$\mathsf{UNIT}: \mathbf{14} \ \mathsf{S} \text{-} \mathsf{Block} \ \mathsf{ELEMENTS}$

Important Points

Group-1 (alkali metals) and group-2 (alkaline earth metals) are included in the sblock 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 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.V.					
(1)	The alkali metals are low room tempreature rises	melting. Which of the formula 30° c?	ollowing alkali metal	is expected to melt if the			
	(a) Na	(b) K	(c) Rb	(d) Cs			
(2)	The reducing power of a the strongest reducing ag	metal depends on variou gent in aqueous solution.	us factors. Suggest th	e factor which makes Li,			
	(a) Sublimation enthalpy	(b) Ionisation enthalpy					
	(c) Hydration enthalpy	(d) Electron - gain enth	alpy				
(3)	Metal carbonates decom metal carbonates is most	pose on heating to give t stable thermally ?	metal oxide and carb	oondioxide. Which of the			
	(a) MgCO ₃	(b) CaCO ₃	(c) $SrCO_3$	(d) BaCO ₃			
(4)	Which of the following	metal hydroxide is the le	east basic ?				
	(a) Mg(OH) ₂	(b) Ca(OH) ₂	(c) $Sr(OH)_2$	(d) Ba(OH) ₂			
(5)	Some of the group - 2 n following metal halides,	netal halides are covalen the one which is soluble	t and soluble in orga e in ethanol is	anic solvents. Among the			
	(a) BeCl ₂	(b) MgCl ₂	(c) CaCl ₂	(d) SrCl ₂			
	The order of decreasing ionisation enthalpy in alkali metal is						
6)		1 5					
6)	(a) Na > Li > K > Rb)	(b) Li > Na > I	K > Rb			
(6)	(a) Na > Li > K > Rb (c) Rb > Na > K > L	i	 (b) Li > Na > I (d) K < Li < N 	X > Rb a < Rb			
(6) (7)	 (a) Na > Li > K > Rb (c) Rb > Na > K > L The solubility of metal has the individual ions. Amonis due to 	i i lides depends on their na ong the fluorides of alkal	 (b) Li > Na > I (d) K < Li < N ture, lattice enthalpy a i metals, the lowest s 	K > Rb a < Rb and hydration enthalpy of colubility of LiF in water			
(6) (7)	 (a) Na > Li > K > Rb (c) Rb > Na > K > L The solubility of metal has the individual ions. Amo is due to (a) Ionic nature of lithium 	i i lides depends on their na ong the fluorides of alkal n fluoride	 (b) Li > Na > I (d) K < Li < N ture, lattice enthalpy a i metals, the lowest s (b) High lattice er 	K > Rb a < Rb and hydration enthalpy of colubility of LiF in water nthalpy			
(6) (7)	 (a) Na > Li > K > Rb (c) Rb > Na > K > L The solubility of metal has the individual ions. Amo is due to (a) Ionic nature of lithium (c) High hydration enthal 	i ilides depends on their na ong the fluorides of alkal n fluoride lpy for lithium ion.	 (b) Li > Na > I (d) K < Li < N ture, lattice enthalpy a i metals, the lowest s (b) High lattice er (d) Low ionisation 	K > Rb a < Rb and hydration enthalpy of solubility of LiF in water nthalpy a enthalpy of lithium atom.			
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(12)) Dead burnt plaster is								
	(a) CaSO ₄	(b) $CaSO_4 \cdot H_2O$	(c) $CaSO_4 \cdot \frac{1}{2}H_2O$	(d) $CaSO_4 \cdot 2H_2O$					
(13)	A substance which gives gas is	crimson red flame and bre	eaks on heating to give	oxygen and a brown					
	(a) Magnesium nitrate	(b) Calcium nitrate	(c) Barium nitrate	(d) Strontium nitrate					
(14)	The formula of sodash i	s							
	(a) $Na_2CO_3 \cdot 10H_2O$	(b) $Na_2CO_3 \cdot 2H_2O$	(c) Na ₂ CO ₃	(d) $Na_2CO_3 \cdot H_2O$					
(15)	Which of the following of	compounds are readily sol	uble in water ?						
	(a) BeSO ₄	(b) MgSO ₄	(c) BaSO ₄	(d) both (a) and (b)					
(16)	Identify the correct form	ula of halides of alkaline e	arth metals from the fo	ollowing.					
	(a) $BaCl_2 \cdot 2H_2O$	(b) $BaCl_2 \cdot 4H_2O$	(d) $SrCl_2 \cdot 4H_2O$						
(17)	(7) Which of the following statement is true about $Ca(OH)_2$?								
	(a) It is used in the prep	paration of bleaching power	der.						
	(b) It is a light blue soli	d.							
	(c) It does not possess of	lisinfectant property.							
	(d) It is used in the man	ufacture 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-I	R, E-T	(b) A-Q, B-P, C-R,	D-S, E-T					
	(c) A-R, B-S, C-T, D-C	Q, E-P	(d) A-S, B-R, C-Q, D-P, E-T						
(19)	When water is added to CO_2 is passed into the excess of carbon dioxide compound (D). Identify t	compound (A) of calcium, solution, it turns milky d is passed into the solution, he compound (D).	solution of compound ue to the formation of milkiness disappears du	(B) is formed. When of compound (C). If ue to the formation of					
	(a) CaO	(b) Ca(OH) ₂	(c) CaCO ₃	(d) $Ca(HCO_3)_2$					
(20)	Which alkali metal emits	longest wavelength light i	n 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	s oxidising agent ?				
	(a) NaNO ₃	(b) Na_2O_2	(c) Na ₂ O	(d) KNO ₃			
(23)	The salt that is added to	table salt to make it flow	w freely in rainy seasc	on is			
	(a) KCl	(b) KI	(c) $Ca_3(PO_4)_2$	(d) Na ₃ PO ₄			
(24)	Which of the following	alkaline earth metal sulpha	tes is least soluble in v	vater ?			
	(a) MgSO ₄	(b) CaSO ₄	(c) BaSO ₄	(d) SrSO ₄			
(25)	The hydration energy of	f Mg ²⁺ is greater than that	of				
	(a) Al^{3+} (b) Be^{2+} (c) Na^{+}	(d) Mg^{3+}					
(26)	The active constituent o	f bleaching powder is					
	(a) Ca(OCl) ₂	(b) Ca(OCl)Cl	(c) $Ca(C1O_2)_2$	(d) Ca(C1O ₂)Cl			
(27)	KO ₂ is used in oxygen	cylinders in space and sub	marines because it				
	(a) absorbs CO_2 and inc	preases O_2 content	(b) eliminates moisture				
	(c) produces ozone		(d) None of the above				
(28)	A metal M readily forms which becomes inert on	water soluble sulphate MS heating. The hydroxide is	O_4 , water insoluble hydrogen by a soluble in NaOH. The	roxide and oxide MO e metal M is			
	(a) Be	(b) Ca	(c) Mg	(d) Sr			
(29)	Which of the following	is sparingly soluble in wate	er?				
	(a) NaOH	(b) KOH	(c) LiOH	(d) RbOH			
(30)	Photo electric effect is n	naximum in					
	(a) Cs	(b) K	(c) Na	(d) Li			
(31)	Among the following co	mpounds of cement which	n is present in the highe	est amount ?			
	(a) Ca_2SiO_4	(b) Al ₂ O ₃	(c) Ca_3SiO_5	(d) $Ca_3Al_2O_6$			
(32)	Which pair of the follow	ving chlorides do not impa	art 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 hydrati	on enthalpy in following ic	on is				
	(a) $Rb^+ > K^+ > Cs^+ > Na^+$	>Li*	(b) $Li^+ > Na^+ > K^+ >$	$Rb^+ > Cs^+$			
	(c) $K^+ > Na^+ > Rb^+ > Cs^+$	> Li ⁺	(d) $Cs^+ > Rb^+ > K^+ >$	$Na^+ > Li^+$			

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(34)	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	e 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 na	ture ?					
	(a) MgO	(b) BeO	(c) CaO	(d) BaO				
(37)	Which of the following	characteristics is not relate	ed to alkali metals?					
	(a) Their ions are iso ele	ectronic with noble gases.						
(b) low melting point (c) low electronegativity (d) high ionisation energy								
(38)	Fill in the blanks with pr	roper option given below f	or the following staten	nent.				
	"All the halides of alkali	ne earth metals with excep	ption of ""	are ionic in nature."				
	(a) Barium halide	(b) Strontium halide	(c) Beryllium halide (d) Calcium halide				
(39)	K_2CO_3 can not be prepa	ared by solvay ammonia	process because					
	(a) K_2CO_3 is fairly solub	ole in water.	(b) It has no water of crystallization.					
	(c) KHCO ₃ is highly sol	uble in water.	(d) K_2CO_3 decomposes in H_2O .					
(40)	The reaction of Cl ₂ with	X gives bleaching powd	er X is					
	(a) CaO	(b) Ca(OH) ₂	(c) Ca(OCl) ₂	(d) $Ca(O_3Cl)_2$				
(41)	Which of the following al enthalpy ?	kaline earth metal sulphates	has hydration enthalpy	higher than the lattice				
	(a) SrSO ₄	(b) MgSO ₄	(c) CaSO ₄	(d) BaSO ₄				
(42)	A compound (A) on here obtain (B). Excess of Co recovered in the solid for	ating gives a colourless gas D_2 is bubbled through aquiorm. Solid (C) on gentle h	s and a residue that is eous solution of B, (C eating gives back (A).	dissolved in water to) is formed, which is 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	h of the following trends i	s incorrect ?					
	(a) Hydration enthalpy : $Be > Mg > Ca > Sr$							
	(b) Second Ionization e	nthalpy: 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				
		—						
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(45)	Flame test is not given	by				
	(a) Be	(b) Sr	(c) K	(d) Ca		
(46)	The alkaline earth metal	s forming ionic oxides are				
	(a) MgO	(b) BeO	(c) CaO	(d) (a) and (c)		
(47)	The basic character of	the oxides MgO, SrO, K ₂	O, NiO and Cs ₂ O inc	creases in the order :		
	(a) MgO > SrO > K_2 O	$O > NiO > Cs_2O$	(b) $Cs_2O < K_2O <$	MgO < SrO < NiO		
	(c) NiO $<$ MgO $<$ SrG	$O < K_2O < Cs_2O$	(d) $K_2O < NiO < M$	$MgO < SrO < Cs_2O$		
(48)	Which of the following	are arranged in increasing	order of solubilities ?			
	(a) $CaCO_3 < KHCO_3$	< NaHCO ₃	(b) NaHCO ₃ < KH	$CO_3 < CaCO_3$		
	(c) KHCO ₃ < NaHCO	$_{3}$ < CaCO ₃	(d) $CaCO_3 < NaHO$	$CO_3 < KHCO_3$		
(49)	The compound insolubl	e in aceticacid is				
	(a) Calcium oxide		(b) Calcium carbonate			
	(c) Calcium oxalate		(d) Calcium hydroxid	le		
(50)	Which of the following	has the lowest melting poi	nt?			
	(a) LiCl	(b) KCl	(c) NaCl	(d) RbCl		
(51)	The correct order of de	creasing ionic character is				
	(a) $BeCl_2 > MgCl_2 > 0$	$CaCl_2 > BaCl_2$	(b) $BeCl_2 > MgCl_2$	$> BaCl_2 > CaCl_2$		
	(c) $\operatorname{BeCl}_2 > \operatorname{BaCl}_2 > N$	$[gCl_2 > CaCl_2]$	(d) $\operatorname{BaCl}_2 > \operatorname{CaCl}_2 > \operatorname{MgCl}_2 > \operatorname{BeCl}_2$			
(52)	The highest lattice energy	gy corresponds to				
	(a) MgO	(b) CaO	(c) SrO	(d) BaO		
(53)	How many of the follow	ing s -block elements do no	t give characteristic colo	ours in the flame test?		
	Li , Be, Ca, Ba, Sr, M	lg, Na, K, Ba				
	(a) 3	(b) 4	(c) 2	(d) 5		
(54)	How many of the follow	wing sulphates of metals d	issolve in the water ?			
	SrSO ₄ , K ₂ SO ₄ , BeSO ₄ ,	Li ₂ SO ₄ , MgSO ₄ , BaSO ₄ ,	Na ₂ SO ₄ , CaSO ₄ , Rb ₂	$_{2}SO_{4}$		
	(a) 6	(b) 4	(c) 3	(d) 5		
(55)	How many of the follow	ving hydroxides is/are amp	hoteric in character ?			
	CsOH, LiOH, Ca(OH) ₂	, $Be(OH)_2$, $Mg(OH)_2$, $Sr(OH)_2$, 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 direct	tly form superoxides on	heating with oxygen ?		
	(a) 5	(b) 2	(c) 3	(d) 4		
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(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) $2\text{Li}_2\text{O} \xrightarrow[673k]{\text{heat}} \text{Li}_2\text{O}_2 + 2\text{Li}$ (b) $2K_2O \xrightarrow{heat}{673k} K_2O_2 + 2K$ (d) $2Rb_2O \xrightarrow{heat}{673k} Rb_2O_2 + 2Rb$ (c) $2Na_2O \xrightarrow{heat}{673k} Na_2O_2 + 2Na_2O_2$ (60) Which of the following has maximum lattice energy? (a) Li₂O (b) Na₂O (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 cocentration 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." (b) 51%, 26%, 11% (a) 26 %, 51%, 11% (c) 11%, 51%, 26% (d) 26%, 11%, 51% (64) A sample of portaland cement contain 23% SiO₂, 3% Al₂O₃ and 2% Fe₂O₃ then what would be its silica module (n)? (a) 3.83 (c) 21.73 (d) 4.6 (b) 28

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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 heamo	globin are complex of "	" and "	'' respectivelly.				
	(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) (COO) ₂ Ca	(b) (COONa) ₂	(c) (COO) ₂ Ba	(d) (COO) ₂ Mg				
(68)	Which of the following	metal ions plays an import	ant role in muscle con	traction ?				
	(a) K ⁺	(b) Mg^{2+}	(c) Na ⁺	(d) Ca^{2+}				
(69)	White enamel of our te	eth is						
	(a) $Ca_{3}(PO_{4})_{2}$	(b) CaCl ₂	(c) CaF ₂	(d) CaBr ₂				
(70)	Two mole of magnesium	n nitride on reacting with a	an excess of water give	es :				
	(a) One mole of ammor	lia	(b) Two moles of nit	tric acid				
	(c) Four moles of ammo	onia	(d) Three moles of an	mmonia				
(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 cofigurati	on of metal M is 1s ² 2s ² 2p	b^6 3s ² . The formula of i	its oxide would be				
	(a) MO	(b) M ₂ O	(c) M_2O_3	(d) MO ₂				
(76)	The formula of carnallite	eis						
	(a) KCl • MgCl ₂ • 2H ₂ O		(b) $K_2 O \cdot Al_2 O_3 \cdot 6H_2 O$					
	(c) KCl g MgCl ₂ g $6H_2O$		(d) $Na_2B_4O_7 \cdot 10H_2O$					
(77)	When NaOH is made,	the gas released at the ca	thode is					
	(a) Cl ₂	(b) H ₂	(c) O ₂	(d) H ₂ O				
		_						
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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 re	eactors					
	(C) Liquid Na	(R) SO ₂ absorber						
	(D) Caesium	(S) Detergent						
	(a) A-R, B-S, C-Q, D-	Р	(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 separ	ation of Li, KCl is added	to LiCl					
	(a) To increase the cond	uctivity of LiCl						
	(b) To lower the fusion	temperature of the mixure						
	(c) To decrease the conductivity of LiCl							
	(d) Both (a) and (b)							
(80)	Molecular formula of Glauber's salt is							
	(a) $MgSO_4 \cdot 7H_2O$	(b) $FeSO_4 \cdot 7H_2O$	(c) $CuSO_4 \cdot 5H_2O$	(d) $Na_2SO_4 \cdot 10H_2O$				
(81)	The name "Blue John" i	s given to which of the fol	lowing compounds.					
	(a) CaH ₂	(b) CaF ₂	(c) $Ca_{3}(PO_{4})_{2}$	(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 g	m of O_2 are reacted and the	he residual mixure co	ntains				
	(a) 60 gm of MgO only	4	(b) 40 gm of MgO and 20 gm of $\rm O_2$					
	(c) 45 gm of MgO and	1 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) $4\text{LiNO}_{3(s)} \rightarrow 2\text{Li}_2\text{O}_{3(s)}$	$_{(s)} + 4NO_{2(s)} + O_{2(g)}$	(b) $2NaNO_{3(s)} \rightarrow 2NaNO_{3(s)}$	$NaNO_{2(s)} + O_{2(g)}$				
	(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 o	f bonds between two carb	bon 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 isoe	electronic 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 Lassigne 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 trueStatement 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 metalStatement-2 Metalic bonding in Potassium is weaker than inSodium.
- (93) Statement-1 Be(OH)₂ is solublein HCl and NaOH
 Statement-2 Be(OH)₂ is amphoteric in nature



(94)	Statement-1 Be Forrns	[BeF ₄] ²⁻ but Al forrms [All	$\begin{bmatrix} -2 \\ -6 \end{bmatrix}^3 -$						
	Statement-2 Be doesnot	have d-orbitals in the Va	lence shell but Al has.						
(95)	Statement - 1 Li ${}_{2}CO_{3}$ at	nd Na ₂ CO ₃ are therally un	nstable.						
	Statement - 2 Both the	carbonates are salts of lan	ge cations and large a	nions.					
(96)	Statement - 1 Metallic cl bottom.	haracter of alkali metals in	creases on going dowr	a group from top to					
	Statement - 2 Ionisation	enthalpy of alkali metals ir	creases on going down	n from top to bottom.					
(97)	Statement - 1 Superoxid	les of alkali metals are dia	magnetic.						
	Statement - 2 Superoxides contain the ion O_2^- which has one unpaired electron.								
(98)	Statement - 1 Alkali me	tals donot impart colour to	o the flame.						
	Statement - 2 Their ioniz	zation enthalpies are very	low.						
(99)	Statement - 1 Sodium c	annot be obtained by che	mical reduction of its	ore.					
	Statement - 2 Sodium is	s one of the strongest redu	icing agent.						
(100)	Statement - 1 Beryllium h	ydroxide becomes soluble ir	excess alkali forming b	eryllate ion [Be(OH) ₄] ²					
	Statement - 2 Beryllium	ion has greater tendency	to form complexes.						
(101)	The half life period of i	sotopes ²²³ Fr is							
	(a) 21 hour	(b) 21 second	(c) 21 minute	(d) 21 day					
(102)	Sylvine is the mineral of	f							
	(a) K	(b) Na	(c) Li	(d) Rb					
(103)	Which pump is importan	nt in biological reaction in	human body ?						
	(a) Ca-Mg Pump	(b) K-Fe Pump	(c) Na-K Pump	(d) Fe-Ca Pump					
(104)	Withrite is which type of	of salt of Barium ?							
	(a) Carbonate	(b) Sulphate	(c) Chloride	(d) Phosphate					
(105)	Silastine is the mineral of	of							
	(a) Ca	(b) Ra	(c) Ba	(d) Sr					
(106)	Which of the following	reaction does not occur in	i solvay ammonia soda	a process ?					
	(a) $(NH_4)_2CO_3 + H_2O + O_3$	$CO_2 \rightarrow 2NH_4HCO_3$							
	(b) $2KHCO_3 \xrightarrow{\Delta} K_2CO_3$	$O_3 + H_2O + CO_2$							
	(c) $2NaHCO_3 \xrightarrow{\Lambda} Na_2O_3$	$CO_3 + H_2O + CO_2$							
	(d) $2NH_4Cl + Ca(OH)_2 -$	$\rightarrow 2NH_3 + CaCl_2 + H_2O$							

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(107)	(107) What will be final weight of 286 gm $Na_2CO_3.10H_2O$ 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 compound	ls CaO, CsF, KCl, Mg	gO is				
	(a) CaO, CsF, KCl, Mg	gO	(b) MgO, KCl, CaO,	, CsF,				
	(c) KCl, CaO, CsF, Mg	gO	(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 be put out by using CO	o prepare an antacid, this r_2 based extiguishers. The	metal accidently catche metal is	s fire which can not				
	(a) C	(b) Ca	(c) Mg	(d) Na				

ANSWER KEY

(1)	d	(16)	а	(31)	С	(46)	d	(61)	d	(76)	С	(91)	b	(106)	b
(2)	С	(17)	а	(32)	b	(47)	С	(62)	а	(77)	b	(92)	d	(107)	d
(3)	d	(18)	С	(33)	b	(48)	d	(63)	а	(78)	а	(93)	а	(108)	d
(4)	а	(19)	d	(34)	b	(49)	С	(64)	d	(79)	d	(94)	а	(109)	d
(5)	а	(20)	b	(35)	d	(50)	а	(65)	b	(80)	d	(95)	С	(110)	С
(6)	b	(21)	b	(36)	b	(51)	а	(66)	С	(81)	b	(96)	С		
(7)	b	(22)	С	(37)	d	(52)	а	(67)	а	(82)	а	(97)	d		
(8)	а	(23)	С	(38)	С	(53)	С	(68)	d	(83)	d	(98)	d		
(9)	С	(24)	С	(39)	С	(54)	а	(69)	С	(84)	d	(99)	а		
(10)	b	(25)	С	(40)	b	(55)	а	(70)	С	(85)	b	(100)	b		
(11)	b	(26)	а	(41)	b	(56)	С	(71)	а	(86)	d	(101)	С		
(12)	а	(27)	а	(42)	а	(57)	b	(72)	b	(87)	а	(102)	а		
(13)	d	(28)	а	(43)	b	(58)	d	(73)	d	(88)	а	(103)	b		
(14)	С	(29)	С	(44)	d	(59)	а	(74)	С	(89)	b	(104)	а		
(15)	d	(30)	а	(45)	а	(60)	С	(75)	а	(90)	а	(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 $Be(OH)_2$ to $Ba(OH)_2$, Thus, $BaCO_3$ is the most stable.
- (4) As the ionisation enthalpy increases from $Mg \rightarrow Ba$ the M O bond becomes weaker and weaker down the group, and hence basicity increases down the group. Thus, $Mg(OH)_2$ is least basic.
- (6) Ionisation enthalpy decreases as the atomic size, increases , so, Li > Na > K > 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) $Be(OH)_2$ being amphoteric dissolves in NaOH.

(9)
$$2\mathrm{NH}_4\mathrm{Cl}_{(\mathrm{s})} + \mathrm{Ca}(\mathrm{OH})_{2(\mathrm{aq})} \rightarrow 2\mathrm{NH}_{3(\mathrm{g})} + \boxed{\mathrm{Ca}\mathrm{Cl}_{2(\mathrm{aq})}} + \mathrm{H}_2\mathrm{O}_{(1)}$$

- (14) $2Sr(NO_3)_2 \xrightarrow{\Delta} 2SrO + O_2 + 4NO_2 \rightarrow$ brown gas. Sr gives Crimson red flame.
- (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) Li₂CO₃ is not so stable towards heat, being small in size, it is decompose into Li₂O and CO₂.
- (41) The hydration enthalpy of Be²⁺ and Mg²⁺ ions is more than the lattice enthalpy and so they are soluble in water.
- (42) $CaCO_{3(s)} \xrightarrow{\Delta} CO_{2(g)} + CaO_{(s)}$

(A)

 $\mathrm{CaO}_{(\mathrm{s})} + \mathrm{H}_{2}\mathrm{O}_{(1)} \rightarrow \mathrm{Ca(OH)}_{2(\mathrm{aq})}$

 $Ca(OH)_{2(aq)} + 2CO_{2(g)} \rightarrow Ca(HCO_3)_{2(aq)}$

 $Ca(HCO_3)_{2(aq)} \xrightarrow{\Delta} CaCO_{3(s)} + CO_{2(g)} + H_2O_{(1)}$

- (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, Cs₂O is more basic than K₂O and SrO is more basic than MgO. Therefore, the overall order is :

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 $NiO < MgO < SrO < K_2O < Cs_2O$

(48) The solubility of bicarbonates of alkali metals increases down the group but alkaline earth metal carbonates are insoluble in H₂O. (49) CaO, CaCO₃ 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 CH₃COOH. (53) 2 (Be, Mg) (54) 6 [K₂SO₄, BeSO₄, Li₂SO₄, MgSO₄, Na₂SO₄, Rb₂SO₄] (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 module $\eta = \frac{\% SiO_2}{\% Al_2O_3 + \% Fe_2O_3} = \frac{23}{2+3} = 4.6$ (70) $Mg_3N_2 + 6H_2O \rightarrow 3Mg(OH)_2 + 2NH_3$ 1mole 2 moles 2 mole 4 moles (71) Gypsum = $CaSO_4$. $2H_2O$ Plaster of paris = $CaSO_4 \cdot \frac{1}{2}H_2O$ So, difference $=2-\frac{1}{2}=1\frac{1}{2}$ (83) $2Mg + O_2 \rightarrow 2MgO$ 2×24 32gm 2×40 gm $2x24 \text{ gm } 32\text{ gm} \quad 2 \times 40\text{ gm}$ 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 O₂ to form 50 gm MgO so, 10 gm of O_2 is remain. (85) $Ca^{2+}C^{-} \equiv C^{-} \rightarrow 1\sigma$ and $2\pi CaC_2$: Calcium Carbide (97) correct statement : 1 Superoxides of alkali metals are paramagnetic. (98) correct statement : 1

Alkali metals impart characteristic colour to the bunsen flame.

(107)
$$\frac{\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}_{(s)}}{286 \text{ gm}} \xrightarrow{373\text{K}} \frac{\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}_{(s)}}{124 \text{ gm}} + 9\text{H}_2\text{O}_{(g)}$$

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

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