EXERCISE-I

Alkali metals

1. A mixture of KCl and KF is added to sodium chloride
(A) To increase the conductivity of NaCl
(B) To decrease the melting point of NaCl
(C) To supress the degree of dissociation of NaCl
(D) To decrease the volatility of NaCl

2. A well known reagent which contains copper sulphate, sodium potassium tarterate and sodium hydroxide is
(A) Fenton's reagent (B) Schiff's reagent
(C) Fehling's solution (D) Nessler's reagent

3. Sodium metal can be stored under
(A) Benzene (B) Kerosene
(C) Alcohol (D) Toluene

4. The most dangerous method of preparing hydrogen would be by the action of HCl and
(A) Al (B) K
(C) Fe (D) Zn

5. Based on lattice energy and other considerations which one of the following alkali metal chlorides is expected to have the highest melting point
(A) *LiCl* (B) *NaCl*
(C) *KCl* (D) *RbCl*

6. 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) $Na_2S_2O_3.3H_2O$

7. The reagent commonly used to determine hardness of water titrimetrically is
(A) Oxalic acid
(B) Disodium salt of *EDTA*
(C) Sodium citrate
(D) Sodium thiosulphate

8. K_2CS_3 can be called potassium
(A) Thiocyanate (B) Thiocarbonate
(C) Thiocarbide (D) Sulphocyanide

9. Which is most basic in character
(A) RbOH (B) KOH
(C) NaOH (D) LiOH

10. 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

11. K, Ca and Li metals may be arranged in the decreasing order of their standard electrode potentials as
(A) K, Ca, Li (B) Li, K, Ca
(C) Li, Ca, K (D) Ca, Li, K

12. Alkali metals lose electrons in
(A) *s*-orbitals (B) *p*-orbitals
(C) *d*-orbitals (D) *f*-orbitals

13. The alkali metal that reacts with nitrogen directly to form nitride is
(A) Li (B) Na
(C) K (D) Rb

14. Which of the following has density greater than water
(A) Li (B) Na
(C) K (D) Rb

15. The reactivity of the alkali metal sodium with water, is made use of
(A) In drying of alcohols
(B) In drying of benzene
(C) In drying of ammonia solution
(D) As a general drying agent

16. Which of the following has smaller size
(A) H (B) He^+
(C) $_1H^2$ (D) Li^{2+}

17. KF combines with HF to form KHF_2. The compound contains the species
(A) K^+, F^- and H^+ (B) K^+, F^- and HF
(C) K^+ and $[HF_2]^-$ (D) $[KHF]^+$ and F^-

18. Which alkali metal is most metallic in character
(A) *K* (B) *Cs*
(C) *Na* (D) *Li*

19. The property of hydrogen which distinguishes it from other alkali metals is
(A) Its electropositive character
(B) Its affinity for non-metals
(C) Its reducing character
(D) Its non-metallic character

20. Which of the following reacts with water with high rate
(A) Li (B) K
(C) Na (D) Rb

21. Cryolite helps in
(A) Lowering the melting point
(B) Increasing the melting point
(C) Increasing the electrical conductivity
(D) Decreasing the electrical conductivity

22. In certain matters lithium differs from other alkali metals, the main reason for this is
(A) Small size of *Li* atom and Li^+ ion
(B) Extremely high electropositivity of Li
(C) Greater hardness of Li
(D) Hydration of Li^+ ion

23. Acidified potassium permanganate solution is decolourised by
(A) Bleaching powder (B) Microcosmic salt
(C) Mohr salt (D) White vitriol

24. Which one of the following is used as a disinfectant in water treatment
(A) Alum
(B) Charcoal
(C) Kieselguhr
(D)Potassium permanganate

25. Sodium thiosulphate is used in photography
(A) To convert metallic silver into silver salt
(B) *AgBr* grain is reduced to non-metallic silver
(C) To remove reduced silver
(D) To remove undecomposed *AgBr* in the form of $Na_3[Ag[S_2O_3)_2]$ (a complex salt)

26. Composition of borax is
(A) $Na_2B_4O_7.4H_2O$ (B) $Na_2B_4O_7.10H_2O$
(C) $NaBO_2$ (D) H_2

27. When sodium dicarbonate is heated strongly for calcined in a kiln, it forms
(A) Na (B) Na_2CO_3
(C) $NaCO_3$ (D) $NaHCO_3$

28. The strongest reducing agent is
(A) *K* (B) *Al*
(C) *Mg* (D) *Br*

29. The word 'alkali' is used for alkali metals indicates
(A) Ash of the plants (B) Metallic nature
(C) Silvery lusture (D) Active metal

30. Potassium nitrate is called
(A) Mohr's salt (B) Gypsum
(C) Indian salt petre (D) Chile salt petre

31. *NaOH* is prepared by the method
(A) Down's cell
(B) Castner cell
(C) Solvay process
(D) Castner Kellner cell

32. Sodium gives blue colour with NH_3 solution, this blue colour is due to
(A) Ammoniated $Na^{\oplus}$ (B) Ammoniated $Na^{\ominus}$
(C) Ammoniated e^- (D) Na^+ / Na^- pair

33. The strongest reducing agent of the alkali metal is
(A) *Li* (B) *Na*
(C) *K* (D) *Cs*

34. 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

35. The reaction of water with sodium and potassium is
(A) Exothermic
(B) Endothermic
(C) Reversible
(D) Irreversible and endothermic

36. When potassium ferrocyanide crystals are heated with concentrated sulphuric acid, the gas evolved is
(A) Ammonia
(B) Sulphur dioxide
(C) Carbon dioxide
(D) Carbon monoxide

37. Characteristic feature of alkali metals is
(A) Good conductor of heat and electricity
(B) High melting points
(C) Low oxidation potentials
(D) High ionization potentials

38. A substance X is a compound of an element of group IA the substance X gives a violet colour in flame test, X is
(A) LiCl (B) NaCl
(C) KCl (D) None

39. Which of the following alkali metal ions has lowest ionic mobility in aqueous solution
(A) Rb^+ (B) Cs^+
(C) Li^+ (D) Na^+

40. Lithium shows similarities to magnesium in its chemical behaviour because
(A) Similar size, greater electronegativity and similar polarizing power.
(B) Similar size same electronegativity and lower polarizing power
(C) Similar size, same electronegativity and similar high polarizing power
(D) None of these

41. Which is most basic in character
(A) CsOH (B) *KOH*
(C) *NaOH* (D) *LiOH*

42. Photoelectric effect is maximum in
(A) Cs (B) *Na*
(C) *K* (D) *Li*

43. A metal M reacts with N_2 to give a compound 'A' (M_3N). 'A' on heating at high temperature gives back 'M' and 'A' *on* reacting with H_2O gives a gas 'B'. 'B' turns $CuSO_4$ solution blue on passing through it. A and B can be
(A) *Al* and NH_3 (B) *Li* and NH_3
(C) *Na* and NH_3 (D) *Mg* and NH_3

44. 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
(A) Na_2CO_3 (B) K_2CO_3
(C) $Ca(HCO_3)_2$ (D) $CaCO_3$

45. mongst LiCl, RbCl, $BeCl_2$ and $MgCl_2$ the compounds with the greatest and least ionic character respectively are
(A) LiCl and RbCl (B) $MgCl_2$ and $BeCl_2$
(C) RbCl and $BeCl_2$ (D) RbCl and $MgCl_2$

46. Salt cake is
(A) Sodium sulphate
(B) Sodium chloride
(C) Sodium bisulphite
(D) Sodium sulphate and Sodium chloride

47. Globar salt is
(A) $MgSO_4.7H_2O$ (B) $CuSO_4.5H_2O$
(C) $FeSO_4.7H_2O$ (D) $Na_2SO_4.10H_2O$

48. The colour given to the flame by sodium salts is
(A) Light red (B) Golden yellow
(C) Green (D) Pink

49. Solvay's process is used for the preparation of
(A) Ammonia
(B) Sodium bicarbonate
(C) Sodium carbonate
(D) Calcium carbonate

50. Sodium when heated in a current of dry ammonia gives
(A) Sodium nitrite (B) Sodium hydride
(C) Sodium amide (D) Sodium azide

51. Sodium carbonate is manufactured by Solvay process, the products that are recycled are
(A) CO_2 and NH_3 (B) CO_2 and NH_4Cl
(C) NaCl, CaO (D) $CaCl_2$, CaO

52. The useful bye–products, obtained in the Solvay process of manufacturing sodium carbonate, are
(A) Quick lime and CO_2
(B) $NaHCO_3$ and NH_4Cl
(C) NH_4Cl solution and quick lime
(D) $NaHCO_3$ and CO_2

53. In the preparation of sodium carbonate, which of the following is used
(A) Slaked lime (B) Quick lime
(C) Lime stone (D) NaOH

54. When NaOH crystals are left in open air, they acquire a fluid layer around each crystal as
(A) They start melting
(B) They absorb moisture from air
(C) They react with air to form a liquid compound
(D) They absorb CO_2 from air

55. Sodium carbonate reacts with SO_2 in aqueous medium to give
(A) $NaHSO_3$ (B) Na_2SO_3
(C) $NaHSO_4$ (D) Na_2SO_4

56. Baking soda is
(A) Na_2CO_3 (B) $NaHCO_3$
(C) Na_2SO_4 (D) K_2CO_3

57. Soda ash is
(A) $Na_2CO_3.H_2O$ (B) NaOH
(C) Na_2CO_3 (D) $NaHCO_3$

58. Soda lime is
(A) NaOH (B) CaO
(C) NaOH and CaO (D) Na_2CO_3

59. Molten sodium is used in nuclear reactors to
(A) Absorb neutrons in order to control the chain reaction
(B) Slow down the fast neutrons
(C) Absorb the heat generated by nuclear fission
(D) Extract radio-isotopes produced in the reactor

60. Squashes are stored by adding
(A) Citric acid
(B) KCl
(C) Na_2SO_3
(D) Sodium metabisulphite

Alkaline earth metals

61. Which of the following sulphates have the highest solubility in water
(A) $MgSO_4$ (B) $BaSO_4$
(C) $CaSO_4$ (D) $BeSO_4$

62. The composition formulae of gypsum is
(A) $(CaSO_4)_2.H_2O$ (B) $2CaSO_4$
(C) $CaSO_4.2H_2O$ (D) $2CaSO_4.H_2O$

63. Mortar is a mixture of
(A) $CaCO_3$, sand and water
(B) Slaked lime and water
(C) Slaked lime, sand and water
(D) $CaCO_3$ and CaO

64. Gypsum $CaSO_4.2H_2O$ on heating to about 120^oC forms a compound which has the chemical composition represented by
(A) $CaSO_4$ (B) $2CaSO_4.H_2O$
(C) $CaSO_4.H_2O$ (D) $2CaSO_4.3H_2O$

65. 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

66. Mark the incorrect statement
(A) Lithopone is cheap and possess good covering power
(B) Lithopone is yellow pigment
(C) Lithopone is prepared by mixing barium sulphide and zinc sulphate
(D) Lithopone is a mixture of barium sulphate and zinc sulphide

67. 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

68. 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

69. Deep pink colour is given to flame by the salts of
(A) Strontium (B) Potassium
(C) Zinc (D) Barium

70. Calcium salts give which colour when put in a flame
(A) Brick red (B) Green
(C) White (D) Pink

71. The right order of the solubility of sulphates of alkaline earth metals in water is
(A) Be > Ca > Mg > Ba > Sr
(B) Mg > Be > Ba > Ca > Sr
(C) Be > Mg > Ca > Sr > Ba
(D) Mg > Ca > Ba > Be > Sr

72. Which of the following has highest electrode potential
(A) Be (B) Mg
(C) Ca (D) Ba

73. The alkaline earth metals Ba, Sr, Ca and Mg may be arranged in the order of their decreasing first ionisation potential as
(A) Mg, Ca, Sr, Ba,
(B) Ca, Sr, Ba, Mg
(C) Sr, Ba, Mg, Ca
(D) Ba, Mg, Ca, Sr,

74. Which of the following alkaline earth metals shows some properties similar to aluminium
(A) Be (B) Ca
(C) Sr (D) Ba

75. Which of the following ions forms highly soluble hydroxide in water
(A) K^+ (B) Zn^{++}
(C) Al^{+++} (D) Ca^{++}

76. Sodium sulphate is soluble in water whereas barium sulphate is sparingly soluble because
(A) The hydration energy of Na_2SO_4 is less than its lattice energy
(B) The hydration energy of Na_2SO_4 is more than its lattice energy
(C) The lattice energy of $BaSO_4$ is more than its hydration energy
(D) The lattice energy has no role to play in solubility

77. Which one of the following is most basic
(A) Al_2O_3 (B) MgO
(C) SiO_2 (D) P_2O_5

78. 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

79. 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

80. $CaCO_3 \rightarrow CaO + CO_2$ reaction in a line goes to completion because
(A) CaO does not react to CO_2 to give $CaCO_3$
(B) Backward reaction is very slow
(C) CO_2 formed escapes out
(D) None of these

81. A major constituent of portland cement except lime is
(A) Silica (B) Alumina
(C) Iron oxide (D) Magnesia

82. 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

83. Identify the correct statement
(A) Gypsum contains a lower percentage of plaster 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

84. Which of the following decreases on going gradually from Be to Ba (in periodic table)
(A) Basic character of hydroxides
(B) Solubility of sulphates in water
(C) Solubility of hydroxides in water
(D) Strength of elements as reducing agent

85. Alkaline earth metals are
(A) *Li, Be, K, Mg, Ca*
(B) *Be, Mg, Ca, Sr, Ba*
(C) *Be, K, Mg, Ca, Sr*
(D) *Be, Mg, Ca, K, Rb*

86. Which of the following substances is used in the laboratory for fast drying of neutral gases
(A) Sodium phosphate
(B) Phosphorus pentoxide
(C) Sodium sulphate
(D) Anhydrous calcium chloride

87. Which of the following can be represented by the configuration $[Kr]5s^2$?
(A) Ca (B) Sr
(C) Ba (D) Ra

88. Point out the incorrect statement regarding Be (Group-IIA)
(A) It forms an ionic carbide
(B) Its carbonate decomposes on heating
(C) Its halides are covalent
(D) It is easily attacked by water

89. Beryllium differs from rest of the members of its family (Group-IIA) in many ways. The reason for this is its
(A) Small size and higher electronegativity
(B) Small size and lower electronegativity
(C) Large size and lower ionisation energy
(D) Large size and largest ionic radius

90. The oxide, which is best soluble in H_2O is
(A) $Ba(OH)_2$ (B) $Mg(OH)_2$
(C) K^+, HCO_3^- (D) $Ca(OH)_2$

91. Which of the following alkaline-earth metal hydroxides is the strongest base
(A) $Be(OH)_2$ (B) $Mg(OH)_2$
(C) $Ca(OH)_2$ (D) $Ba(OH)_2$

92. Which one of the following is the strongest base
(A) $Be(OH)_2$ (B) $Mg(OH)_2$
(C) $Al(OH)_3$ (D) $Si(OH)_4$

93. Lime stone is
(A) CaO (B) $Ca(OH)_2$
(C) Both (A) and (B) (D) None of these

94. Which of the alkaline earth metals is strongest reducing agent
(A) Ca (B) Sr
(C) Ba (D) Mg

95. Plaster of paris hardens by
(A) Giving off CO_2
(B) Changing into $CaCO_3$
(C) Uniting with water
(D) Giving out water

96. Which is not soluble in water
(A) $CaCO_3$ (B) $BaCO_3$
(C) $SrCO_3$ (D) All of these

97. The correct order of the increasing ionic character is
(A) $BeCl_2 < MgCl_2 < CaCl_2 < BaCl_2$
(B) $BeCl_2 < MgCl_2 < BaCl_2 < CaCl_2$
(C) $BeCl_2 < BaCl_2 < MgCl_2 < CaCl_2$
(D) $BaCl_2 < CaCl_2 < MgCl_2 < BeCl_2$

98. $MgCl_2.6H_2O$ when heated gives
(A) Magnesium oxychloride
(B) Magnesium dichloride
(C) Magnesium oxide
(D) Magnesium chloride

99. Which of the following hydroxide is insoluble in water

(A) $Be(OH)_2$ (B) $Mg(OH)_2$

(C) $Ca(OH)_2$ (D) $Ba(OH)_2$

100. 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

101. Sparingly soluble salt is

(A) KCl (B) NaCl

(C) NH_4Cl (D) $BaSO_4$

102. Among the alkaline earth metals the element forming predominantly covalent compound is

(A) Barium (B) Strontium

(C) Calcium (D) Berylium

103. Peroxide bond is present in

(A) MgO (B) CaO

(C) Li_2O (D) BaO_2

104. Least ionic character is found in

(A) Mg (B) Sr

(C) Ca (D) Ra

105. The number of water molecules in gypsum and plaster of paris respectively are

(A) 1/2 and 2 (B) 2 and 1/2

(C) 2 and 1 (D) 5 and 2

106. Which of the following is formed when calcium combines with oxygen

(A) *Ca* (B) *CaO*

(C) CaO_2 (D) Ca_2O_2

107. Slow acting nitrogenous fertilizer among the following is

(A) NH_2CONH_2 (B) NH_4NO_3

(C) CaNCN (D) KNO_3

108. Plaster of paris is used

(A) In surgery and dentistry

(B) As a white wash

(C) As a constituent of tooth paste

(D) For the preparation of *RCC*

109. 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 than iron

(D) Forms a corrosion-resistance alloy with iron

110. Among K, Ca, Fe, and Zn , the element which can form more than one binary compound with chlorine is

(A) *K* (B) *Ca*

(C) Fe (D) *Zn*