11. The s-Block Elements – Multiple Choice Questions

1. Alkali Metals

1. Which is most basic in character

(a) $RbOH$ (b) KOH

(c) $NaOH$ (d) $LiOH$

2. Which of the following has density greater than water

(a) Li (b) Na

(c) K (d) Rb

3. Which of the following reacts with water with high rate

(a) Li (b) K

(c) Na (d) Rb

4. With the increase in atomic weights, melting points of the alkali metals

(a) Increase

(b) Decrease

(c) Remain constant

(d) Do not show definite trend

5. Photoelectric effect is maximum in

(a) Cs (b) Na

(c) K (d) Li

6. Among the following the least thermally stable is

(a) K_2CO_3 (b) Na_2CO_3

(c) $BaCO_3$ (d) Li_2CO_3

7. The stability of the following alkali metal chlorides follows the order

(a) $LiCl > KCl > NaCl > CsCl$

(b) $CsCl > KCl > NaCl > LiCl$

(c) $NaCl > KCl > LiCl > CsCl$

(d) $KCl > CsCl > NaCl > LiCl$

8. The order of decreasing ionisation enthalpy in alkali metals is

(a) $Na > Li > K > Rb$ (b) $Rb < Na < K < Li$

(c) $Li > Na > K > Rb$ (d) $K < Li < Na < Rb$

9. Which of the following doesn't decompose on heating

(a) $MgCO_3$ (b) Na_2CO_3

(c) Li_2CO_3 (d) $Ca(HCO_3)_2$

10. Which of the following alkali metals has the biggest tendency for the half reaction, $M(g) \rightarrow M^+(aq) + e^-$

(a) Lithium (b) Sodium

(c) Cesium (d) Potassium

11. The low solubility of LiF and that of CsI in water are respectively due to which of the properties of the alkali metal ions

(a) Higher hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+

(b) Smaller hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+

(c) Smaller lattice enthalpy of Li^+, higher hydration enthalpy of Cs^+

(d) Smaller hydration enthalpy of Li^+, smaller lattice enthalpy of Cs^+

(e) Higher lattice enthalpy of Li^+, smaller hydration enthalpy of Cs^+

12. Which physical property in the alkali metal group increases with atomic number

(a) Melting point (b) Electronegativity

(c) Hydration enthalpy (d) Density

13. Consider the following abbreviations for hydrated alkali ions

$X = [Li(H_2O)_n]^+$; $Y = [K(H_2O)_n]^+$; $Z = [Cs(H_2O)_n]^+$

Which is the correct order of size of these hydrated alkali ions

(a) $X > Y > Z$ (b) $Z > Y > X$

(c) $X = Y = Z$ (d) $Z > X > Y$

14. 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

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

(a) Li (b) Na

(c) K (d) Cs

16. The most stable compound is

(a) LiF (b) $LiCl$

(c) $LiBr$ (d) LiI

17. The alkali metal that reacts with nitrogen directly to form nitride is

(a) Li (b) Na

(c) K (d) Rb

18. Which of the following statement about $LiCl$ and $NaCl$ is correct

(a) $LiCl$ has higher melting point than $NaCl$

(b) $LiCl$ dissolves in water whereas $NaCl$ does not

(c) $LiCl$ would ionize in water more than $NaCl$

(d) Fused $LiCl$ would be less conducting than fused $NaCl$

19. The solubility of metal halides depends on their nature, lattice enthalpy and hydration enthalpy of the individual ions. Amongst 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

20. Which of the following does not illustrate the anomalous properties of lithium

(a) The melting point and boiling point of Li are comparatively high

(b) Li is much softer than the other group I metals

(c) Li forms a nitride Li_3N unlike group I metals

(d) The ion of Li and its compounds are more heavily hydrated than those of the rest of the group

21. 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

22. Choose the incorrect statement in the following

(a) BeO is almost insoluble but $BeSO_4$ is soluble in water

(b) BaO is soluble but $BaSO_4$ is insoluble in water

(c) LiI is more soluble than KI in ethanol

(d) Both Li and Mg form solid hydrogen carbonates

(e) Both $LiCl$ and $MgCl_2$ are deliquescent

23. Chile saltpetre is

(a) $NaNO_3$ (b) Na_2SO_4

(c) KNO_3 (d) Na_2SO_3

24. Which of the following chemicals, in addition to water, are used for the manufacture of Na_2CO_3 by Solvay process

(a) $NaCl, CO$ and NH_3 (b) $NaCl, CO_2$ and NH_3

(c) $NaCl, NH_4Cl$ and CO_2 (d) $NaHCO_3, CO$ and NH_3

25. Aluminium reacts with caustic soda to form

(a) Aluminium hydroxide (b) Aluminium oxide

(c) Sodium meta-aluminate (d) Sodium tetra aluminate

26. Sodium when heated in a current of dry ammonia gives

(a) Sodium nitrite (b) Sodium hydride

(c) Sodium amide (d) Sodium azide

27. The substance used to decolourise and purify oils is

(a) Sodium carbonate (b) Sodium chloride

(c) Sodium hydroxide (d) Sodium sulphate

28. When CO is passed over solid $NaOH$ heated to $200^\circ C$, it forms

(a) Na_2CO_3 (b) $NaHCO_3$

(c) $HCOONa$ (d) None

29. Soda ash is

(a) $Na_2CO_3.H_2O$ (b) $NaOH$

(c) Na_2CO_3 (d) $NaHCO_3$

30. Soda lime is

(a) $NaOH$ (b) CaO

(c) $NaOH$ and CaO (d) Na_2CO_3

31. The cell used for the electrolysis of fused $NaCl$ is

(a) Down's cell (b) Castner cell

(c) Solvay cell (d) Nelson cell

32. In the manufacture of metallic sodium by the fused salt electrolysis (Down's process) a small amount of calcium chloride is added to

(a) Improve the electrical conduction

(b) Increase the temperature of electrolysis

(c) Bring down the melting temperature

(d) Stabilize the metallic sodium

33. The number of hydroxide ions produced by one molecule of sodium carbonate (Na_2CO_3) on hydrolysis is

(a) 1 (b) 2

(c) 3 (d) 4

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

(a) Ammoniated electron (b) Sodium ion

(c) Sodium amide (d) Ammoniated sodium ion

35. The correct formula of hypo is

(a) $Na_2S_2O_3.5H_2O$ (b) Na_2SO_4

(c) $Na_2S_2O_3.4H_2O$ (d) $Na_2S_2O_3.3H_2O$

36. When washing soda is heated

(a) CO is released

(b) $CO + CO_2$ is released

(c) CO_2 is released

(d) Water vapour is released

37. In the Castner's process for the extraction of sodium, the anode is made of.....metal

(a) Copper (b) Iron

(c) Sodium (d) Nickel

38. Sn is dissolved in excess of $NaOH$ solution, the compound obtained is

(a) $Sn(OH)_2$ (b) Na_2SnO_3

(c) Na_2SnO_2 (d) SnO_2

39. Which one of the following metallic hydroxides does not dissolve in sodium hydroxide solution

(a) $Zn(OH)_2$ (b) $Al(OH)_3$

(c) $Fe(OH)_3$ (d) $Pb(OH)_2$

40. An alkali metal hydride (NaH) reacts with diborane in "A" to give a tetrahedral compound 'B' which is extensively used as reducing agent in organic synthesis. The compounds 'A' and 'B' respectively are

(a) C_6H_6 and $NaBH_4$

(b) C_2H_6 and C_2H_5Na

(c) $(C_2H_5)_2O$ and $NaBH_4$

(d) CH_3COCH_3 and $B_3N_3H_6$

41. In Castner-Kellner cell for production of sodium hydroxide

(a) Brine is electrolyzed using graphite electrodes

(b) Molten sodium chloride is electrolysed

(c) Sodium amalgam is formed at mercury cathode

(d) Brine is electrolyzed with Pt electrodes

42. Concentrated aqueous sodium hydroxide can separate mixture of

(a) Al^{3+} and Sn^{2+} (b) Al^{3+} and Fe^{3+}

(c) Al^{3+} and Zn^{2+} (d) Zn^{2+} and Pb^{2+}

43. Fire extinguishers contain H_2SO_4 and

(a) $CaCO_3$ (b) Na_2CO_3

(c) $NaHCO_3$ (d) $NaHCO_3$ and Na_2CO_3

44. 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) $CaCl_2$ (b) $NaCl$

(c) $NaOH$ (d) $NaHCO_3$

45. When KI is added to acidified solution of sodium nitrite

(a) NO gas is liberated & I_2 is set free

(b) N_2 gas is liberated & HI is produced

(c) N_2O gas is liberated & I_2 is set free

(d) N_2 gas is liberated & HOI is produced

46. Which is an ore of potassium

(a) Carnellite (b) Cryolite

(c) Bauxite (d) Dolomite

47. Na_2CO_3 can be manufactured by Solvay's process but K_2CO_3 cannot be prepared because

(a) K_2CO_3 is more soluble

(b) K_2CO_3 is less soluble

(c) $KHCO_3$ is more soluble than $NaHCO_3$

(d) $KHCO_3$ is less soluble than $NaHCO_3$

48. An inorganic compound first melts then resolidifies and then liberates a gas. It may be

(a) MnO_2 (b) Al_2O_3

(c) $KMnO_4$ (d) $KClO_3$

49. What is lye

(a) 10% solution of $NaCl$

(b) 10% solution of KOH

(c) 10% solution of $Ca(OH)_2$

(d) 10% solution of Na_2CO_3

2. Alkaline Earth Metals

1. Which of the following sulphates have the highest solubility in water

(a) $MgSO_4$ (b) $BaSO_4$

(c) $CaSO_4$ (d) $BeSO_4$

2. Lithopone is

(a) $BaO + ZnSO_4$ (b) $ZnO + BaSO_4$

(c) $BaS + ZnSO_4$ (d) $ZnS + BaSO_4$

3. A certain metal M is used to prepare an antacid, which is used as a medicine in acidity. This metal accidentally catches fire which can not be put out by using CO_2 based extinguishers. The metal M is

(a) Ca (b) C

(c) Mg (d) All of these

4. The highest lattice energy corresponds to

(a) MgO (b) CaO

(c) SrO (d) BaO

5. H_2SO_4 is added to 20% cold aqueous solution of BaO_2. The product formed is

(a) H_2O_2 (b) BaO

(c) $Ba(OH)_2$ (d) H_2SO_5

6. 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) $SrCl_2$

7. 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) $Ba(OH)_2$

8. Which of the following elements does not form hydride by direct heating with dihydrogen

(a) Be (b) Mg

(c) Sr (d) Ba

9. Dehydration of hydrates of halides of calcium, barium and strontium i.e., $CaCl_2.6H_2O$, $BaCl_2\ 2H_2O$, $SrCl_2.2H_2O$, can be achieved by heating. These become wet on keeping in air. Which of the following statements is correct about these halides

(a) Act as dehydrating agent

(b) Can absorb moisture from air

(c) Tendency to form hydrate decreases from calcium to barium

(d) All of the above

10. The highly efficient method of obtaining beryllium is

(a) Dissociation of beryllium carbide

(b) Electrolysis of fused beryllium chloride

(c) Reduction of beryllium oxide with carbon

(d) Reduction of beryllium halide with magnesium

11. Which of the following salts is insoluble in water at room temperature but soluble in boiling water

(a) $CaCl_2$ (b) $BaCl_2$

(c) $SrCl_2$ (d) $PbCl_2$

12. The decomposition temperature is the lowest for

(a) $BeCO_3$ (b) $MgCO_3$

(c) $SrCO_3$ (d) $BaCO_3$

13. In India at the occasion of marriages, the fire works used give green flame. Which one of the following radicals may be present

(a) Na (b) K

(c) Ba (d) Ca

14. The oxide, which is best soluble in H_2O is

(a) $Ba(OH)_2$ (b) $Mg(OH)_2$

(c) $Sr(OH)_2$ (d) $Ca(OH)_2$

15. BaO_2 and ozone reacts to produce

(a) Ba (b) Ba_2O_3

(c) BaO (d) $Ba(OH)_2$

16. Which is not soluble in water

(a) $CaCO_3$ (b) $BaCO_3$

(c) $SrCO_3$ (d) All of these

17. The thermal stability of alkaline earth metal carbonates $MgCO_3, CaCO_3$, $BaCO_3$ and $SrCO_3$ decreases as

(a) $CaCO_3 > SrCO_3 > MgCO_3 > BaCO_3$

(b) $BaCO_3 > SrCO_3 > MgCO_3 > CaCO_3$

(c) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$

(d) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$

18. The compound exhibiting maximum value of equivalent conductance in a fused state is

(a) $SrCl_2$ (b) $CaCl_2$

(c) $MgCl_2$ (d) $BeCl_2$

19. Match the flame colours of the alkaline earth metal salts in the Bunsen burner

(A)	Calcium	(p)	Brick red
(B)	Strontium	(q)	Apple green
(C)	Barium	(r)	Crimson

(a) A–p, B–r, C–q (b) A–r, B–p, C–q

(c) A–q, B–r, C–p (d) A–p, B–q, C–r

20. Which is used to produce smoke screens

(a) Calcium phosphide (b) Zinc sulphide

(c) Sodium carbonate (d) Zinc phosphide

21. $BaSO_4$ and carbon on heating reacts to produce

(a) $Ba + SO_2 + CO_2$ (b) $BaS + CO$

(c) $BaS + O_2 + SO_2$ (d) $BaCO_3 + S + O_2$

22. Philospher's wool when heated with BaO at $1100^\circ C$ gives a compound. Identify the compound

(a) $BaZnO_2$ (b) $Ba + ZnO_2$

(c) $BaCdO_2$ (d) $BaO_2 + Zn$

23. When CO_2 is bubbled through a solution of barium peroxide in water

(a) O_2 is released

(b) Carbonic acid is formed

(c) H_2O_2 is formed

(d) No reaction occurs

24. 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) $BaCO_3$

25. Which of the carbonates given below is unstable in air and is kept in CO_2 atmosphere to avoid decomposition

(a) $BeCO_3$ (b) $MgCO_3$

(c) $CaCO_3$ (d) $BaCO_3$

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

(a) $Mg(OH)_2$ (b) $Ca(OH)_2$

(c) $Sr(OH)_2$ (d) $Ba(OH)_2$

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

(a) Magnesium nitrate (b) Calcium nitrate

(c) Barium nitrate (d) Strontium nitrate

28. Phosphine, acetylene and ammonia can be formed by treating water with

(a) Mg_3P_2, Al_4C_3, Li_3N (b) Ca_3P_2, CaC_2, Mg_3N_2

(c) $Ca_3P_2, CaC_2, CaCN_2$ (d) Ca_3P_2, Mg_2C, NH_4NO_3

29. The decreasing order of basic character of K_2O, BaO, CaO and MgO is

(a) $K_2O > BaO > CaO > MgO$

(b) $K_2O > CaO > BaO > MgO$

(c) $MgO > BaO > CaO > K_2O$

(d) $MgO > CaO > BaO > K_2O$

30. In the Alkaline earth metals, the element forming predominantly covalent compound is

(a) Be (b) Mg

(c) Sr (d) Ca

31. Epsom salt is

(a) $CaSO_4.2H_2O$ (b) $BaSO_4.2H_2O$

(c) $MgSO_4.2H_2O$ (d) $MgSO_4.7H_2O$

32. Which of the following metal is found in green colouring pigment chlorophyll of plants

(a) Fe (b) Mg

(c) Na (d) Al

33. Alloys of ..... metal are light and strong and so are used in the manufacture of aeroplane parts

(a) Cr (b) Sn

(c) Fe (d) Mg

34. Pure anhydrous $MgCl_2$ can be prepared from the hydrated salt by

(a) Heating the hydrate with coke

(b) Heating the hydrate with Mg ribbon

(c) Melting the hydrate

(d) Heating the hydrate to red heat in an atmosphere of HCl gas

35. The wire of flash bulb is made of

(a) Mg (b) Cu

(c) Ba (d) Ag

36. Iron pipes lying under acidic soil are often attached to blocks of magnesium for protection from rusting. Magnesium offers protection to iron against corrosion because it

(a) Prevents air from reaching the surface of iron

(b) Is more readily converted into positive ions

(c) Is higher electropositive than iron

(d) Forms a corrosion-resistance alloy with iron

37. Magnesium burns in air to give

(a) MgO (b) Mg_3N_2

(c) $MgCO_3$ (d) MgO and Mg_3N_2 both

38. A metal is burnt in air and the ash on moistening smells of NH_3. The metal is

(a) Na (b) Fe

(c) Mg (d) Al

39. Plaster of Paris is

(a) $CaSO_4.2H_2O$ (b) $CaSO_4.3H_2O$

(c) $CaSO_4.H_2O$ (d) $CaSO_4.\frac{1}{2}H_2O$

40. Bleaching powder is a compound having the molecular formula

(a) $CaOCl_3$ (b) $CaOCl_2$

(c) $CaClO$ (d) $CaClO_3$

41. Bone ash contains

(a) CaO (b) $CaSO_4$

(c) $Ca_3(PO_4)_2$ (d) $Ca(H_2PO_4)_2$

42. Which is quick lime

(a) $Ca(OH)_2$ (b) CaO

(c) $CaCO_3$ (d) $Ca(OH)_2 + H_2O$

43. Dead burn plaster is

(a) $CaSO_4.2H_2O$ (b) $MgSO_4.7H_2O$

(c) $CaSO_4.\frac{1}{2}H_2O$ (d) $CaSO_4$

(e) $MgSO_4$

44. A chemical A is used for the preparation of washing soda to recover ammonia. When CO_2 is bubbled through an aqueous solution of A, the solution turns milky. It is used in white washing due to disinfectant nature. What is the chemical formula of A

(a) $Ca(HCO_3)_2$ (b) CaO

(c) $Ca(OH)_2$ (d) $CaCO_3$

45. Bleaching powder is obtained by the interaction of chlorine and

(a) Conc. solution of $Ca(OH)_2$

(b) Dilute solution of $Ca(OH)_2$

(c) Dry calcium oxide

(d) Dry slaked lime

46. Calcium cynamide is

(a) $CaCHNH_2$ (b) $CaCN_2$

(c) CaC_2N_2 (d) $Ca(CN)_2$

47. Which of the following ions forms highly soluble hydroxide in water

(a) K^+ (b) Zn^{++}

(c) Al^{+++} (d) Ca^{++}

48. Portland cement is manufactured by using

(a) Lime stone, clay and sand

(b) Lime stone, gypsum and sand

(c) Lime stone, gypsum and alumina

(d) Lime stone, clay and gypsum

49. In the presence of cobalt chloride, bleaching powder decomposes to form

(a) $CaCO_3$ and O_3 (b) ClO_2 and CaO

(c) Cl_2O and CaO (d) $CaCl_2$ and O_2

50. Which of the following statements is false

(a) $CaOCl_2$ gives OH^-, Cl^- and OCl^- in aqueous solution

(b) Diamond and graphite are allotrops of carbon

(c) Bleaching action of Cl_2 in moist condition is not permanent

(d) Calomel is Hg_2Cl_2

51. Which is used to reduce the acidity of soil

(a) Calcium hydroxide (b) Ammonium sulphate

(c) Ammonium nitrate (d) Ammonium chloride

52. Slow acting nitrogenous fertilizer among the following is

(a) NH_2CONH_2 (b) NH_4NO_3

(c) $CaNCN$ (d) KNO_3

53. The chief component of cement that has property of setting quickly and acquiring considerable strength within a few days is

(a) Tricalcium silicate, $3CaO \cdot SiO_2$

(b) Dicalcium silicate, $2CaO \cdot SiO_2$

(c) Tricalcium aluminate, $3CaO \cdot Al_2O_3$

(d) All the above

54. Which is insoluble in water

(a) H_2S (b) $HgCl_2$

(c) $Ca(NO_3)_2$ (d) CaF_2

55. 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

56. Cement, the important building material is a mixture of oxides of several elements. Besides calcium, iron and sulphur, oxides of elements of which of the group (s) are present in the mixture

(a) Group 2 (b) Groups 2, 13 and 14

(c) Groups 2 and 13 (d) Groups 2 and 14

57. To remove last traces of water from alcohol, the metal used is

(a) Sodium (b) Potassium

(c) Calcium (d) Aluminium

58. What is the chemical composition of Nicol's prism

(a) Al_2O_3 (b) $CaSO_4$

(c) $CaCO_3$ (d) Na_3AlF_6

3. IIT-JEE/ AIEEE

1. Based on lattice energy and other considerations which one of the following alkali metal chlorides is expected to have the highest melting point **[2005]**

(a) $LiCl$ (b) $NaCl$

(c) KCl (d) $RbCl$

2. The main oxides formed on combustion of Li, Na and K in excess of air are, respectively **[2016]**

(a) LiO_2, Na_2O_2 and K_2O (b) Li_2O_2, Na_2O_2 and KO_2

(c) Li_2O, Na_2O_2 and KO_2 (d) Li_2O, Na_2O and KO_2

3. Solubility of iodine in water is greatly increased by the addition of iodide ions because of the formation of ..... **[1994]**

(a) I_2 (b) I_3

(c) I_3^- (d) I^-

4. Glauber's salt is **[1985]**

(a) $MgSO_4.7H_2O$ (b) $CuSO_4.5H_2O$

(c) $FeSO_4.7H_2O$ (d) $Na_2SO_4.10H_2O$

5. Aqueous solution of $Na_2S_2O_3$ on reaction with Cl_2 gives **[2008]**

(a) $Na_2S_4O_6$ (b) $NaHSO_4$

(c) $NaCl$ (d) $NaOH$

6. The metallic lustre exhibited by sodium is explained by **[1987]**

(a) Diffusion of sodium ions

(b) Oscillation of loose electrons

(c) Excitation of free protons

(d) Existence of body centred cubic lattice

7. Which of the following pair can't exist in solution **[1986]**

(a) $NaHCO_3$ and $NaOH$ (b) Na_2CO_3 and $NaOH$

(c) Na_2CO_3 and $NaCl$ (d) $NaHCO_3$ and $NaCl$

8. KF combines with HF to form KHF_2. The compound contains the species **[1996]**

(a) K^+, F^- and H^+ (b) K^+, F^- and HF

(c) K^+ and $[HF_2]^-$ (d) $[KHF]^+$ and F^-

9. KO_2 (potassium superoxide) is used in oxygen cylinders in space and submarines because it **[2002]**

(a) Absorbs CO_2 and increases O_2 content

(b) Eliminates moisture

(c) Absorbs CO_2

(d) Produces ozone

10. Both lithium and magnesium display several similar properties due to the diagonal relationship; however, the one which is incorrect, is **[2017]**

(a) Both form soluble bicarbonates

(b) Both form nitrides

(c) Nitrates of both Li and Mg yield NO_2 and O_2 on heating

(d) Both form basic carbonates

11. When metal 'M' is treated with $NaOH$, a white gelatinous precipitate 'X' is obtained, which is soluble in excess of $NaOH$. Compound 'X' when heated strongly gives an oxide which is used in chromatography as an adsorbent. The metal 'M' is **[2018]**

(a) Al (b) Fe

(c) Zn (d) Ca

12. A metal M readily forms its sulphate MSO_4 which is water-soluble. It forms its oxide MO which becomes inert on heating. It forms its insoluble hydroxide $M(OH)_2$ which is soluble in $NaOH$ solution. Then M is **[2002]**

(a) Mg (b) Ba

(c) Ca (d) Be

13. The solubilities of carbonates decreases down the magnesium group due to a decrease in **[2003]**

(a) Lattice energies of solids

(b) Hydration energies of cations

(c) Inter-ionic attraction

(d) Entropy of solution formation

14. Which one of the following alkaline earth metal sulphates has its hydration enthalpy greater than its lattice enthalpy **[2010;]**

(a) $CaSO_4$ (b) $BeSO_4$

(c) $BaSO_4$ (d) $SrSO_4$

15. A sodium salt on treatment with $MgCl_2$ gives white precipitate only on heating. The anion of the sodium salt is **[2004]**

(a) HCO_3^- (b) CO_3^{2-}

(c) NO_3^- (d) SO_4^{2-}

16. One mole of magnesium nitride on the reaction with an excess of water gives **[2004]**

(a) Two moles of ammonia (b) One mole of nitric acid

(c) One mole of ammonia (d) Two moles of nitric acid

17. The composition formulae of gypsum is **[1978]**

(a) $(CaSO_4)_2.H_2O$ (b) $2CaSO_4$

(c) $CaSO_4.2H_2O$ (d) $2CaSO_4.H_2O$

18. The metal that cannot be obtained by electrolysis of an aqueous solution of its salts is **[2014]**

(a) Ag (b) Ca

(c) Cu (d) Cr

19. The substance not likely to contain $CaCO_3$ is **[2003]**

(a) A marble statue (b) Calcinated gypsum

(c) Sea shells (d) Dolomite

20. Which of the following on thermal decomposition yields a basic as well as an acidic oxide **[2012]**

(a) $KClO_3$ (b) Na_2CO_3

(c) $NaNO_3$ (d) $CaCO_3$

(e) NH_4NO_3

4. NEET/ AIPMT/ CBSE-PMT

1. In the case of alkali metals, the covalent character decreases in the order **[2009]**

(a) $MCl > MI > MBr > MF$

(b) $MF > MCl > MBr > MI$

(c) $MF > MCl > MI > MBr$

(d) $MI > MBr > MCl > MF$

2. Which one of the alkali metals, forms only, the normal oxide, M_2O on heating in air **[2012]**

(a) Rb (b) K

(c) Li (d) Na

3. The ease of adsorption of the hydrated alkali metal ions on an ion-exchange resins follows the order **[2012]**

(a) $Li^+ < K^+ < Na^+ < Rb^+$ (b) $Rb^+ < K^+ < Na^+ < Li^+$

(c) $K^+ < Na^+ < Rb^+ < Li^+$ (d) $Na^+ < Li^+ < K^+ < Rb^+$

4. The sequence of ionic mobility in aqueous solution is **[2006, 08]**

(a) $Rb^+ > K^+ > Cs^+ > Na^+$

(b) $Na^+ > K^+ > Rb^+ > Cs^+$

(c) $K^+ > Na^+ > Rb^+ > Cs^+$

(d) $Cs^+ > Rb^+ > K^+ > Na^+$

5. The alkali metals form salt-like hydrides by the direct synthesis at elevated temperature. The thermal stability of these hydrides decreases in which of the following orders **[2008]**

(a) $NaH > LiH > KH > RbH > CsH$

(b) $LiH > NaH > KH > RbH > CsH$

(c) $CsH > RbH > KH > NaH > LiH$

(d) $KH > NaH > LiH > CsH > RbH$

6. The strongest reducing agent of the alkali metal is **[2000]**

(a) Li (b) Na

(c) K (d) Cs

7. The function of "Sodium pump" is a biological process operating in each and every cell of all animals. Which of the following biologically important ions is also a constituent of this pump **[2015]**

(a) Mg^{2+} (b) K^{+}

(c) Fe^{2+} (d) Ca^{2+}

8. In the replacement reaction

$$\geq CI + MF \rightarrow \geq CF + MI$$

The reaction will be most favourable if M happens to be **[2012]**

(a) Na (b) K

(c) Rb (d) Li

9. Washing soda is **[1990]**

(a) $Na_2CO_3.10H_2O$ (b) $Na_2CO_3.H_2O$

(c) $Na_2CO_3.5H_2O$ (d) Na_2CO_3

10. In which of the following processes, fused sodium hydroxide is electrolysed at $330^{\circ}C$ temperature for extraction of sodium **[2000]**

(a) Castner's process (b) Down's process

(c) Cyanide process (d) Both (b) and (c)

11. Identify the correct order of solubility in aqueous medium **[2013]**

(a) $Na_2S > ZnS > CuS$ (b) $CuS > ZnS > Na_2S$

(c) $ZnS > Na_2S > CuS$ (d) $Na_2S < CuS > ZnS$

12. Potash alum is a **[1989]**

(a) Complex salt (b) Acid salt

(c) Double salt (d) Normal salt

13. When potassium ferrocyanide crystals are heated with concentrated sulphuric acid, the gas evolved is **[1999]**

(a) Ammonia (b) Sulphur dioxide

(c) Carbon dioxide (d) Carbon monoxide

14. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric field **[2017]**

(a) Na (b) K

(c) Rb (d) Li

15. On heating which of the following releases CO_2 most easily **[2015]**

(a) K_2CO_3 (b) Na_2CO_3

(c) $MgCO_3$ (d) $CaCO_3$

16. The low solubility of $BaSO_4$ in water can be attributed to **[1991]**

(a) High lattice energy (b) Dissociation energy

(c) Low lattice energy (d) Ionic bond

17. In which of the following the hydration energy is higher than the lattice energy **[2007]**

(a) $BaSO_4$ (b) $MgSO_4$

(c) $RaSO_4$ (d) $SrSO_4$

18. Which one of the following is a true peroxide **[2010]**

(a) SO_2 (b) BaO_2

(c) MnO_2 (d) NO_2

19. Which pair of substances gives same gaseous product, when these react with water **[1994]**

(a) Ca and CaH_2 (b) Na and Na_2O_2

(c) K and KO_2 (d) Ba and BaO_2

20. Among K, Ca, Fe, and Zn, the element which can form more than one binary compound with chlorine is **[2004]**

(a) K (b) Ca

(c) Fe (d) Zn

21. Match **List I** with **List II** for the compositions of substance and select the correct answer using the code given below the lists **[2011]**

List I Substances		**List II Composition**	
(A)	Plaster of paris	(i)	$CaSO_4.2H_2O$
(B)	Epsomite	(ii)	$CaSO_4.\frac{1}{2}H_2O$
(C)	Kieserite	(iii)	$MgSO_4.7H_2O$
(D)	Gypsum	(iv)	$MgSO_4.H_2O$
		(v)	$CaSO_4$

Code

	(A)	(B)	(C)	(D)
(a)	(i)	(ii)	(iii)	(v)
(b)	(iv)	(iii)	(ii)	(i)
(c)	(iii)	(iv)	(i)	(ii)
(d)	(ii)	(iii)	(iv)	(i)

22. Which of the following oxides is most acidic in nature **[2018]**

(a) BeO (b) MgO

(c) CaO (d) BaO

23. A solid compound 'X' on heating gives CO_2 gas and a residue. The residue mixed with water forms 'Y'. On passing an excess of CO_2 through 'Y' in water, a clear solution, 'Z' is obtained. On boiling 'Z', compound 'X' is reformed. The compound 'X' is **[2004; 2010]**

(a) Na_2CO_3 (b) K_2CO_3

(c) $Ca(HCO_3)_2$ (d) $CaCO_3$

24. The property of the alkaline earth metals that increases with their atomic number is **[1997; 2010]**

(a) Ionisation energy

(b) Electronegativity

(c) Solubility of their sulphates

(d) Solubility of their hydroxides

25. Solubility of the alkaline earth's metal sulphates in water decreases in the sequence **[2015]**

(a) $Ca > Sr > Ba > Mg$ (b) $Sr > Ca > Mg > Ba$

(c) $Ba > Mg > Sr > Ca$ (d) $Mg > Ca > Sr > Ba$

26. Which of the following oxides is not expected to react with sodium hydroxide **[2009]**

(a) B_2O_3 (b) CaO

(c) SiO_2 (d) BeO

The solubility of sulphates in water down the Be group is $Be > Mg >> Ca > Sr > Ba$. This is due to **[1995]**

(a) High heat of solvation for smaller ions like Be^{2+}

(b) Increasing molecular weight

(c) Decreasing lattice energy

(d) Increase in melting points

27. The correct order of increasing thermal stability of K_2CO_3, $MgCO_3$, $CaCO_3$ and $BeCO_3$ is **[2007]**

(a) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$

(b) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$

(c) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$

(d) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$

28. Which of the following statements is false **[2016]**

(a) Mg^{2+} ions form a complex with ATP

(b) Ca^{2+} ions are important in blood clotting

(c) Ca^{2+} ions are not important in maintaining the regular beating of the heart

(d) Mg^{2+} ions are important in the green parts of plants

29. In context with beryllium, which one of the following statements is incorrect **[2016]**

(a) Its hydride is electron-deficient and polymeric

(b) It is rendered passive by nitric acid

(c) If forms Be_2C

(d) Its salts rarely hydrolyze

30. Which of the following is not a water absorber and dehydrating substance **[1989]**

(a) Silica gel (b) P_2O_5

(c) Conc. H_2SO_4 (d) Aqueous $CaCl_2$

31. Which of the following compounds has the lowest melting point **[2011]**

(a) CaF_2 (b) $CaCl_2$

(c) $CaBr_2$ (d) CaI_2

32. The formula for calcium chlorite is **[1994, 96]**

(a) $Ca(ClO_4)_2$ (b) $Ca(ClO_3)_2$

(c) $CaClO_2$ (d) $Ca(ClO_2)_2$

33. Among CaH_2, BeH_2, BaH_2, the order of ionic character is **[2018]**

(a) $BeH_2 < CaH_2 < BaH_2$ (b) $CaH_2 < BeH_2 < BaH_2$

(c) $BeH_2 < BaH_2 < CaH_2$ (d) $BaH_2 < BeH_2 < CaH_2$

34. Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\ 2s^2\ 2p^3$, the simplest formula for this compound is **[2018]**

(a) Mg_2X_3 (b) MgX_2

(c) Mg_2X (d) Mg_3X_2

5. AIIMS

1. The pair of amphoteric hydroxides is **[2005]**

(a) $Al(OH)_3$, $LiOH$ (b) $Be(OH)_2$, $Mg(OH)_2$

(c) $B(OH)_3$, $Be(OH)_2$ (d) $Be(OH)_2$, $Zn(OH)_2$

2. The elements of group IA provide a colour to the flame of Bunsen burner due to **[1987]**

(a) Low ionization potential

(b) Low melting point

(c) Softness

(d) Presence of one electron in the outermost orbit

3. Baking soda is **[1996]**

(a) Na_2CO_3 (b) $NaHCO_3$

(c) Na_2SO_4 (d) K_2CO_3

4. The reagent commonly used to determine hardness of water titrimetrically is **[2003]**

(a) Oxalic acid (b) Disodium salt of *EDTA*

(c) Sodium citrate (d) Sodium thiosulphate

5. When sodium is heated with moist air, then the product obtained is **[1999]**

(a) Na_2O (b) $NaOH$

(c) Na_2CO_3 (d) Na_2O_2

6. On dissolving moderate amount of sodium metal in liquid NH_3 at low temperature, which one of the following does not occur **[2003]**

(a) Blue coloured solution is obtained

(b) Na^+ ions are formed in the solution

(c) Liquid NH_3 becomes good conductor of electricity

(d) Liquid ammonia remains diamagnetic

7. Which of the following compounds transform baking soda into baking powder **[2001]**

(a) KCl (b) $KHCO_3$

(c) $NaHCO_3$ (d) $KHC_4H_4O_6$

8. The most basic among these hydroxides is **[2001]**

(a) $Be(OH)_2$ (b) $Mg(OH)_2$

(c) $Ca(OH)_2$ (d) $Ba(OH)_2$

9. The pair whose both species are used in anti acid medicinal preparations is **[2006]**

(a) $NaHCO_3$ and $Mg(OH)_2$

(b) Na_2CO_3 and $Ca(HCO_3)_2$

(c) $Ca(HCO_3)_2$ and $Mg(OH)_2$

(d) $Ca(OH)_2$ and $NaHCO_3$

10. Mortar is a mixture of **[2000]**

(a) $CaCO_3$, sand and water

(b) Slaked lime and water

(c) Slaked lime, sand and water

(d) $CaCO_3$ and CaO

11. Calcium is obtained by **[2001]**

(a) Roasting of lime stone

(b) Reduction of $CaCl_2$ with carbon

(c) Electrolysis of a solution of $CaCl_2$ in water

(d) Electrolysis of molten $CaCl_2$

6. Assertion and Reason

Read the assertion and reason carefully to mark the correct option out of the options given below :

(a) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(b) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(c) If assertion is true but reason is false.

(d) If the assertion and reason both are false.

(e) If assertion is false but reason is true.

1. Assertion : Potassium and caesium are used in photo-electric cells.
Reason : Potassium and caesium emit electrons on exposure to light. **[AIIMS 2002]**

2. Assertion : Lithium forms Lithium oxide (LiO_2).
Reason : N_2 molecule have unpaired electrons. **[AIIMS 1995]**

3. Assertion : PbI_4 is a stable compound.
Reason : Iodide stabilizes higher oxidation state. **[AIIMS 2003]**

4. Assertion : *Mg* is not present in enamel of human teeth.
Reason : *Mg* is an essential element for biological functions of human. **[AIIMS 2004]**

5. Assertion : *K*, *Rb* and *Cs* form superoxides.
Reason : The stability of the superoxides increases from '*K*' to '*Cs*' due to decrease in lattice energy. **[EAMCET 2009]**

6. Assertion : Anhydrous BaO_2 is used for preparing H_2O_2.
Reason : Hydrated BaO_2 is not available. **[AIIMS 2001]**

7. Assertion : Barium is not required for normal biological function in human.
Reason : Barium does not show variable oxidation state. **[AIIMS 2003]**

8. Assertion : Potassium is not obtained by the electrolysis of fused *KCl*.
Reason : Potassium vapourises at the melting point of *KCl*.

9. Assertion : Magnesium continue to burn in nitric oxide.
Reason : During burning heat evolved do not decompose *NO*. **[AIIMS 2001]**

11. The s-Block Elements – Answers Keys

1. Alkali Metals

1	a	2	d	3	d	4	b	5	a
6	d	7	b	8	c	9	b	10	a
11	e	12	d	13	a	14	d	15	a
16	a	17	a	18	d	19	b	20	b
21	c	22	d	23	a	24	b	25	c
26	c	27	c	28	c	29	c	30	c
31	a	32	c	33	b	34	a	35	a
36	d	37	c	38	b	39	c	40	c
41	c	42	b	43	d	44	a	45	a
46	a	47	c	48	d	49	b		

2. Alkaline Earth Metals

1	d	2	d	3	c	4	a	5	a
6	a	7	a	8	a	9	d	10	b
11	d	12	a	13	c	14	a	15	c
16	d	17	c	18	a	19	a	20	a
21	b	22	a	23	c	24	d	25	a
26	a	27	b	28	bc	29	a	30	a
31	d	32	b	33	d	34	d	35	a
36	b	37	d	38	c	39	d	40	b
41	c	42	b	43	d	44	c	45	d
46	b	47	a	48	d	49	d	50	c
51	c	52	c	53	a	54	d	55	b
56	b	57	c	58	c				

3. IIT-JEE/ AIEEE

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

4. NEET/ AIPMT/ CBSE-PMT

1	d	2	c	3	b	4	d	5	b
6	a	7	b	8	c	9	a	10	a
11	a	12	c	13	d	14	d	15	c
16	a	17	b	18	b	19	a	20	c
21	d	22	a	23	d	24	d	25	d
26	b	27	b	28	c	29	d	30	d
31	d	32	d	33	a	34	d		

5. AIIMS

1	d	2	a	3	b	4	b	5	b
6	d	7	d	8	d	9	a	10	c
11	d								

6. Assertion & Reason

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