	Exercis	e-1		
		ONLY ONE OPT		YPE
Sec	tion (A) : Electron	ic configuration an	d Physical Propertie	s of alkali metals
1.	Among the alkali m (1) Na	etals most abundant me (2) K	tal is : (3) Li	(4) Cs
2.	Which of the follow (1) [Ar]3d ¹⁰ 4s ¹	ing configurations repres (2) [Ne]3s ² 3p ¹	ents the s–block element (3) [He] 2s ² 2p ⁶ 3s ¹	? (4) None of these
3.	The similarity in the (1) their same atom	e properties of alkali meta hicity.	als is due to : (2) similar outer shell	electron configuration.

(3) same energy of valence shell. (4) same principal quantum number of valence shell.

- 4. Which one of the following metals is largest in the periodic table ? (1) K (2) Cs (3) Zn (4) Ba
- 5. Select the correct statement.
 - (1) Density of alkali metals regularly increases in moving down the group from Li to Cs.
 - (2) Group 1 elements are the largest in their horizontal periods in the periodic table (exclude noble gases)
 - (3) The melting and boiling points of group 1 elements increases on moving down from Li to Cs.
 - (4) Alkali metals are more harder than alkaline earth metals.
- 6. The hydration enthalpies of alkali metal ions :
 - (1) decrease with increasing ionic size down the group.
 - (2) increase with increase in ionic size down the group.
 - (3) remain same with increase ionic size down the group.
 - (4) first decrease from Li to K and then increase of Rb to Cs. VA/1.1.1 .

7.	Which one of the f (1) Melting point (3) Tendency to lo	iollowing properties in se electron	ncreases on moving dov (2) Hardness o (4) Metallic bor	vn the group from Li to Cs ? f metals nd strength
8.	Which of the follow (1) Li	ving alkali metals give (2) Na	s hydrated salts ? (3) K	(4) Cs
9.	Alkali metals are :		(0) - the second state	

- (1) weak reducing agents (2) strong reducing agents (3) strong oxidising agents (4) strong oxidising as well as strong reducing agents
- 10. Select the correct statement with respect to alkali metals.
 - (1) Melting points decrease with increasing atomic number.
 - (2) Density of potassium is less then sodium
 - (3) Salts of Li to Cs impart characteristic colour to an oxidising flame. (of Bunsen burner).
 - (4) All of these.
- 11. Match the metals given in Column-I with their characteristic colour of flame in oxidising flame given in Column-II using the codes given.

	Colu	mn-l				Colu	mn-ll			
(a)	Li				(p)	Violet	t or Lilac	;		
(b)	Na				(q)	Red v	/iolet			
(c)	K				(r)	Golde	en yellov	v		
(d)	Rb				(s)	Crime	son red			
	(a)	(b)	(c)	(d)			(a)	(b)	(c)	(d)
(1)	S	р	q	r		(2)	S	r	р	q
(3)	S	r	q	р		(4)	r	S	р	q



(4) K

(4) Be > Ca > Mg

- 12. Identify the correct statement.
 - (1) Sodium metal can be prepared by the electrolysis of an aqueous solution of NaCl.
 - (2) Sodium metal can be kept under ethyl alcohol.
 - (3) Sodium metal is insoluble in liquid NH₂ at low temperature.
 - (4) Elemental sodium is easily oxidised.
- 13. Sodium and potassium react with water much more vigorously than lithium because :
 - (1) sodium and potassium have high values of hydration energy as compared to that of lithium.
 - (2) sodium and potassium have higher melting point than that of lithium.
 - (3) sodium and potassium have lower melting point than that of lithium.
 - (4) sodium and potassium have lower hydration energy than that of lithium.
- 14. Which of the following has the highest reactivity towards water ? (1) Na (2) Rb (3) Li
- Which of the following statements is true for all the alkali metals ? 15.
 - (1) Their nitrates decomposes on heating to give the corresponding nitrites and oxygen.
 - (2) Their chlorides are deliquescent and crystallise as hydrates.
 - (3) They react with water to form hydroxide and hydrogen.
 - (4) They readily react with halogens to form ionic halides, M⁺X⁻.

Section (B) : Electronic configuration and Physical Properties of alkaline earth metals

- 1. Which of the following electronic configurations in the outermost two shells is characteristic of the alkaline earth metals ?
 - (2) $(n 1)s^2p^6d^{10}ns^2$ (1) $(n - 1)s^2p^6ns^2$ $(3)(n-1)s^2p^6ns^2p^1$ (4) None of these
- 2. The most electropositive amongst the alkaline earth metals is : (1) Be (2) Mg (3) Ca (4) Ba
- 3. Which of the following metals does give characteristic flame colouration? (4) All of these (1) Be (2) Mg (3) Ca
- The first ionisation energies of alkaline earth metal are higher than those of the alkali metals. This is 4. because:
 - (1) there is increase in the nuclear charge of the alkaline earth metal
 - (2) there is decrease in the nuclear charge of the alkaline earth metal
 - (3) there is no change in the nuclear charge
 - (4) none of these
- 5. The set representing the correct order of first ionisation potential is : (1) Ca > Mg > Be(2) Be > Mg > Ca (3) Mg > Ca > Be
- Property of alkaline earth metals that increases with their atomic number is : 6.
 - (1) thermal stability of their carbonates.
 - (2) electron affinity. (3) hydration enthalpies of their metal ions. (4) solubility of their sulphates.
- 7. Which of the following statement is incorrect?
 - (1) The atomic radius of Na is greater than that of Mg.
 - (2) Metallic bond of Mg is stronger than the metallic bond in Na.
 - (3) Melting and boiling points of Mg are less than those of Ca.
 - (4) Mg and Ca both impart characteristic colour to the flame.
- 8. Which of the following statements is false ?
 - (1) BeCl₂ exists as dimer in the vapour state and polymeric in the solid state
 - (2) Calcium hydride is called hydrolith
 - (3) The oxides of Be and Ca are amphoteric
 - (4) Bicarbonates of Na and Sr are soluble in water

Section (C)	: Chemical	properties	of	alkali metals
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1.	Na and Li are placed in (1) NaOH, Na $_2$ O, Li $_2$ O	dry air. We get : (2) Na ₂ O, Li ₂ O	(3) Na₂O, Li₂O, Li₃N, NH	H ₃ (4) Na ₂ O, Li ₃ N, Li ₂ O, Na ₂ O ₂	
2.	In the presence of oxyg (1) LiO	en, on heating, lithium fc (2) LiO ₂	orms (3) Li ₂ O	(4) Li ₂ O ₂	
3.	The basic strength of w (1) LiOH	hich hydroxide is maxim (2) NaOH	um? (3) CsOH	(4) KOH	
4.	Which of the following $(1) \text{ K}_2 \text{CO}_3$	compounds has maximur (2) Na ₂ CO ₃	n thermal stability ? (3) Li ₂ CO ₃	(4) Rb ₂ CO ₃	
5.	Which of the following $(1) \text{ Li}_2 \text{CO}_3$	can not decompose on he (2) Na ₂ CO ₃	eating to give CO ₂ ? (3) KHCO ₃	(4) BaCO ₃	
6.	Which does not exist in (1) NaHCO ₃	solid state. (2) NaHSO ₃	(3) LiHCO ₃	(4) CaCO ₃	
7.	The correct order of me (1) MF > MCl > MBr > M (3) MCl > MF > MBr > M	elting point of alkali metal ⁄/I //I	halides is : (2) MI > MBr > MCl > M (4) MI > MF > MCl > M	1F Br	
8.	 Which of the following statement is incorrect ? (1) The superoxide ion (i.e., O₂⁻) is stable only in presence of larger cations such as K, Rb, Cs. (2) Alkali metals are normally kept in kerosene oil. (3) All the alkali metal hydrides are ionic solids with high melting points. (4) The concentrated solution of alkali metals in liquid ammonia are strong paramagnetic in pature. 				
9.	A ribben of magnesium added, the gas evolved (1) ammonia	was heated to redness was : (2) hydrogen	in an atmosphere of nitr (3) nitrogen	ogen and on cooling water was (4) oxygen	
10.	Which of the following e	elements form super oxid (2) Na	le as major product wher (3) Cs	n heated in excess of air ? (4) Li	
11.	 Which of the following statements is not true about the solvated ions formed when sodium dissolves in liquid ammonia at low temperature ? (1) Deep blue colour of the solution is due to solvated electron. (2) Highly conducting nature of the solution is due to the solvated cation and solvated anion. (3) The solution is reducing in nature and have paramagnetic character because of the presence of solvated unpaired electrons. (4) none of these 				
12.	An alkali metal nitrate The alkali metal is :	on heating decomposes	and liberates two differ	ent gases along with an oxide.	
	(1) Li	(2) Na	(3) K	(4) Cs	
Section	on (D) : Chemical p	roperties of alkaline	e earth metals		
1.	A metal M readily form MO. The oxide and hyd (1) Be	ns water soluble sulphat Iroxide are soluble in Na (2) Mg	e MSO ₄ , water insolubl DH. The M is : (3) Ca	e hydroxide M(OH) ₂ and oxide (4) Sr	
2.	The hydration energy o (1) Al ³⁺	f Mg ²⁺ ion is higher than (2) Be ²⁺	that of : (3) Na⁺	(4) None of these	

3.	When magnesium burns (1) Mg_3N_2	s in air, compounds of m (2) MgCO ₃	agnesium formed are ma (3) Mg(NO ₃) ₂	agnesium oxide and : (4) $Mg(NO_2)_2$	
4.	BeF ₂ is soluble in water because of : (1) ionic nature of BeF ₂ (2) greater hydration energy of Be ²⁺ ion as compared to lattice energy (3) covalent nature of BeF ₂ (4) none of these				
5.	Which of the following c (1) $MgSO_4$	ompounds is most solub (2) CaSO ₄	le in water ? (3) SrSO ₄	(4) BaSO ₄	
6.	Among the alkaline eart (1) Ba	h metals, the element fo (2) Sr	rming predominantly cov (3) Ca	alent compound is : (4) Be	
7.	Compounds of alkaline	earth metals are less so	bluble in water than the c	corresponding alkali metal salts	
	(1) their high ionisation (3) their low hydration e	energy nergy	(2) their low electronega(4) their high lattice ene	ativity rgy	
8.	Consider the following statements and pick out the wrong one. (a) The solubility, thermal stability and the basic character of the hydroxides of alkaline earth metals increases from Mg(OH) ₂ to Ba(OH) ₂ . (b) The dehydration of hydrated chlorides, bromides and iodides of Ca, Sr and Ba can be achieved or basic character.				
	(c) The chlorides of both	h beryllium and aluminiu	m are soluble in organic	solvents and are strong Lewis	
	(1) (a) and (b) only	(2) (a) and (c) only	(3) (a), (b) and (c)	(4) none	
9.	The correct order of dec (1) $BeCO_3 > MgCO_3 > C$ (2) $BaCO_3 > SrCO_3 > C$ (3) $MgCO_3 > BeCO_3 > C$ (4) $BeCO_3 > MgCO_3 > C$	creasing lattice energy of $CaCO_3 > SrCO_3 > BaCO_3$ $aCO_3 > MgCO_3 > BeCO_3$ $CaCO_3 > SrCO_3 > BaCO_3$ $CaCO_3 > BaCO_3 > SrCO_3$	BaCO ₃ , MgCO ₃ , CaCO	₃ , SrCO ₃ , BeCO ₃	
Sectio	on (E) : Compounds	of alkali metals			
1.	Which of the following a (1) $M_2O - M(OH)_2$ (3) $MO_2 - M(OH)_2 + H_2O$	Ikali metal oxides is not O_2	correctly matched with th (2) $M_2O_2 - M(OH)_2 + H_2$ (4) 1,3	eir hydrolysis products? O ₂	
2.	Which salt on heating de (1) LiNO ₃	oes not give brown colou (2) KNO ₃	ıred gas ? (3) Pb(NO ₃) ₂	(4) AgNO ₃	
3.	Sodium burns in dry air (1) Na ₂ O	to give as major product (2) Na ₂ O ₂	: (3) NaO ₂	(4) Na ₃ N	
4.	The oxide that gives hyd (1) PbO_2	drogen peroxide on treat (2) Na ₂ O ₂	ment with a dilute cold a (3) MnO ₂	cid is : (4) SnO ₂	
5.	The by-product of Solva (1) carbon dioxide	y ammonia process is : (2) ammonia	(3) calcium chloride	(4) calcium carbonate	
6.	Sodium carbonate can prepared because: (1) K_2CO_3 is more solub (3) KHCO ₃ is more solu	be manufactured by S le ble than NaHCO ₃	Solvay's process but po (2) K_2CO_3 is less solubl (4) KHCO ₃ is less solubl	otassium carbonate cannot be e le than NaHCO ₃	

7. Which of the following products are obtained in the electrolysis of brine solution (i.e. NaCl solution) in Castner-Kellner cell ? (1) Na, H₂ (2) Na- amalgam, Cl (3) Na- amalgam, NaOH(4) NaOH, Cl₂, H₂. Sodium amalgam on reaction with water yields : 8. (1) Hg + NaOH (2) Hg + NaOH + O_2 (3) Hg + NaOH + H₂ (4) HgO + NaOH + H₂ Which of the following statements is not correctly mentioned? 9. (1) Sodium hydrogen carbonate is precipitated in the reaction of sodium chloride with ammonium hydrogen carbonate in solvay process. (2) Sodium metal discharged at the cathode combines with mercury to form sodium amalgam in Castner-Kellner cell in manufacture of sodium hydroxide. (3) Baking soda is made by saturating a solution of sodium carbonate with carbon dioxide. (4) Deep blue colour solutions of alkali metals in liquid ammonia on decomposition yield alkali metals and liquid ammonia. 10. What products are formed during the electrolysis of a concentrated aqueous solution of sodium chloride ? I. Cl₂ (g) , II . NaOH (aq). , III. H₂(g). (1) I only (2) I and II only (3) I and III only (4) All of these Zinc reacts with excess of caustic soda to form : 11. (2) ZnO (3) Na₂ZnO₂ (4) Zn(OH)₂.ZnCO₃ (1) $Zn(OH)_{2}$ 12. Crude common salt becomes damp on keeping in air because : (1) It is hygroscopic in nature. (2) It contains MgCl₂ and CaCl₂ as impurities which are deliquescent in nature. (3) (1) and (2) both. (4) none. Section (F): Compounds of alkaline earth metals 1. Which of the following salts on heating gives a mixture of two gases ? (4) RbNO₃ (1) $Ca(NO_3)_2$ (2) NaNO₃ (3) KNO₃ 2. Plaster of Paris hardens by : (2) utilising water (1) giving off CO_2 (3) changing into CaCO₃ (4) giving out water A compound X on heating gives a colourless gas. The residue is dissolved in water to obtained Y. 3. Excess CO₂ is bubbled through aqueous solution of Y, Z is formed. Z on gently heating gives back X. The compound X is: (1) CaCO₃ (2) Na_2CO_3 (3) $Ca(HCO_3)_2$ (4) K_2CO_3 Identify the correct statement. 4. (1) Gypsum contains a lower percentage of calcium than Plaster of Paris (2) Gypsum is obtained by heating Plaster of Paris (3) Plaster of Paris is obtained by hydration of gypsum (4) Plaster of Paris is obtained by partial oxidation of gypsum Gypsum on heating at a temperature of 393 K yields : 5. (2) hemihydrate of calcium sulphate (1) calcium oxide (3) anhydrous calcium sulphate (4) none of these. 6. A compound (X) has following characteristics. (i) It is used as a water softening agent (ii) It gives NaOH on reaction with Na₂CO₂. (iii) Its clear solution becomes milky when CO₂ gas is passed. (iv) It liberates ammonia gas with ammonium salts. The compound (X) is : $(1) Ca(HCO_3)_2$ (2) Ca(OH)₂ (3) CaO (4) CaCO₂

Exercise-2

1.	Which of the following e (1) $(n - 1)s^2p^6ns^2$	electronic configuration ir (2) (n – 1) s²p ⁶ d¹⁰ns¹	n the outermost shell is cl (3) (n – 1)s²p⁶ns¹	naracteristics of alkali metals ? (4) ns²p ⁶ d¹		
2.	Which of the following p (1) Li and Mg	air of element shows dia (2) Na and Mg	agonal relationship ? (3) K and Mg	(4) AI and Mg		
3.	Which of the following s (1) Alkali metals do not (2) Alkali metal salts imp (3) The softness of alka (4) Alkali metal tarnish i	tatement is false for alka occur free in nature. part colour to the flame. li metals decreases dow n dry air.	ali metals? n the group with increasi	ng atomic number.		
4.	Which of the following h	as maximum ionisation	energy ?			
	(1) Ba> Ba⁺ + e⁻		(2) Be → Be ⁺ + e ⁻			
	(3) Ca \longrightarrow Ca ²⁺ + 2e	9-	(4) Mg \longrightarrow Mg ⁺ + e ⁻			
5.	Calcium is obtained by the : (1) roasting of limestone (2) electrolysis of a solution of calcium chloride in H ₂ O (3) reduction of calcium chloride with carbon (4) electrolysis of molten anhydrous calcium chloride.					
6.	The compound of alkali (1) Diamagnetic	ne earth metals have the (2) paramagnetic	e following magnetic natu (3) Ferromagnetic	re : (4) Antiferromagnetic		
7.	Which of the following is (1) Carnallite	s not an ore of magnesiu (2) Magnesite	m ? (3) Dolomite	(4) Gypsum		
8.	\mathbf{S}_1 : The first element estimilarities in properties \mathbf{S}_2 : Cement is a product clay which contains silic \mathbf{S}_3 : BeSO ₄ and MgSO ₄ \mathbf{S}_4 : Thermal stability of (1) T T F F	each in 1^{st} and 2^{nd} group to the second member of to obtained by combining a, SiO ₂ along with the or are insoluble in water. carbonates of alkaline e (2) F F T T	is, lithium in group 1 st an of the next group. a material rich in lime, C kides of AI, Fe and Mg. arth metals decreases w (3) T F T F	ad beryllium in group 2 nd shows CaO with other material such as ith increasing cationic size. (4) F T F T		
9.	Select the false statement among the following ? (1) Alkaline earth metals are diamagnetic in nature. (2) Alkaline earth metals are stronger reducing agents than alkali metals. (3) $MgCO_3$ on heating decomposes to form MgO and CO_2 . (4) 'Dead burnt plaster' has chemical composition $CaSO_4$.					
10.	Among the following hat hydrated molecule is :	alides, the one which ha	s the least water of crys	tallisation (i.e. less than six) in		
	(1) BaCl ₂	(2) $CaCl_2$	(3) SrCl_2	(4) MgCl ₂		
11.	A substance 'X' is a cor on performing flame tes (1) LiCl	npound of an element o it .The compound X is : (2) NaCl	f group IA. The substanc (3) KCI	e 'X' gives a violet colour flame (4) None of these		

12.	A metals M reacts with 'M' and 'A' on reacting and B can be:	N_2 to give a compound with H_2O gives a gas B	d 'A'($M_{3}N$). 'A' on heating at high temperature gives bac B. 'B' turns CuSO ₄ solution blue on passing through it.		
	(1) Al and NH_3	(2) Li and $\rm NH_{3}$	(3) Na and $\rm NH_{_3}$	(4) Mg and NH.	
13.	Which of the following a (1) Na ₂ O	acts as an oxidising as w (2) NaO ₃	ell as reducing agent ? (3) NaNO ₃	(4) NaNO ₂	
14.	Consider the following $X = [Li(H_2O)_n]^+$ $Z = [Cs(H_2O)_n]^-$	abbreviations for hydrate ; Y = [K(H ₂ O) _n] ⁺ ;	d alkali ions :		
	Which is the correct or $(1) X > Y > Z$	der of size of these hydra (2) Z > Y > X	ted alkali ions ? (3) X = Y = Z	(4) Z > X > Y	
15.	The increasing order of (1) NaBr < KCl < Lil < 0 (3) Lil < NaBr < KCl < 0	ionic character of CsF, I CsF CsF	Lil, NaBr and KCl is : (2) CaF < KCl < NaBr < (4) Lil < KCl < CsF < N	⊲ Lil aBr	
16.	RbO ₂ is :				
	(1) peroxide and param(3) superoxide and para	agnetic amagnetic	(2) peroxide and diama(4) superoxide and diar	gnetic nagnetic	
17.	 Potassium superoxide finds use in breathing equipment and safeguards. The use to breathe in oxygen generated internally in the apparatus without being exposed to toxic fumes outside. The supply of oxygen is due to : (i) slow decomposition of KO₂ (ii) reaction of superoxide with moisture in the exhaled air. (iii) reaction of KO₂ in the exhaled air 				
	(1) i, ii and iii are correct(3) iii is only correct	t	(2) ii and iii are correct(4) i and ii are correct		
18.	The solubility if alkali m (1) LiOH < NaOH < KO (3) LiOH > CsOH > Rbo	etal hydroxide follows the H < RbOH < CsOH OH > NaOH > KOH	e order : (2) LiOH > NaOH > KOH > RbOH > CsOH (4) none of these		
19.	Sodium peroxide which (1) H_2O_2	is a yellow solid, when e (2) Na ₂ O	exposed to air becomes v (3) Na ₂ O and O ₃	white due to the formation of : (4) NaOH and Na ₂ CO ₃	
20.	Which one of the follow (1) LiCl	ing salts does not impart (2) Kl	t colour to the flame ? (3) MgCl ₂	(4) CaCl ₂	
21.	Which of the following s (1) Calcium carbonate (3) Sodium bicarbonate	substance can be used fo	or drying neutral or basic (2) Sodium carbonate (4) calcium oxide	gases ?	
22.	Which of the following (1) AICI ₃	exists in polymeric form ? (2) BeCl ₂	(3) SiC	(4) B ₂ H ₆	
23.	Which pair of the follow (1) BeCl_2 and SrCl_2	ing chlorides do not impa (2) BeCl ₂ and MgCl ₂	art colour to the flame ? (3) $CaCl_2$ and $BaCl_2$	(4) $BaCl_2$ and $SrCl_2$	
24.	When CaC_2 is heated in (1) Ca(CN) ₂	n atmospheric nitrogen ir (2) Ca ₃ N ₂	n an electric furnace the ((3) CaNC ₂	compound formed is : (4) CaNCN	
25.	Which of the following o (1) KCIO ₃	on thermal decomposition (2) Na ₂ CO ₃	n yields a basic as well a (3) NaNO ₃	s an acidic oxide ? (4) CaCO ₃	

26.	 S₁: Beryllium has higher ionization enthalpy compared to other alkaline earth metals but it has reducing nature. S: Ma²t ion is smaller than Lit ion 					
	\mathbf{S}_2 . Wy norms smaller	$\frac{1}{2} = \frac{1}{2} = \frac{1}$	200			
	\mathbf{S}_3 : \mathbf{H}_2 \mathbf{CO}_3 decompose (1) T T F	(2) F F T	gas. (3) T T T	(4) F F F		
27.	Beryllium has less nega (1) the smaller hydration (2) the large value of the (3) the large value of ion (4) (2) and (3) both.	ntive value of reduction p n energy of the Be ²⁺ . e atomization enthalpy o nisation energy of the Be	otentials compared to otl f the Be metal. e metal.	her alkaline earth metals due to		
28.	 Which of the following reactions of potassium superoxide supply oxygen gas in the breathing equipments used in space and submarines ? (a) reaction of superoxide with nitrogen in the exhaled air (b) reaction of superoxide with moisture in the exhaled air (c) reaction of superoxide with carbon dioxide in the exhaled air (1) (a), (b) and (c) (2) (b) and (c) only (3) (b) only (4) (a) and (b) only 					
29.	Sodium carbonate is matrix (1) CO_2 and NH_3	anufactured by Solvay pr (2) CO ₂ and NH ₄ Cl	rocess, the products that (3) NaCl, CaO	are recycled are : (4) CaCl ₂ ,CaO		
30.	The pair of compounds (1) NaHCO ₃ and NaOH (3) Na $_2$ CO $_3$ and NaHCC	which cannot exist toget 0_3	ther is : (2) Na ₂ CO ₃ and NaOH (4) NaHCO ₃ and NaCl			
31.	Plaster of Paris is :					
	(1) $CaSO_4.H_2O$	(2) CaSO ₄ .2H ₂ O	(3) $CaSO_4$. $\frac{1}{2}H_2O$	(4) $CaSO_4.1 \frac{1}{2} H_2O.$		
32.	 Bleaching powder loses its power on keeping for a long time because : (1) it changes into calcium hypochlorate (2) it changes into calcium chloride and calcium hydroxide (3) it absorbs moisture (4) it changes into calcium chloride and calcium chlorate. 					
33.	Hybridisation of BeCl ₂ in	n vapour state at 100ºC a	and in solid state respect	ively are :		
	(1) sp ² , sp ³	(2) sp, sp ²	(3) sp, sp ³	(4) sp, sp		
34.	$CaSO_4.2H_2O \longrightarrow 393 K$ Chemical formula of X i	→ Product (X) : s :				
	(1) 2(CaSO ₄).H ₂ O	(2) CaSO ₄ . $\frac{1}{2}$ H ₂ O	(3) CaSO ₄	(4) $CaSO_4.H_2O$		
35.	Chemical (X) is used fo (i) the production of soc (ii) the manufacture of b (iii) for the extraction of (1) $Ca(OH)_2$	r : lium hydroxide leaching powder magnesium from sea wa (2) CaO	ater. What is the chemica (3) $Ca(HCO_3)_2$	ll formula of (X)? (4) CaCO ₃		

	Exercis	e-3			
	PARI-I:	NEET / AIPWIT Q	UESTION (PRE	VIOUS YEAR	(5)
1.	A solid compound '2 On passing an ex- compound 'X' is refo (1) Ca(HCO ₃) ₂	X' on heating gives CO_2 cess of CO_2 through 'Y' prmed. The compound 'X (2) CaCO ₃	gas and a residue. Th in water a clear sol is (3) Na ₂ CO ₃	e residue mixed wit ution 'Z' is obtaine (4) K ₂ CO ₃	h water forms 'Y'. ed. On boiling 'Z' [AIPMT 2004]
2.	The correct order of (1) Rb ⁺ > K ⁺ > Na ⁺ (3) Na ⁺ > K ⁺ > Rb ⁺	f mobility of the alkali met > Li ⁺ > Li ⁺	al ions in aqueous solu (2) Li+ > Na+ > K+ (4) K+ > Rb+ > Na	ution is : > Rb ⁺ * > Li ⁺	[AIPMT 2006]
3.	The sequence of ion (1) Rb ⁺ > K ⁺ > Cs ⁺ : (3) K ⁺ > Na ⁺ > Rb ⁺ :	nic mobility in aqueous so > Na+ > Cs+	blution is : (2) Na+ > K+ > Rb (4) Cs+ > Rb+ > K+	+ > Cs+ + > Na+	[AIPMT 2006]
4.	The correct order of (1) $K_2CO_3 < MgCO_3$ (3) $BoCO_4 < MgCO_3$	f increasing thermal stabi $_{3} < CaCO_{3} < BeCO_{3}$	lity of K_2CO_3 , MgCO ₃ , (2) BeCO ₃ < MgC(4) MgCO ₃ < BoC(4)	$CaCO_3$ and $BeCO_3$ $O_3 < K_2CO_3 < CaC_2$	is : [AIPMT 2007] D ₃
5.	Which one of the al (1) Rb	a c cacco ₃ < R ₂ co ₃ kali metals, forms only, th (2) K	the normal oxide, M_2O c (3) Li	on heating in air ? (4) Na	[AIPMT 2012]
6.	Solubility of the alka (1) Ca > Sr > Ba > I (3) Ba > Mg > Sr > I	aline earth's metal sulpha Mg Ca	tes in water decreases (2) Sr > Ca > Mg : (4) Mg > Ca > Sr :	in the sequence > Ba > Ba	[AIPMT 2015]
7.	The suspension of s (1) Aqueous solutio (3) Quicklime	slaked lime in water is kn n of slaked lime	own as (2) Limewater (4) Milk of lime		[NEET-2 2016]
8.	In context with beryllium, which one of the following statements is incorrect ? (1) Its hydride is electron-deficient and polymeric. (2) It is rendered passive by nitric acid (3) It forms Be ₂ C (4) Its salts rarely hydrolyze.				[NEET-2 2016]
9.	lonic mobility of wh are put under an ele (1) Na	ich of the following alkal ectric field ? (2) K	i metal ions is lowest (3) Rb	when aqueous solu (4) Li	ition of their salts [NEET 2017]
10.	Among CaH₂, BeH₂ (1) BeH₂ < CaH₂ < I (3) BeH₂ < BaH₂ < 0	, BaH ₂ , the order of ionic BaH ₂ CaH ₂	character is (2) BaH ₂ < BeH ₂ < (4) CaH ₂ < BeH ₂ <	c CaH₂ < BaH₂	[NEET 2018]
11.	Which of the followi (1) MgO	ng oxides is most acidic i (2) CaO	n nature ? (3) BaO	(4) BeO	[NEET 2018]

PART - II : AIIMS QUESTION (PREVIOUS YEARS)

1. Assertion : Magnesium continue to burn in nitric oxide.

Reason : During burning heat evolved do not decompose NO.

- (1) If both assertion and reason are true and reason is a correct explanation of assertion.
- (2) If both assertion and reason are true but reason is not a correct explanation of assertion.
- (3) If assertion is true but reason is false.
- (4) If assertion and reason both are false.
- On dissolving moderate amount of sodium metal in liquid NH₃ at low temperature, which one of the following does not occur?
 - (1) Blue coloured solution is obtained
 - (2) Na⁺ ions are formed in the solution
 - (3) Liquid ammonia becomes good conductor of electricity
 - (4) Liquid ammonia remains diamagnetic
- 3.
 The paramagnetic species is :
 [AIIMS 2003]

 (1) KO₂
 (2) SiO₂
 (3) TiO₂
 (4) BaO₂
- 4.Assertion : Barium is not required for normal biological function in human.[AIIMS 2003]Reason : Barium does not show variable oxidation state.
 - (1) If both assertion and reason are true and reason is a correct explanation of assertion.
 - (2) If both assertion and reason are true but reason is not a correct explanation of assertion.
 - (3) If assertion is true but reason is false.
 - (4) If assertion and reason both are false.
- 5. Assertion : BaCO₃ is more soluble in HNO₃ than in plain water. [AIIMS 2003]

Reason : carbonate is weak base and reacts with the H⁺ from the strong acid, causing the barium salt to dissociate

- (1) If both assertion and reason are true and reason is a correct explanation of assertion.
- (2) If both assertion and reason are true but reason is not a correct explanation of assertion.
- (3) If assertion is true but reason is false.
- (4) If assertion and reason both are false.
- 6. Assertion : Mg is not present in enamel of human teeth.
 - Reason : Mg is an essential element for biological function of human.
 - (1) If both assertion and reason are true and reason is a correct explanation of assertion.
 - (2) If both assertion and reason are true but reason is not a correct explanation of assertion.
 - (3) If assertion is true but reason is false.
 - (4) If assertion and reason both are false.

7.	The pair whose both species are used ir	n antiacid medicinal preparations is :	[AIIMS 2006]
	(1) NaHCO ₃ and Mg(OH) ₃	(2) Na_2CO_3 and Ca $(HCO_3)_2$	
	(3) $Ca(HCO_3)_2$ and $Mg(OH)_2$	(4) $Ca(OH)_2$ and $NaHCO_3$	

8. Assertion : Among the alkali metals, lithium salts exhibit the least electrical conductance in aqueous solution.

Reason : Smaller the radius of the hydrated cation, Lower is the electrical conductance in aqueous solutions. [AIIMS 2009]

- (1) If both assertion and reason are true and reason is a correct explanation of assertion.
- (2) If both assertion and reason are true but reason is not a correct explanation of assertion.
- (3) If assertion is true but reason is false.
- (4) If assertion and reason both are false.

[AIIMS 2001]

[AIIMS 2004]

- 9. [AIIMS 2010] Assertion : Be does not impart any characteristic colour to the bunsen flame. Reason : Due to its very high ionization energy, beryllium requires a large amount of energy for excitation of the electrons. (1) If both assertion and reason are true and reason is a correct explanation of assertion. (2) If both assertion and reason are true but reason is not a correct explanation of assertion. (3) If assertion is true but reason is false. (4) If assertion and reason both are false. 10. Which of the following is not hygroscopic ? [AIIMS 2011] (4) LiCl (1) CsCl (2) MgCl₂ (3) CaCl₂ 11. Assertion : LiCI is predominantly a covalent compound. [AIIMS 2012] Reason : Electronegativity difference between Li and CI is too small. (1) If both assertion and reason are true and reason is a correct explanation of assertion. (2) If both assertion and reason are true but reason is not a correct explanation of assertion. (3) If assertion is true but reason is false. (4) If assertion and reason both are false. 12. Assertion : Of the various chlorides of alkaline earth metals BeCl, is covalent in nature, where as MgCl, and CaCl, are ionic compounds. [AIIMS 2012] Reason : Be is the first member of group 2. (1) If both assertion and reason are true and reason is a correct explanation of assertion. (2) If both assertion and reason are true but reason is not a correct explanation of assertion. (3) If assertion is true but reason is false. (4) If assertion and reason both are false. Chemical A is used for water softening to remove temporary hardness. A reacts with Na₂CO₂ to generate 13. caustic soda. When CO₂ is bubbled through A, it turns cloudy. What is the chemical formula of A. [AIIMS 2012] (3) Ca(OH), (4) $Ca(HCO_2)_2$ (1) CaCO₂ (2) CaO 14. Assertion: Best diagonal relationship is shown between Be and Al. [AIIMS 2013] Reason: Ionization energy of Be is almost the same as that of AI. (1) If both assertion and reason are true and reason is a correct explanation of assertion. (2) If both assertion and reason are true but reason is not a correct explanation of assertion. (3) If assertion is true but reason is false. (4) If assertion and reason both are false. 15. Assertion : K, Rb and Cs (all belonging to group1) can also form superoxides. [AIIMS 2014] Reason : The ionic radii of K, Rb and Cs show the following trend Cs⁺ < Rb⁺ < K⁺ (1) If both assertion and reason are true and reason is a correct explanation of assertion. (2) If both assertion and reason are true but reason is not a correct explanation of assertion. (3) If assertion is true but reason is false. (4) If assertion and reason both are false. Assertion : Sodium reacts with oxygen to form Na₂O₂ but potassium reacts with oxygen to form KO₂. 16. Reason : Potassium is more reactive metal than sodium. [AIIMS 2015] (1) If both assertion and reason are true and reason is a correct explanation of assertion. (2) If both assertion and reason are true but reason is not a correct explanation of assertion. (3) If assertion is true but reason is false. (4) If assertion and reason both are false. 17. An allylide on hydrolysis given allylene. The alkaline earth metal cation of allylide dissolves in dry ether
 - in the presence of alkyl halide to form Grignard reagent. The allylide is [AIIMS 2016]

(1) Mg_2C_3 (2) Ca_2C_3 (3) MnC_2 (4) MgC_2

4

- 18. A mixture of which pair of species react with water to produce a pure colourless gas that gives white fumes with HCI? [AIIMS 2016] (1) Calcium hydride and calcium carbide (2) Calcium carbide and aluminium nitride (3) Magnessium nitride and calcium nitride (4) Calcium phosphide and calcium cyanamide Assertion : When CO₂ is continuously bubbled through lime water a precipitate is formed which later 19. dissolves. [AIIMS 2016] Reason : Calcium bicarbaonate is initially formed which reacts further with carbon dioxide to form calcium carbonate. (1) If both assertion and reason are true and reason is a correct explanation of assertion. (2) If both assertion and reason are true but reason is not a correct explanation of assertion. (3) If assertion is true but reason is false. (4) If assertion and reason both are false. 20. Assertion : Generally alkali and alkaline earth metals form superoxides. [AIIMS 2016] Reason : There is a single bond between O and O in superoxides. (1) If both assertion and reason are true and reason is a correct explanation of assertion. (2) If both assertion and reason are true but reason is not a correct explanation of assertion. (3) If assertion is true but reason is false. (4) If assertion and reason both are false. 21. CO₂ gas along with solid (Y) is obtained when sodium salt (X) is heated. (X) is again obtained when CO₂ gas is passed into aqueous solution (Y). (X) and (Y) respectively, are [AIIMS 2017] (1) Na₂CO₃, Na₂O (2) Na₂CO₃, NaOH (3) NaHCO₃, Na₂CO₃ (4) Na₂CO₃, NaHCO₃ 22. **Assertion** : Superoxides of alkali metals are paramagnetic in nature. [AIIMS 2017] **Reason** : Superoxide contain the ion which has one unpaired electron. (1) If both assertion and reason are true and reason is a correct explanation of assertion. (2) If both assertion and reason are true but reason is not a correct explanation of assertion. (3) If assertion is true but reason is false. (4) If assertion and reason both are false.
 - 23. What is product of reaction between $Ba(OH)_2$ dilute solution with $H_2O_2 + CIO_2$: [AIIMS 2018] (1) HOCI (2) Ba(OCI)₂ (3) Ba(ClO₃)₂ (4) Ba(ClO₂)₂

PART - III : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

1.	KO ₂ (potassium super oxide) is used in oxygen cylinders in space and submarines because it :						
	(1) Absorbs CO ₂ and in	ncreases O ₂ contents	(2) Eliminates moisture		[AIEEE-2002]		
	(3) Absorbs CO ₂		(4) Produces ozone				
2.	A metal M readily form	ns water soluble sulphat	e MSO ₄ , water insolub	le hydroxide M(OH) ₂ and oxide		
	MO which becomes in (1) Be	ert on heating. The hydro (2) Mg	xide is soluble in NaOH. (3) Ca	The M is : (4) Sr	[AIEEE-2002]		
3.	In curing cement plast (1) developing interloc (2) hydrated sand grav (3) converting sand int (4) keeping it cool.	ers, water is sprinkled fro king needle like crystals o rel mixed with cement o silicic acid	m-time to time. This help of hydrate silicates	s in :	[AIEEE-2003]		
4.	Several blocks of mag (1) make the ship light (3) prevent puncturing	nesium are fixed to the be er by under-sea rocks	ottom of a ship to : (2) prevent action of wa (4) keep away the shar	ater and salt ks.	[AIEEE-2003]		
5.	One mole of magnesiu (1) one mole of ammol (3) two moles of ammo	im nitride on the reaction nia onia	with an excess of water (2) one mole of nitric ad (4) two moles of nitric a	gives : cid icid.	[AIEEE-2004]		

6.	Beryllium and aluminium exhibit many properties which are similar. But, the two elements differ in									
	(1) exhibiting maximum	covalency in compounds	(2) forming polymeric h	vdrides						
	(1) exhibiting maximum (2) forming covalent ba	lides	(2) forming polyment in	junues is natura in thair a	vidoc					
	(5) forming covalent ha	nues								
7.	Following statements regarding the periodic trends of chemical reactivity of the alkali metals an									
	halogens are given. WI	nich of these statements	gives the correct picture ? [AIEEE-2006]							
	(1) The reactivity decreases in the alkali metals but increases in the halogens with increase in atom									
	number down the group.									
	(2) In both the alkali metals and the halogens the chemical reactivity decreases with increase in atomic									
	number down the group.									
	(3) Chemical reactivity increases with increase in atomic number down the group in both the alkali									
	metals and halogens.									
	(4) In alkali metals the reactivity increases but in the halogens it decreases with increase in atomic									
	number down the group.									
8.	The ionic mobility of all	ali metal ions in aqueous	s solution is maximum fo	r :	[AIEEE-2006]					
	(1) K ⁺	(2) Rb⁺	(3) Li+	(4) Na⁺	· ·					
9.	Which one of the follow	wing orders presents the	correct sequence of the	e increasing basic	nature of the					
	given oxides ?		[AIEEE-2011]							
	(1) $Al_2O_3 < MgO < Na_2$	0 < K ₂ 0	(2) MgO < K_2O < AI_2O_3 < Na_2O							
	(3) Na ₂ O < K ₂ O < MgC	$0 < Al_2O_3$	(4) $K_2O < Na_2O < Al_2O_3 < MgO$							
10.	The products obtained	on heating LiNO, will be	a: [AIEEE-2011]							
	' (1) Li O + NO. + O.	(2) Li N + O.	(3) Li O + NO + O.	(4) LiNO. + O.						
	$(\cdot) = 2 \cdot \cdot$	(-)	$(\circ) = 2 \circ \cdots \circ 2$	()						
11.	Which of the following	on thermal decomposition	on yields a basic as well as acidic oxide ? [AIEEE-2011]							
	(1) NaNO ₃	(2) KCIO ₃	(3) CaCO ₃	(4) NH ₄ NO ₃						
12	Which and of the following alkaline parth motal subsetse has its hydration anthony grapter than									
	lattice onthology 2									
		(2) Paso	(2) PoSO		iiii <i>j=</i> 2013]					
	(1) CaSO ₄	(2) $Beso_4$	(3) BasO ₄	(4) 5150 ₄						
13.	The main oxides formed on combustion of Li, Na and K in excess of air are, respectively:									
	[JEE (Main)-2016]									
	(1) LiO_2 , Na_2O_2 and K_2O_2)	(2) Li_2O_2 , Na_2O_2 and KO_2							
	(3) Li_2O , Na_2O_2 and KO	2	(4) Li_2O , Na_2O and KO_2							

14.	Both howe (1) b (2) b (3) n (4) b	lithium and may ever, the one whic oth form soluble b oth form nitrides itrates of both Li a oth form basic car	thium and magnesium display several similar properties due to the diagonal relationshifts, the one which is incorrect, is : [JEE (Main)-2017] In form soluble bicarbonates in form nitrides ates of both Li and Mg yield NO_2 and O_2 on heating in form basic carbonates								
15.	The	products obtained	aOH are : [JEE (Main)-2017]								
	(1) C	CIO_2^- and CIO_3^-	(2)	Cl⁻ and ClO⁻	(3) Cl⁻an	d CIO ₂	(4) CIC	D- and ClO ₃			
16.	The requi (1) [3	recommended co ired to made teeth 3Ca ₃ (PO ₄) ₂ .CaF ₂]	oncent enan (2)	ration of fluoride io nel harder by conver [3{Ca(OH) ₂ }·CaF ₂]	n in drink rting [3Ca: (3) [CaF ₂	king water is ₃(PO₄)₂·Ca(Oŀ ₂]	up to 1 1)2] to : (4) [3(C	ppm as fluoride ion is [JEE (Main)-2018] CaF ₂) ·Ca(OH ₂]			
17.	The (1) S	alkaline earth met r(NO ₃)2	al nitra (2) I	ate that does not cry Mg(NO ₃)2	vstallise wi (3) Ba(No	ith water molecules, is : [JEE (Main)-2019] O ₃) ₂ (4) Ca(NO ₃) ₂					
18.	The (1) N	metal used for ma la	<-ray tube window is Ca	s : (3) Mg (4) Be			[JEE (Main)-2019]				
19.	Sodium metal on dissolution in liquid ammonia gives a deep blue solution due to the formation of:										
	(1) s (3) s	odamide odium-ammonia c	omple	×	(2) ammoniated electrons(4) sodium ion-ammonia complex						
20.	The	amphoteric hydro»	kide is	:				[JEE (Main)-2019]			
	(1) S	r(OH)2	(2) Mg(OH) ₂		(3) Ca(OH) ₂		(4) Be(OH)2			
21.	Match the following item in column I with the corresponding item in column II. [JEE (Main)-2019]										
	Column I			Column II							
	(i)	Na ₂ CO _{3.} 10H ₂ O	(A)	Portand cement in	gredient						
	(ii)	Mg(HCO ₃) ₂	(B)	Castner-Kellner pro	ocess						
	(iii)	NaOH	(C)	Solvay process							
	(iv)	Ca ₃ Al ₂ O ₆	a ₃ Al ₂ O ₆ (D) Temporary hard		ess						
	(1) (i (3) (i	$) \rightarrow (C); (ii) \rightarrow (D)$ $) \rightarrow (D); (ii) \rightarrow (A);$; (iii) - ; (iii) -	\rightarrow (B); (iv) \rightarrow (A) \rightarrow (B); (iv) \rightarrow (C)	(2) (i) \rightarrow (C); (ii) \rightarrow (B); (iii) \rightarrow (D); (iv) \rightarrow (A) (4) (i) \rightarrow (B); (ii) \rightarrow (C); (iii) \rightarrow (A); (iv) \rightarrow (D)						
22.	A me with	etal on combustion another product. T	n in e The m	xcess air forms X. 3 etal is :	X upon hy	drolysis with	water yie	elds H ₂ O ₂ and O ₂ along [JEE (Main)-2019]			
	(1) Mg		(2) Li		(3) Na (4) Rb						

Answers

F

						EXER	CISE	· 1					
SEC	TION (A)												
1.	(1)	2.	(3)	3.	(2)	4.	(2)	5.	(2)	6.	(1)	7.	(3)
8.	(1)	9.	(2)	10.	(4)	11.	(2)	12.	(4)	13.	(3)	14.	(2)
15.	(3)												
SEC	TION (B)												
1.	(1)	2.	(4)	3.	(3)	4.	(1)	5.	(2)	6.	(1)	7.	(4)
8.	(3)												
SEC	TION (C)												
1.	(4)	2.	(3)	3.	(3)	4.	(4)	5.	(2)	6.	(3)	7.	(1)
8.	(4)	9.	(1)	10.	(3)	11.	(4)	12.	(1)				
SEC	TION (D)												
1.	(1)	2.	(3)	3.	(1)	4.	(2)	5.	(1)	6.	(4)	7.	(4)
8.	(4)	9.	(1)										
SEC	TION (E)												
1.	(4)	2.	(2)	3.	(2)	4.	(2)	5.	(3)	6.	(3)	7.	(2)
8.	(3)	9.	(4)	10.	(4)	11.	(3)	12.	(2)				
SEC	TION (F)												
1.	(1)	2.	(2)	3.	(1)	4.	(1)	5.	(2)	6.	(2)		
						EXER	CISE ·	- 2					
1.	(3)	2.	(1)	3.	(3)	4.	(2)	5.	(4)	6.	(1)	7.	(4)
8.	(1)	9.	(2)	10.	(1)	11.	(3)	12.	(2)	13.	(4)	14.	(1)
15.	(3)	16.	(3)	17.	(2)	18.	(1)	19.	(4)	20.	(3)	21.	(4)
22.	(2)	23.	(2)	24.	(4)	25.	(4)	26.	(3)	27.	(4)	28.	(2)
29.	(1)	30.	(1)	31.	(3)	32.	(4)	33.	(3)	34.	(3)	35.	(1)
						EXER		- 3					
						P	ART-I						
1.	(2)	2.	(1)	3.	(4)	4.	(3)	5.	(3)	6.	(4)	7.	(4)
8.	(2)	9.	(4)	10.	(1)	11.	(4)						
						PA	ART-II						
1.	(3)	2.	(4)	3.	(1)	4.	(2)	5.	(1)	6.	(2)	7.	(1)
8.	(1)	9.	(1)	10.	(1)	11.	(3)	12.	(2)	13.	(3)	14.	(1)
15.	(3)	16.	(2)	17.	(1)	18.	(3)	19.	(1)	20.	(4)	21.	(4)
22.	(1)	23.	(4)										
						P/	ART-II						
1.	(1)	2.	(1)	3.	(1)	4.	(2)	5.	(3)	6.	(1)	7.	(4)
8.	(2)	9.	(1)	10.	(1)	11.	(3)	12.	(2)	13.	(3)	14.	(4)
15.	(2)	16.	(1)	17.	(3)	18.	(4)	19.	(2)	20.	(4)	21.	(1)
22.	(4)												