following statements is/are correct for “when alkali metals are dissolved in liquid ammonia. We get...”
(a) A blue solution in case of dilute alkali metal ammonia solution.
(b) If we increase concentration of metal in ammonia then the blue colour starts changing and finally changes to that of bronze colour.
(c) The blue colour of the solution of alkali metal in liquid ammonia is due to excitation of free ammoniated electrons to higher energy levels.
(d) All the above are correct.
- (62) Which of the following pairs of elements possess diagonal relationship ?
(a) Li and Mg (b) Li and Al (c) Na and Mg (d) Cs and Ba
- (63) Fill in the blanks with suitable option.
“The important ingredients of potland cement are dicalcium silicate “_____” % , tricalcium silicate ... % and tricalcium aluminate “_____” % respectively.”
(a) 26 %, 51%, 11% (b) 51%, 26%, 11%
(c) 11%, 51%, 26% (d) 26%, 11%, 51%
- (64) A sample of portaland cement contain 23% SiO_2 , 3% Al_2O_3 and 2% Fe_2O_3 then what would be its silica module (n) ?
(a) 3.83 (b) 28 (c) 21.73 (d) 4.6

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- (65) For a good quality of cement, the ratio of silica (SiO_2) and alumina (Al_2O_3) must be between...
- (a) 3 to 5 (b) 2.5 to 4 (c) 6 to 7.5 (d) 4 to 5.5
- (66) Chloro phyll and heamoglobin are complex of “_____” and “_____” respectively.
- (a) Mg^{2+} and Ca^{2+} (b) Na^+ and K^+ (c) Mg^{2+} and Fe^{2+} (d) Cl^- and Fe^{2+}
- (67) Which of the following is the component of most of the kidney stones ?
- (a) $(\text{COO})_2\text{Ca}$ (b) $(\text{COONa})_2$ (c) $(\text{COO})_2 \text{Ba}$ (d) $(\text{COO})_2\text{Mg}$
- (68) Which of the following metal ions plays an important role in muscle contraction ?
- (a) K^+ (b) Mg^{2+} (c) Na^+ (d) Ca^{2+}
- (69) White enamel of our teeth is ...
- (a) $\text{Ca}_3(\text{PO}_4)_2$ (b) CaCl_2 (c) CaF_2 (d) CaBr_2
- (70) Two mole of magnesium nitride on reacting with an excess of water gives :
- (a) One mole of ammonia (b) Two moles of nitric acid
(c) Four moles of ammonia (d) Three moles of ammonia
- (71) Which of the following metal is used in windows of X - ray tubes ?
- (a) Be (b) Mg (c) Ba (d) Al
- (72) Which of the following is not a Mg ore ?
- (a) Magnesite (b) Gypsum (c) Dolomite (d) Carnalite
- (73) The difference of water molecules in gypsum and plaster of paris is ...
- (a) $\frac{5}{2}$ (b) 2 (c) $\frac{1}{2}$ (d) $1\frac{1}{2}$
- (74) Which of the following exists in polymeric form ?
- (a) AlCl_3 (b) SiC (c) BeCl_2 (d) B_2H_6
- (75) The electronic cofiguration of metal M is $1s^2 2s^2 2p^6 3s^2$. The formula of its oxide would be ...
- (a) MO (b) M_2O (c) M_2O_3 (d) MO_2
- (76) The formula of carnalliteis ...
- (a) $\text{KCl} \cdot \text{MgCl}_2 \cdot 2\text{H}_2\text{O}$ (b) $\text{K}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$
(c) $\text{KCl g MgCl}_2 \text{ g } 6\text{H}_2\text{O}$ (d) $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$
- (77) When NaOH is made, the gas released at the cathode is ...
- (a) Cl_2 (b) H_2 (c) O_2 (d) H_2O
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(78) Choose proper option for matching column - I and column - II

Column - I

Column - II

(A) NaOH

(P) Photo electric cells

(B) Na_2CO_3

(Q) Coolant in nuclear reactors

(C) Liquid Na

(R) SO_2 absorber

(D) Caesium

(S) Detergent

(a) A-R, B-S, C-Q, D-P

(b) A-P, B-Q, C-R, D-S

(c) A-Q, B-P, C-R, D-S

(d) A-S, B-Q, C-P, D-R

(79) In the electrolytic separation of Li, KCl is added to LiCl ...

(a) To increase the conductivity of LiCl

(b) To lower the fusion temperature of the mixture

(c) To decrease the conductivity of LiCl

(d) Both (a) and (b)

(80) Molecular formula of Glauber's salt is ...

(a) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$

(b) $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$

(c) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

(d) $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$

(81) The name "Blue John" is given to which of the following compounds.

(a) CaH_2

(b) CaF_2

(c) $\text{Ca}_3(\text{PO}_4)_2$

(d) CaO

(82) The wire of flash bulb is made of ...

(a) Mg

(b) Cu

(c) Ba

(d) Ag

(83) 30 gm of Mg and 30 gm of O_2 are reacted and the residual mixture contains ...

(a) 60 gm of MgO only

(b) 40 gm of MgO and 20 gm of O_2

(c) 45 gm of MgO and 15 gm of O_2

(d) 50 gm of MgO and 10 gm of O_2

(84) Which of the following is not correct ?

(a) $4\text{LiNO}_{3(s)} \rightarrow 2\text{Li}_2\text{O}_{(s)} + 4\text{NO}_{2(s)} + \text{O}_{2(g)}$

(b) $2\text{NaNO}_{3(s)} \rightarrow 2\text{NaNO}_{2(s)} + \text{O}_{2(g)}$

(c) The oxides Li_2O and MgO do not give super oxides by combining with more oxygen.

(d) Lithium hydrogen carbonate is obtained in solid form.

(85) The number and type of bonds between two carbon atoms in calcium carbides are ...

(a) one sigma, one pi.

(b) one sigma, two pi.

(c) two sigma, one pi.

(d) two sigma, two pi

(86) Which of the following salts are composed of isoelectronic cations and anions ?

(a) NaCl

(b) MgF_2

(c) CaS

(d) (b) and (c) both

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- (87) Which are correct statements for Be and Al ?
- (a) Both are rendered passive by con.HNO₃
 - (b) Both have sp - hybridization in their compounds.
 - (c) Both form acidic oxides
 - (d) Both form hydrides
- (88) Identify the correct statement ?
- (a) Gypsum contains a lower percentage of calcium than plaster of paris
 - (b) Gypsum is obtained by heating plaster of paris
 - (c) Plaster of paris can be obtained by hydration of gypsum
 - (d) Plaster of paris is obtained by partial oxidation of gypsum.
- (89) Which of the following metal is used in the test of elements in organic compounds by Lassaigne test ?
- (a) Li
 - (b) Na
 - (c) K
 - (d) Rb
- (90) The setting time of dicalcium silicates is “_____”
- (a) 28 days
 - (b) 1 year
 - (c) 1 week
 - (d) 24 hour



Assertion - Reason type Questions

The questions given below contains statement - 1 (Assertion) and statement - 2 (Reason) Each question has four choices (a), (b), (c) and (d) out of which only one is correct. Choose the correct option as under.

- (a) Statement - 1 is true, statement - 2 is true
Statement - 2 is a correct explanation for statement - 1
 - (b) Statement - 1 is true, statement - 2 is true;
Statement - 2 is not a correct explanation for statement - 1
 - (c) Statement - 1 is true, statement - 2 is false
 - (d) Statement - 1 is false, statement - 2 is true.
- (91) Statement-1 Alkali metals dissolve in ammonia to give blue solutions.
Statement-2 Alkali metals in liquid ammonia give solvated species of the type $[M(NH_3)_x]^+$
- (92) Statement-1 Sodium metal is softer than potassium metal
Statement-2 Metallic bonding in Potassium is weaker than in Sodium.
- (93) Statement-1 $Be(OH)_2$ is soluble in HCl and NaOH
Statement-2 $Be(OH)_2$ is amphoteric in nature

- (94) Statement-1 Be forms $[\text{BeF}_4]^{2-}$ but Al forms $[\text{AlF}_6]^{3-}$
Statement-2 Be does not have d-orbitals in the valence shell but Al has.
- (95) Statement - 1 Li_2CO_3 and Na_2CO_3 are thermally unstable.
Statement - 2 Both the carbonates are salts of large cations and large anions.
- (96) Statement - 1 Metallic character of alkali metals increases on going down a group from top to bottom.
Statement - 2 Ionisation enthalpy of alkali metals increases on going down from top to bottom.
- (97) Statement - 1 Superoxides of alkali metals are diamagnetic.
Statement - 2 Superoxides contain the ion O_2^- which has one unpaired electron.
- (98) Statement - 1 Alkali metals do not impart colour to the flame.
Statement - 2 Their ionization enthalpies are very low.
- (99) Statement - 1 Sodium cannot be obtained by chemical reduction of its ore.
Statement - 2 Sodium is one of the strongest reducing agents.
- (100) Statement - 1 Beryllium hydroxide becomes soluble in excess alkali forming beryllate ion $[\text{Be}(\text{OH})_4]^{2-}$
Statement - 2 Beryllium ion has greater tendency to form complexes.
- (101) The half life period of isotopes ^{223}Fr is
(a) 21 hour (b) 21 second (c) 21 minute (d) 21 day
- (102) Sylvine is the mineral of ...
(a) K (b) Na (c) Li (d) Rb
- (103) Which pump is important in biological reaction in human body ?
(a) Ca-Mg Pump (b) K-Fe Pump (c) Na-K Pump (d) Fe-Ca Pump
- (104) Witherite is which type of salt of Barium ?
(a) Carbonate (b) Sulphate (c) Chloride (d) Phosphate
- (105) Strontianite is the mineral of ...
(a) Ca (b) Ra (c) Ba (d) Sr
- (106) Which of the following reaction does not occur in Solvay ammonia soda process ?
(a) $(\text{NH}_4)_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2 \rightarrow 2\text{NH}_4\text{HCO}_3$
(b) $2\text{KHCO}_3 \xrightarrow{\Delta} \text{K}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$
(c) $2\text{NaHCO}_3 \xrightarrow{\Delta} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$
(d) $2\text{NH}_4\text{Cl} + \text{Ca}(\text{OH})_2 \rightarrow 2\text{NH}_3 + \text{CaCl}_2 + \text{H}_2\text{O}$

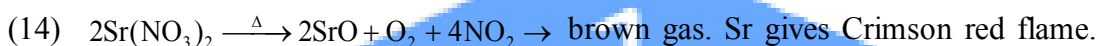
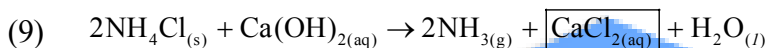
- (107) What will be final weight of 286 gm $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ by Heating at 373 K ?
 (a) 206 gm (b) 162 gm (c) 186 gm (d) 124 gm
- (108) The order of decreasing polarity in the compounds CaO, CsF, KCl, MgO is _____
 (a) CaO, CsF, KCl, MgO (b) MgO, KCl, CaO, CsF,
 (c) KCl, CaO, CsF, MgO (d) CsF, KCl, CaO, MgO
- (109) Which is not an ore of Ca ?
 (a) Lime stone (b) Flurospar (c) Dolomite (d) Epsomsalt
- (110) A certain metal is used to prepare an antacid, this metal accidently catches fire which can not be put out by using CO_2 based extinguishers. The metal is _____
 (a) C (b) Ca (c) Mg (d) Na



| | | | | | | | | | | | | | | | |
|------|---|------|---|------|---|------|---|------|---|------|---|-------|---|-------|---|
| (1) | d | (16) | a | (31) | c | (46) | d | (61) | d | (76) | c | (91) | b | (106) | b |
| (2) | c | (17) | a | (32) | b | (47) | c | (62) | a | (77) | b | (92) | d | (107) | d |
| (3) | d | (18) | c | (33) | b | (48) | d | (63) | a | (78) | a | (93) | a | (108) | d |
| (4) | a | (19) | d | (34) | b | (49) | e | (64) | d | (79) | d | (94) | a | (109) | d |
| (5) | a | (20) | b | (35) | d | (50) | a | (65) | b | (80) | d | (95) | c | (110) | c |
| (6) | b | (21) | b | (36) | b | (51) | a | (66) | c | (81) | b | (96) | c | | |
| (7) | b | (22) | c | (37) | d | (52) | a | (67) | a | (82) | a | (97) | d | | |
| (8) | a | (23) | c | (38) | c | (53) | c | (68) | d | (83) | d | (98) | d | | |
| (9) | c | (24) | c | (39) | c | (54) | a | (69) | c | (84) | d | (99) | a | | |
| (10) | b | (25) | c | (40) | b | (55) | a | (70) | c | (85) | b | (100) | b | | |
| (11) | b | (26) | a | (41) | b | (56) | c | (71) | a | (86) | d | (101) | c | | |
| (12) | a | (27) | a | (42) | a | (57) | b | (72) | b | (87) | a | (102) | a | | |
| (13) | d | (28) | a | (43) | b | (58) | d | (73) | d | (88) | a | (103) | b | | |
| (14) | c | (29) | c | (44) | d | (59) | a | (74) | c | (89) | b | (104) | a | | |
| (15) | d | (30) | a | (45) | a | (60) | c | (75) | a | (90) | a | (105) | d | | |

Hints

- (1) Melting point decreases as the strength of metallic bonding decreases with increasing size of the atom.
- (2) Due to small size of the Li^+ , its hydration enthalpy is the highest and hence Li is the strongest reducing agent.
- (3) Thermal stability of metal carbonates increases as the electropositive character of the metal or the basicity of the metal hydroxide increases from $\text{Be}(\text{OH})_2$ to $\text{Ba}(\text{OH})_2$. Thus, BaCO_3 is the most stable.
- (4) As the ionisation enthalpy increases from $\text{Mg} \rightarrow \text{Ba}$ the M - O bond becomes weaker and weaker down the group, and hence basicity increases down the group. Thus, $\text{Mg}(\text{OH})_2$ is least basic.
- (6) Ionisation enthalpy decreases as the atomic size, increases, so, $\text{Li} > \text{Na} > \text{K} > \text{Rb}$
- (7) Due to small size of Li^+ and F^- ions, lattice enthalpy is much higher than hydration enthalpy and hence LiF is least soluble among alkali metal fluorides.
- (8) $\text{Be}(\text{OH})_2$ being amphoteric dissolves in NaOH .

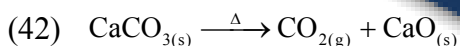


(24) The solubility decreases as we move from CaSO_4 to BaSO_4 .

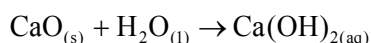
(32) The electrons of Be and Mg are so strongly bonded that they do not get excited in flame.

(35) Li_2CO_3 is not so stable towards heat, being small in size, it decomposes into Li_2O and CO_2 .

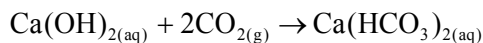
(41) The hydration enthalpy of Be^{2+} and Mg^{2+} ions is more than the lattice enthalpy and so they are soluble in water.



(A)



(B)



(C)



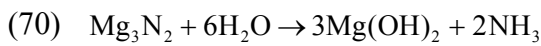
(A)

- (44) Because of the small size of Li and F, LiF has highest lattice enthalpy and hence most stable.
- (47) Alkali metal oxides are most basic followed by alkaline earth metal oxides while transition metal oxides are least basic. Amongst alkali and alkaline earth metal oxides, basicity increases down the group. Thus, Cs_2O is more basic than K_2O and SrO is more basic than MgO . Therefore, the overall order is :

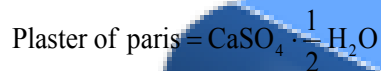
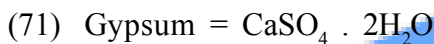


- (48) The solubility of bicarbonates of alkali metals increases down the group but alkaline earth metal carbonates are insoluble in H_2O .
- (49) CaO , $CaCO_3$ and $Ca(OH)_2$ are all bases and hence must dissolve in acetic acid to form calcium acetate only calcium oxalate does not dissolve in CH_3COOH .
- (53) 2 (Be, Mg)
- (54) 6 [K_2SO_4 , $BeSO_4$, Li_2SO_4 , $MgSO_4$, Na_2SO_4 , Rb_2SO_4]
- (55) 1 [$Be(OH)_2$]
- (56) 3 [K, Rb, Cs]
- (57) 5 [Li, Mg, Ca, Sr, Ba]
- (59) Lithium does not form peroxide.

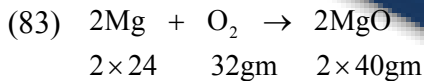
(64) silica mod ule $\eta = \frac{\%SiO_2}{\%Al_2O_3 + \%Fe_2O_3} = \frac{23}{2+3} = 4.6$



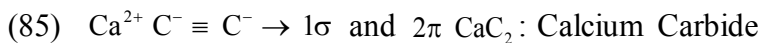
1mole 2 moles
2 mole 4 moles



So, difference = $2 - \frac{1}{2} = 1\frac{1}{2}$

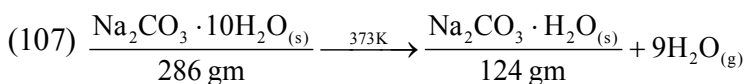


Here, 48 gm of Mg requires 32 gm of O_2 to form 80 gm MgO
so, 30 gm of Mg requires 20 gm of O_2 to form 50 gm MgO
so, 10 gm of O_2 is remain.



(97) correct statement : 1
Superoxides of alkali metals are paramagnetic.

(98) correct statement : 1
Alkali metals impart characteristic colour to the bunsen flame.



(108) According to Fajan rules, polarity increases as the size of the cation increases.