THE S-BLOCK ELEMENTS

1. KO_2 is used in space and submarines because it
   a) Absorbs $CO_2$and increases O_2 concentration
   b) Absorbs moisture
   c) Absorbs CO_2
   d) Produces ozone
2. 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
   a) Be
   b) Ba
   c) Ca
   d) Mg
3. Which of the following exists in polymeric form?
   a) $AlCl_3$
   b) $BeCl_2$
   c) B_2H_6
   d) SiC
4. The element which on burning in air gives peroxide is
   a) Lithium
   b) Sodium
   c) Rubidium
   d) Caesium
5. Electric cookers have a coating of ....that protects them against fire.
   a) Heavy lead
   b) Magnesium oxide
   c) Zinc oxide
   d) Sodium sulphate
6. Limestone is not used in which of the following manufacturing processes?
   a) Phosphorus from phosphorite
   b) Ordinary (soda lime) glass
   c) Iron from haematite
   d) Solvay process of sodium carbonate
7. $Na_2S_2O_3$ is reduced by I_2 to
   a) Na_2S
   b) Na_2SO_4
   c) $NaHSO_3$
   d) $Na_2S_4O_6$
8. If CO_2 is passed in excess into lime water, the milkiness first formed disappears due to:
   a) Reversal of original reaction
   b) Formation of volatile calcium derivative
   c) Formation of soluble calcium bicarbonate
   d) Formation of soluble magnesium hydroxide
9. Which of the following compounds is a peroxide:
   a) KO_2
   b) BaO_2
   c) MnO_2
   d) NO_2
10. Milk of lime is:
    a) $CaCO_3$
    b) $CaHCO_3$
    c) $Ca(OH)_2$
    d) $CaSO_4 \cdot 2H_2O$
11. Initial setting of cement is mainly due to
    a) Hydration and gel formation
    b) Dehydration and gel formation
    c) Hydration and hydrolysis
    d) Dehydration and oxidation
12. Celestine is an ore of:
    a) Ba
    b) Ca
    c) Sr
    d) Mg
13. 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
14. Magnesia is:
    a) MgO
    b) $CuSO_4$
    c) $FeSO_4$
    d) $MgSO_4$
15. Which one of the following processes is used for manufacture of calcium?
    a) Reduction of CaO with carbon
    b) Reduction of CaO with hydrogen
    c) Electrolysis of a mixture of anhydrous $CaCl_2$ and KCl
    d) Electrolysis of molten $Ca(OH)_2$

16. Which substance gives a different flame colouration from the others?
    a) Nitre b) Caustic potash c) Potassium chloride d) Table salt
17. An alloy of Na + K is:
    a) Liquid at room temperature
    b) Used in specially designed thermometers
    c) Both (a) and (b)
    d) None of the above
18. Carnallite is
    a) $MgCO_3 . CaCO_3$ b) $MgSO_4 . 7H_2O$ c) $KAlSi_3O_8$ d) $KCl . MgCl_2 . 6H_2O$
19. Sodium carbonate solution in water is alkaline due to:
    a) Hydrolysis of Na^+
    b) Hydrolysis of CO_3^{2-}
    c) Hydrolysis of both Na^+ and CO_3^{2-} ions
    d) None of the above
20. Which of the following reaction does not liberate gaseous product?
    a) $AlCl_3 + NaOH \rightarrow$ b) $NaOH + P(white) + H_2O \rightarrow$
    c) $Al + NaOH \xrightarrow{\Delta}$ d) $Zn + NaOH \xrightarrow{\Delta}$
21. When one mole of bleaching powder is completely decomposed in presence of CO_2 then the mass of chlorine gas that is liberated will be:
    a) 35.45 g b) 70.90 g c) 17.72 g d) 88.60 g
22. Which of the following compounds on reaction with NaOH and H_2O_2 gives yellow colour?
    a) $Zn(OH)_2$ b) $Cr(OH)_3$ c) $Al(OH)_3$ d) None of these
23. Which of the following compounds has the lowest melting point?
    a) CaF_2 b) $CaCl_2$ c) $CaBr_2$ d) CaI_2
24. The outermost electron is most loosely held in:
    a) Li b) Na c) K d) Cs
25. On heating quick lime with coke in an electric furnace we get:
    a) Ca and CO_2 b) $CaCO_3$ c) CaO d) CaC_2
26. Which salt will not impart colour to flame?
    a) LiCl b) $MgCl_2$ c) $CaCl_2$ d) Kl
27. Shine at freshly cut sodium is because of
    a) Due to oscillation of free electrons b) Due to weak metallic bonding
    c) Due to by absorption of light in crystal lattice d) Due to presence of free valency at the surface
28. Ionic compound $BaSO_4$ is insoluble in water due to
    a) High lattice energy b) Low lattice energy
    c) Low hydration energy d) Both (a) and (c)
29. Gypsum is added to clinker during cement manufacture to:
    a) Decrease the rate of setting of cement
    b) Make the cement impervious
    c) Bind the particles of calcium silicate
    d) To facilitate the formation of colloidal gel
30. Amongst the following hydroxides, the one which has the lowest value of K_{sp} is:
    a) $Mg(OH)_2$ b) $Ca(OH)_2$ c) $Ba(OH)_2$ d) $Be(OH)_2$
31. Which is most basic in character?
    a) CsOH b) KOH c) NaOH d) LiOH
32. Which of the following acts as reducing agent as well as oxidising agent?
    a) Na_2O b) Na_2O_2 c) $NaNO_3$ d) KNO_3
33. Which of the following is correct?
    a) In the Castner's process of sodium extraction, NaCl is used as an electrolyte.

b) Sodium reduces CO_2 to carbon.
c) Mg reacts with cold water and liberate hydrogen gas.
d) Magnalium is an alloy of Mg and Zn.

34. Which is quick lime?
a) $CaCO_3$ b) $Ca(OH)_2 + H_2O$ c) $Ca(OH)_2$ d) CaO

35. Pearl ash and caustic potash are chemically:
a) K_2CO_3 and KOH b) KOH and K_2CO_3 c) Na_2CO_3 and KOH d) Na_2CO_3 and NaOH

36. When sodium is heated in flame it gives:
a) Golden yellow colour b) Crimson red colour c) Brick red colour d) Violet colour

37. Among the following, which has minimum solubility in water?
a) KOH b) CsOH c) LiOH d) RbOH

38. On strong heating $MgCl_2 . 6H_2O$, the product obtained is
a) $MgCl_2$ b) MgO c) $MgCl_2 . 2H_2O$ d) $MgCl_2 . 4H_2O$

39. Sodium chloride imparts a golden yellow colour to the Bunsen flame. This can be interpreted due to:
a) Low ionization potential of sodium
b) Photosensitivity of sodium
c) Sublimation of metallic sodium to give yellow vapour
d) Emission of excess of energy absorbed as a radiation in the visible region

40. Which property increases in magnitude as the atomic number of alkali metals increases?
a) Electronegativity
b) First ionization energy
c) Ionic radius
d) Melting point

41. Bleaching powder is obtained by the interaction of chlorine and
a) Dry calcium oxide b) Dry slaked lime
c) conc. solution of $Ca(OH)_2$ d) dilute solution of $Ca(OH)_2$

42. Ca, Sr and Ba dissolve in liquid ammonia giving a.....
a) Highly conducting b) Highly reducing c) Paramagnetic d) All are correct

43. The ionic conductances of following cations in a given concentration are in the order
a) $Li^+ < Na^+ < K^+ < Rb^+$ b) $Li^+ > Na^+ > K^+ > Rb^+$
c) $Li^+ < Na^+ > K^+ > Rb^+$ d) $Li^+ = Na^+ < K^+ < Rb^+$

44. Which can undergo both oxidation and reduction?
a) Ba^{2+} b) $BaCl_2$ c) Ba^+ d) BaH_2

45. Which component of cement sets at the slowest rate?
a) Dicalcium silicate
b) Tricalcium silicate
c) Tricalcium aluminate
d) Tetracalcium alumino ferrite

46. Scarlet flame colour of Bunsen flame is characteristic of:
a) Sn b) K c) Sb d) Sr

47. Which pair of the following chlorides do not impart colour to the flame?
a) $BeCl_2$ and $SrCl_2$ b) $BeCl_2$ and $MgCl_2$ c) $CaCl_2$ and $BaCl_2$ d) $BaCl_2$ and $SrCl_2$

48. Which one of the following electrolytes is used in Down's process of extracting sodium metal?
a) NaCl + KCl + KF b) NaCl c) NaOH + KCl + KF d) NaCl + NaOH

49. When KCl is heated with conc. H_2SO_4 and solid $K_2Cr_2O_7$, we get:
a) Chromyl chloride b) Chromous chloride c) Chromic chloride d) Chromic oxide

50. 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

51. The highest oxidation potential stands for:
a) Li b) Be c) Ba d) Ra

52. The compound X on heating gives a colourless gas. The residue is dissolved in water to obtain Y. Excess CO_2 is bubbled through aqueous solution of Y, Z is formed. Z on gentle heating gives back X. The compound X is:
a) $CaCO_3$ b) Na_2CO_3 c) $CaSO_4 \cdot 2H_2O$ d) K_2CO_3

53. KO_2 is used in oxygen cylinder in space air craft and submarines because it:
a) Absorbs CO_2 and increase O_2 content
b) Eliminate moisture
c) Absorbs CO_2
d) Produces O_2

54. The oxide, which is best soluble in H_2O is
a) $Ba(OH)_2$ b) $Sr(OH)_2$ c) $Ca(OH)_2$ d) $Mg(OH)_2$

55. Melting point is highest for:
a) Be b) Mg c) Sr d) Ca

56. On dissolving moderate amount of sodium metal in liquid NH_3 at low temperature, which one of the following does not occur?
a) Blue coloured solution is obtained
b) Na^+ ions are formed in solution
c) Liquid ammonia becomes good conductor of electricity
d) Liquid NH_3 remains diamagnetic

57. Which ion forms hydroxide easily soluble in water?
a) Zn^{2+} b) Ba^{2+} c) Mg^{2+} d) Al^{3+}

58. One of the important use of quicklime is:
a) As a purgative
b) In bleaching silk
c) In drying gases and alcohol
d) In dyeing cotton

59. Which out of the following statements is not correct for anhydrous calcium chloride?
a) It is prepared by heating hydrated calcium chloride above 533 K
b) It is used for drying alcohols and NH_3
c) It is used as a dehydrating agent to control snow and ice on highway and pavements
d) When mixed in concrete, it gives quicker initial setting and improves its strength

60. On heating washing soda, we get:
a) CO b) $CO + CO_2$ c) CO_2 d) $H_2O(v)$

61. Sodium forms Na^+ and not Na^{2+}because:
a) Sodium contains only one electron in outermost shell
b) First ionization potential is small and the difference in first and second ionization potentials is very large
c) Radius of $Na^+$is much smaller than of Na^+
d) None of the above

62. Na_2CO_3 can be manufactured by Solvay 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 $NaHCO_3$

63. Which of the following is incorrect?
a) Mg burns in air releasing dazzling light rich in UV rays
b) $CaCl_2 \cdot 6H_2O$ when mixed with ice gives, freezing mixture
c) Mg cannot form complexes
d) Be can form complexes due to its very small size

64. When sodium chloride solution is electrolysed, the gas that is liberated at the cathode is

a) Oxygen b) Chlorine c) Hydrogen d) Air

65. Manufacture of NaOH is done by:
    a) Castner- Kellner process
    b) Solvay process
    c) Brine process
    d) Mond's process
66. Which one of the following statements is true for all the alkali metals?
    a) Their nitrates decompose on heating to give NO_2 and O_2.
    b) Their carbonates decompose on heating to give CO_2 and the metal oxide.
    c) They react with oxygen to give mainly the oxide M_2O.
    d) They react with halogens to give the halides MX.
67. Strongest reducing agent among the following is:
    a) K b) Na c) Al d) Mg
68. The compound which is not soluble in dil. HCl is:
    a) $BaSO_4$ b) MnS c) ZnS d) $BaCO_3$
69. Which alkali metal is most metallic in character?
    a) Li b) Na c) K d) Cs
70. KI and $CuSO_4$ solution when mixed, give
    a) $CuI_2 + K_2SO_4$ b) $Cu_2I_2 + K_2SO_4$ c) $K_2SO_4 + Cu_2I_2 + I_2$ d) $K_2SO_4 + CuI_2 + I_2$
71. Sodium is manufactured by the electrolysis of a fused mixture of sodium and calcium chlorides in a steel cell using a graphite anode and an iron cathode. Calcium is not liberated since:
    a) It belongs to a higher group in the periodic table
    b) It combines with the liberated chlorine to form calcium chloride again
    c) Its discharge potential under these conditions is higher than that of sodium
    d) It is more readily fusible than sodium chloride
72. One mole of magnesium nitride on the reaction with excess water gives:
    a) Two mole of nitric acid
    b) One mole of nitric acid
    c) Two mole of ammonia
    d) One mole of ammonia
73. Which of the following statements is correct for $CsBr_3$?
    a) It is a covalent compound
    b) It contains $Cs^{2+}$and Br^- ions
    c) It contains Cs^+, Br^- and Br_2 lattice molecules
    d) It contains Cs^+ and Br_3^- ions
74. Which of the following is known as dead burnt plaster?
    a) Gypsum b) Plaster of Paris c) Anhydrite d) None of these
75. Which of the compounds of cement sets at the slowest rate?
    a) Dicalcium silicate
    b) Tricalcium silicate
    c) Tricalcium aluminate
    d) Tetracalcium aluminoferrate
76. The alkali metal that reacts with nitrogen directly to form nitride is
    a) Li b) K c) Na d) Rb
77. Alkali metals are powerful reducing agents because:
    a) These are metals
    b) These are monovalent
    c) Their ionic radii is large
    d) Of low ionisation enthalpy

78. Elements of group 1 and group VI in the periodic table have one thing common. That is with the increasing atomic number, the:
    a) Maximum valency increases
    b) Reactivity increases
    c) Atomic radius increases
    d) Oxidizing power increases
79. The solubility in water of sulphates down the Be group is Be > Mg > Ca > Sr > Ba. This is due to:
    a) Increase in m. p.
    b) High ionisation energy
    c) Higher co-ordination number
    d) All of the above
80. The non-metal which is not affected by NaOH:
    a) C b) Si c) P d) S
81. Beryllium shows diagonal relationship with aluminium. Which of the following similarity is incorrect?
    a) Be_2C like AlC_3 yields methane on hydrolysis
    b) Be like Al is rendered passive by HNO_3
    c) $Be(OH)_2$ like $Al(OH)_3$ is basic
    d) Be forms beryllates and Al forms aluminates
82. Which statement is correct for alkaline earth metals?
    a) They are diatomic and form ions of the type M^{2-}
    b) They are highly electronegative elements
    c) They are monoatomic and form ions of the type M^{2+}
    d) They are diatomic and form ions of the type M^{2+}
83. Milk of magnesia is used as
    a) Antichlor b) Antacid c) Antiseptic d) Food preservative
84. In a sodium chloride crystal, each chloride ion is surrounded by:
    a) $4Na^+$ ions b) $6Na^+$ ions c) $1Na^+$ ion d) $2Na^+$ ions
85. Alkaline earth metals are denser than alkali metals, because metallic bonding in alkaline earth's metal is
    a) Weaker b) Stronger c) Volatile d) Not present
86. The ion having maximum value of hydration energy is:
    a) Li^+ b) Na^+ c) K^+ d) Cs^+
87. Magnesium metal is prepared by:
    a) Reduction of MgO by coke
    b) Electrolysis of aqueous solution of $Mg(NO_3)_2$
    c) Displacement of Mg by iron from magnesium sulphate solution
    d) Electrolysis of molten magnesium chloride
88. Which of the following hydroxides is amphoteric in nature?
    a) $Be(OH)_2$ b) $Mg(OH)_2$ c) $Ca(OH)_2$ d) $Ba(OH)_2$
89. Black ash is:
    a) NaOH + CaS b) $NaHCO_3$ + CoS c) Na_2CO_3 + CaS d) Na_2CO_3 + CoS
90. Sodium carbonate is:
    a) Efflorescent b) Deliquescent c) Hygroscopic d) Oxidant
91. How many elements are included in IA group?
    a) 4 b) 5 c) 6 d) 7
92. Which category of salts of alkaline earth metals is not found in solid state, but found in solution state?
    a) Carbonates b) Bicarbonates c) Hydroxides d) Sulphates
93. K_2CS_3 can be called as potassium:
    a) Sulphocyanide b) Thiocarbide c) Thiocarbonate d) Thiocyanate
94. Which is not true in respect of berryllium chemistry?
    a) Beryllium is amphoteric b) It forms unusual carbide Be_2C

c) $Be(OH)_2$ is basic
d) Beryllium halides are electron deficient

95. *A* and *B* are two salts. *A* with dilute HCl and *B* with conc. H_2SO_4 react to give reddish brown vapours, hence *A* and *B* respectively are:
a) $NaBr, NaNO_3$ b) $NaNO_3, NaBr$ c) $NaBr, NaNO_2$ d) $NaNO_2, NaBr$

96. On strong heating CaO and C, the products formed are:
a) Ca and CO b) CaC_2 and CO c) $Ca(OH)_2$ d) CaC_2 and CO_2

97. For which one of the following minerals, the composition given is incorrect?
a) Glauber's salt $-Na_2SO_4 .10H_2O$
b) Borax $- Na_2B_4O_7 .7H_2O$
c) Carnallite $- KCl . MgCl_2 .6H_2O$
d) Soda ash $- Na_2CO_3$

98. 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) $KCl > CsCl > NaCl > LiCl$

99. The solubility of alkali metal hydroxide is
a) $LiOH < KOH < NaOH < RbOH < CsOH$ b) $LiOH < NaOH < KOH < RbOH < CsOH$
c) $CsOH < RbOH < KOH < NaOH < LiOH$ d) None of the above

100. Which of the statements is not true?
a) $K_2Cr_2O_7$ solution in acidic medium is orange
b) $K_2Cr_2O_7$ solution becomes yellow on increasing the pH beyond 7
c) On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky colour is observed
d) $Na_2Cr_2O_7$ is perferred over $K_2Cr_2O_7$ in volumetric analysis

101. Gypsum, $CaSO_4.2H_2O$ on heating to about 120°C forms a compound which has the chemical composition represented by
a) $CaSO_4.H_2O$ b) $2CaSO_4.3H_2O$ c) $2CaSO_4.H_2O$ d) $CaSO_4$

102. Which of the following hydrogen compounds is most ionic?
a) HF b) CsH c) HI d) LiH

103. Which sequence of reactions shows correct chemical relation between sodium and its compounds?
a) $Na + O_2 \rightarrow Na_2O \xrightarrow{HCl\ (aq)} NaCl \xrightarrow{CO_2} Na_2CO_3 \xrightarrow[\Delta]{} Na$
b) $Na \xrightarrow{O_2} Na_2O \xrightarrow{H_2O} NaOH \xrightarrow{CO_2} Na_2CO_3 \xrightarrow[\Delta]{} Na$
c) $Na + H_2O \rightarrow NaOH \xrightarrow{HCl} NaCl \xrightarrow{CO_2} Na_2CO_3 \xrightarrow[\Delta]{} Na$
d) $Na + H_2O \rightarrow NaOH \xrightarrow{CO_2} Na_2CO_3 \xrightarrow{HCl} NaCl \xrightarrow[(molten)]{Electrolysis} Na + \bar{Cl}$

104. The salt added to table salt to make it flow freely in rainy season is:
a) KCl b) NH_4Cl c) $Ca_3(PO_4)_2$ d) $NaHCO_3$

105. Lithopone is
a) $BaO + ZnSO_4$ b) $BaS + ZnSO_4$ c) $ZnS + BaSO_4$ d) $ZnO + BaSO_4$

106. Sodium is heated in air at 300°C to form *X*. *X* absorbs CO_2 and forms Na_2CO_3 and Y? Which of the following is Y?
a) H_2 b) O_2 c) H_2O_2 d) O_3

107. When Na reacts with liquid NH_3 the following substance is formed
a) $Na(NH_3)_x]^-$ b) $[e(NH_3)_y]^-$ c) $NaNH_2$ d) $Na_x(NH_3)_y$

108. Sodium bicarbonate solution on adding to magnesium sulphate solution forms:
a) Magnesium bicarbonate
b) Magnesium hydroxide
c) Basic magnesium carbonate
d) Magnesium carbonate

109. Which pair of elements would form the most ionic bond?

a) H, Cl b) K, Cl c) B, N d) C, O

110. Magnesium wire burns in the atmosphere of CO_2 because:
   a) Magnesium acts as an oxidizing agent
   b) Magnesium has 2 electrons in the outermost orbit
   c) Magnesium acts as a reducing agent and removes oxygen from CO_2
   d) None of the above

111. Potassium when heated strongly in oxygen, it forms:
   a) K_2O b) KO_2 c) K_2O_2 d) KO

112. Ordinary blackboard chalk is made up of:
   a) $CaCO_3$ b) Gypsum c) Fluorspar d) $Ca_3(PO_4)_2$

113. Caustic soda solution is an absorbent for:
   a) NH_3 b) CO_2 c) CO d) N_2O

114. Which of the following represents the composition of carnallite mineral?
   a) $K_2O \cdot Al_2O_3 \cdot 6SiO_2$ b) KNO_3
   c) $K_2SO_4 \cdot MgSO_4 \cdot MgCl_2 \cdot 6H_2O$ d) $KCl \cdot MgCl_2 \cdot 6H_2O$

115. The element that forms a solid basic oxide at room temperature is:
   a) Mg b) S c) H d) P

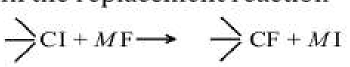
116. Which alkali metal is frequently used in solar cells?
   a) Na b) Li c) K d) Cs

117. Which gives apple green colour in fireworks?
   a) Na b) K c) Ba d) Ca

118. Sodium nitrate decomposes above 800°C and does not give:
   a) N_2 b) O_2 c) NO_2 d) Na_2O

119. Which of the following process is used in the extractive metallurgy of magnesium?
   a) Fused salt electrolysis
   b) Self reduction
   c) Aqueous solution electrolysis
   d) Thermite reduction

120. In the replacement reaction



   The reaction will be most favourable if *M* happens to be:
   a) Na b) K c) Rb d) Li

121. The substance used in Holme's signal of the ship is a mixture of
   a) $CaC_2 + Ca_3P_2$ b) $Ca_3(PO_4)_2 + Pb_3O_4$ c) $H_3PO_4 + CaCl_2$ d) $NH_3 + HOCl$

122. Causticisation process is used for the preparation of:
   a) Caustic soda b) Caustic potash c) Baryta d) Slaked lime

123. Which of the following alkali metal ion in aqueous solution is the best conductor of electricity?
   a) Li^+ b) Na^+ c) Cs^+ d) K^+

124. Indian saltpetre is:
   a) KNO_3 b) $NaNO_3$ c) NaCl d) Na_2CO_3

125. The action of dilute HNO_3 on magnesium gives:
   a) NO b) H_2 c) NO_2 d) NH_4NO_3

126. Brine is chemically:
   a) Conc. Solution of Na_2CO_3
   b) Conc. Solution of Na_2SO_4
   c) Conc. Solution of NaCl
   d) Conc. Solution of alum

127. The atomic numbers of four elements are given below. Which is an alkaline earth metal?
   a) 10 b) 20 c) 30 d) 40

128. The plaster of Paris is:
a) $CaSO_4 \cdot 2H_2O$ b) $CaSO_4$ c) $2CaSO_4 \cdot 2H_2O$ d) $2CaSO_4 \cdot H_2O$

129. The ashes of plants contain alkali metals, 90% of which is:
a) Li b) K c) Na d) Rb

130. At high temperature nitrogen combines with CaC_2 to give:
a) Calcium cyanide b) Calcium cyanamide c) Calcium carbonate d) Calcium nitride

131. Superphosphate of lime is a mixture of:
a) Primary calcium phosphate and Epsom
b) Primary magnesium phosphate and Epsom
c) Primary magnesium phosphate and gypsum
d) Primary calcium phosphate and gypsum

132. A solid is a compound of group 1 element and it gives a bright red colour in the flame test. The solid is
a) LiBr b) CsCl c) KCl d) NaCl

133. When sodium metal is dissolved in liquid ammonia, a blue solution is formed. The blue colour is due to:
a) Solvated Na^+ ions b) Solvated electrons c) Solvated NH_2^- ions d) Solvated protons

134. The chemical which is used for plastering the broken bones is
a) $(CaSO_4)_2 \cdot H_2O$ b) $MgSO_4 \cdot 7H_2O$ c) $FeSO_4 \cdot 7H_2O$ d) $CuSO_4 \cdot 5H_2O$

135. Magnesium burns in CO_2 to form:
a) MgO and CO b) $MgCO_3$ c) MgO and C d) MgO_2

136. Which one is not a correct formula?
a) H_2S b) $NaHSO_4$ c) SiO_2 d) $NaSiO_3$

137. Plaster of Paris on making paste with little water sets to hard mass due to formation of
a) $CaSO_4$ b) $CaSO_4 . 1/2\ H_2O$ c) $CaSO_4 \cdot H_2O$ d) $CaSO_4 \cdot 2H_2O$

138. The most reactive element among the following is:
a) Mg b) Ca c) Sr d) Ba

139. Which removes temporary hardness of water and is used in the manufacture of bleaching powder?
a) Slaked lime $Ca(OH)_2$ b) Plaster of Paris c) Epsom d) hydrolith

140. A piece of magnesium ribbon was heated to redness in an atmosphere of N_2 and then treated with H_2O, the gas evolved is:
a) Ammonia b) Hydrogen c) Nitrogen d) Oxygen

141. Gypsum is:
a) $MgSO_4 \cdot 7H_2O$ b) $CaSO_4 \cdot H_2O$ c) $CaSO_4 \cdot 2H_2O$ d) $CaSO_4 \cdot 3H_2O$

142. Identify the correct statement:
a) Elemental sodium can be prepared and isolated by electrolysing an aqueous solution of sodium chloride
b) Elemental sodium is a strong oxidising agent
c) Elemental sodium is insoluble in ammonia
d) Elemental sodium is easily oxidised

143. Water glass is:
a) Another name for sodium silicate
b) A special form of glass to store water only
c) Hydrated form of glass
d) Hydrated silica

144. $LiAlH_4$ is obtained by reacting an excess of ....with an ethereal solution of $AlCl_3$:
a) LiCl b) LiH c) Li d) LiOH

145. The correct order regarding the solubility of alkaline earth metal chlorides in water is:
a) $BeCl_2 < MgCl_2 < CaCl_2 < SrCl_2 < BaCl_2$
b) $MgCl_2 > CaCl_2 > BeCl_2 > BaCl_2 > SrCl_2$
c) $BaCl_2 > MgCl_2 > CaCl_2 > BeCl_2 > SrCl_2$
d) $BeCl_2 > MgCl_2 > CaCl_2 > SrCl_2 > BaCl_2$

146. The correct order of solubility of fluorides at alkaline earth metals is:

a) $MgF_2 > BaF_2 > SrF_2 > CaF_2 > BeF_2$
b) $BeF_2 > MgF_2 > CaF_2 > SrF_2 > BaF_2$
c) $BaF_2 > SrF_2 > CaF_2 > MgF_2 > BeF_2$
d) None of the above

147. The ease of adsorption of the hydrates alkali metal ions on an ion-exchange resins follows the order:
a) $K^+ < Na^+ < Rb^+ < Li^+$
b) $Na^+ < Li^+ < K^+ < Rb^+$
c) $Li^+ < K^+ < Na^+ < Rb^+$
d) $Rb^+ < K^+ < Na^+ < Li^+$

148. The hydration energy of Mg^{2+} ions is larger than that of:
a) Al^{3+} b) Na^+ c) Be^{2+} d) Mg^{3+}

149. Chile saltpetre is the ore of:
a) Iodine b) Bromine c) Sodium d) Magnesium

150. Thomas slag is
a) $Ca_3(PO_4)_2 . 2H_2O$ b) $Ca_3(PO_4)_2 . CaSiO_3$ c) $MgSiO_3$ d) $CaSiO_3$

151. Sodium carbonate is manufactured by Solvay process. The products those are recycled are:
a) CO_2 and NH_3 b) CO_2 and NH_4Cl c) NaCl and CaO d) $CaCl_2$ and Cao

152. Based on lattice energy and other considerations which one of the following alkali metal chlorides is expected to have the highest melting point?
a) RbCl b) KCl c) NaCl d) LiCl

153. Sodium carbonate on heating gives:
a) Water vapours
b) Carbon dioxide
c) Carbon dioxide + water vapour
d) None of the above

154. The correct order of hydration energy of alkaline earth metal ions is:
a) $Be^{2+} > Mg^{2+} > Ca^{2+} > Sr^{2+} > Ba^{2+}$
b) $Ba^{2+} > Be^{2+} > Ca^{2+} > Mg^{2+} > Sr^{2+}$
c) $Mg^{2+} > Be^{2+} > Ba^{2+} > Ca^{2+} > Sr^{2+}$
d) None of the above

155. Which one has highest lattice energy?
a) NaBr b) NaF c) NaCl d) Nal

156. When CO_2 is bubbled into an aqueous solution of Na_2CO_3, the following is formed:
a) H_2O b) OH^- c) $NaHCO_3$ d) NaOH

157. The decomposition temperature is maximum for
a) $SrCO_3$ b) $CaCO_3$ c) $MgCO_3$ d) $BaCO_3$

158. A metal carbonate is sparingly soluble in water and evolves CO_2 on heating. The metal is:
a) An alkali metal
b) A noble metal
c) An alkaline earth metal
d) None of these

159. Anhydrous mixture of KF and HF contains which type of ions?
a) K^+, H^+, F^- b) $(KF)^+(HF)^-$ c) KH^+, F^- d) $K^+(HF_2)^-$

160. Microcosmic salt is
a) $Na_4P_2O_7$ b) $Na(NH_4)HPO_4$ c) $Na(NH_3)HPO_4 . 4H_2O$ d) $MgNH_4PO_4$

161. Sodium burns in dry air to give:
a) Na_2O b) Na_2O_2 c) NaO_2 d) Na_3N

162. The byproduct of Solvay process is:
a) CO_2 b) $CaCl_2$ c) NH_3 d) $CaCO_3$

163. Select the incorrect statement

a) Be can form complexes due to its very small size
b) Mg cannot form complexes
c) Mg burns in air releasing dazzling light rich in UV rays
d) $CaCl_2.6H_2O$ when mixed with ice gives freezing mixture

164. Acidified solution of sodium thiosulphate is unstable because in thiosulphate:
a) The sulphur atoms are at unstable oxidation state of +2
b) The two sulphur atoms are in different oxidation states of +5 and -1
c) The S—S bond are unstable bonds
d) Thio compounds contain sulphur in zero oxidation state

165. From which mineral Ra is obtained?
a) Limestone b) Rutile c) Pitch blende d) Haematite

166. Metals belonging to the same group in the periodic table are:
a) Magnesium and sodium
b) Magnesium and copper
c) Magnesium and barium
d) Magnesium and potassium

167. In the extraction of sodium by Down's process, cathode and anode are respectively
a) Copper and nickel b) Copper and chromium
c) Nickel and chromium d) Iron and graphite

168. Which of the following statements is false regarding saline hydrides?
a) In the molten state they conduct electricity
b) They dissolve in water giving off hydrogen
c) They are used as reducing agents
d) They are covalent in nature

169. Among the alkali metals caesium is the most reactive because
a) Its incomplete shell is nearest to the nucleus.
b) It has a single electrons in the valence shell.
c) It is the heaviest alkali metal.
d) The outermost electron is more loosely bound than the outermost electron of the other alkali metals.

170. Soda ash is chemically:
a) $Na_2CO_3.H_2O$ b) NaOH c) $NaHCO_3$ d) Na_2CO_3 (anhydrous)

171. Which of the following ions, will have maximum hydration energy?
a) Sr^{2+} b) Ba^{2+} c) Ca^{2+} d) Mg^{2+}

172. Chlorophyll contains:
a) Na b) K c) Mg d) Mn

173. Oxygen can be obtained by heating:
a) Na_2O b) Fe_2O_3 c) Fe_3O_4 d) BaO_2

174. Which of the following pairs of substances would give same gaseous product in reaction with water?
a) Na and Na_2O_2 b) Ca and CaH_2 c) Ca and CaO d) Ba and BaO_2

175. Which of the following is not correct?
a) Iodine oxidises sodium thiosulphate to sodium tetrathionate.
b) Sodium thiosulphate is soluble in water.
c) Ozone is used to identify the presence of unsaturation in alkenes.
d) Sodium thiosulphate reacts with iodine to form sodium sulphate.

176. Which of the following is not an ore of magnesium?
a) Carnallite b) Dolomite c) Calamine d) Sea water

177. The chloride that can be extracted with ether:
a) NaCl b) LiCl c) $BaCl_2$ d) $CaCl_2$

178. Iceland spar is:
a) $CaSiO_4$ b) $CaCO_3$ c) CaF_2 d) $NaAlF_6$

179. Which will react with acid and alkalies both *i. e.*, (amphoteric)
a) MgO b) CaO c) BaO d) BeO

180. Fire extinguishers contain H_2SO_4 and:
a) $NaHCO_3$ and Na_2CO_3 b) $NaHCO_3$ solution c) Na_2CO_3 d) $CaCO_3$

181. The raw materials in Solvay process are:
a) NaOH, CaO and NH_3
b) Na_2CO_3, $CaCO_3$ and NH_3
c) Na_2SO_4, $CaCO_3$ and NH_3
d) NaCl, NH_3, $CaCO_3$

182. One mole of magnesium nitride on the reaction with an excess of water gives
a) One mole of NH_3 b) Two moles of NH_3 c) One mole of HNO_3 d) Two moles of HNO_3

183. Slaked lime is:
a) $CaCO_3$ b) CaO c) $Ca(OH)_2$ d) $Ca(C_2O_4)$

184. Sodium thiosulphate is prepared by
a) Boiling Na_2SO_3 solution with S in alkaline medium
b) Reducing Na_2SO_4 solution with H_2S
c) Boiling Na_2SO_3 solution with S in acidic medium
d) Neutralising $H_2S_2O_3$ solution with NaOH

185. H_2O is dipolar whereas BeF_2 is not. It is because:
a) The electronegativity of F is greater than O
b) H_2O involves H-bonding whereas BeF_2 is discrete molecule
c) H_2O is linear and BeF_2 is angular
d) H_2O is angular and BeF_2 is linear

186. Setting of plaster of Paris involves
a) Oxidation with atmospheric oxygen b) Combination with atmospheric CO_2
c) Dehydration d) Hydration to yield another hydrate

187. The following compounds have been arranged in order of their increasing thermal stabilities. Identify the correct order.
K_2CO_3 (I) $MgCO_3$ (II)
$CaCO_3$ (III) $BeCO_3$(IV)
a) I < II < III < IV b) IV < II < III < I c) IV < II < I < III d) II < IV < III < I

188. The only element which is radioactive among alkali metals is:
a) Cs b) Fr c) Rb d) Li

189. The pair of compounds which cannot exist together in solution is:
a) $NaHCO_3$ and NaOH b) Na_2CO_3 and $NaHCO_3$ c) Na_2CO_3 and NaOH d) $NaHCO_3$ and NaCl

190. Potassium is kept in
a) Alcohol b) Kerosene c) Liquid ammonia d) Water

191. Which one of the alkali metals, forms only, the normal oxide, M_2O on heating in air?
a) Li b) Na c) Rb d) K

192. Common table salt becomes moist and does not pour easily in rainy season because:
a) It contains magnesium chloride
b) It contains magnesium carbonate
c) It melts slightly in rainy season
d) Sodium chloride is hygroscopic

193. The calcium salt used as manure is:
a) CaC_2 b) $CaCN_2$ c) $CaCO_3$ d) $CaSO_4$

194. The product obtained on fusion of $BaSO_4$and Na_2CO_3 is
a) $BaCO_3$ b) BaO c) $Ba(OH)_2$ d) $BaHSO_4$

195. Lithium iodide is:
a) Ionic b) Covalent c) Partially covalent d) None of these

196. Mg burns in CO to produce
a) $MgO + CO$ b) MgO_2 c) $MgO + C$ d) $MgCO_3$

197. A mixture of $Al(OH)_3$ and $Fe(OH)_3$ can be separated easily by treating it with:
a) HCl b) NH_4OH c) HNO_3 d) NaOH

198. Gypsum on heating at 120-230°C gives:
a) Hemihydrate b) Monohydrate c) Dehydrates d) Anhydrous salt

199. Sodium metal cannot be stored under:
a) Benzene b) Kerosene c) Alcohol d) Toluene

200. Which ion has closed shell electronic configuration?
a) Li b) Li^+ c) Li^{2+} d) Li^-

201. Which out of the following compounds is called photographer's fixer?
a) Na_2SO_3 b) $Na_2S_2O_3 .5H_2O$ c) Na_2SO_4 d) Na_2S

202. BeF_2 is soluble in water whereas fluorides of other alkaline earth metals are insoluble because of:
a) Ionic nature of BeF_2
b) Covalent nature of BeF_2
c) Greater hydration energy of Be^{2+} ion as compared to its lattice energy
d) None of the above

203. Sodium thiosulphate, $Na_2S_2O_3 . 5H_2O$ is used in photography to:
a) Reduce the silver bromide grains to metallic silver
b) Convert the metallic silver to silver salt
c) Remove undecomposed AgBr as soluble silver thiosulphate complex
d) Remove reduced silver

204. Hypo is used in:
a) Iodimetric titrations b) Iodometric titrations c) Photography d) All of these

205. Which of the following is an epsom salt?
a) $2CaSO_4 . H_2O$ b) $MgSO_4 . 7H_2O$
c) $MgSO_4 . 2H_2O$ d) $BaSO_4 . 2H_2O$

206. Magnesium form Mg^{2+} and not Mg^+ because:
a) Magnesium (II) carbonate is insoluble in water
b) Generally higher oxidation states are preferred by metals
c) Ionic radius of Mg(II) is smaller than of Mg (I)
d) Hydration energy of divalent magnesium ion is higher

207. Which on mixing with water gives a hissing sound and becomes very hard?
a) Slaked lime
b) Quick lime
c) Limestone
d) Superphosphate of lime

208. Molecular formula of Glauber's salt is
a) $MgSO_4 .7H_2O$ b) $CuSO_4 .5H_2O$ c) $FeSO_4 .7H_2O$ d) $Na_2SO_4 .10H_2O$

209. Dead burnt is:
a) $CaSO_4$ b) Na_2CO_3 c) Anhydrous Na_2SO_4 d) Anhydrous $CuSO_4$

210. Bleaching powder is obtained by interaction of Cl_2 and:
a) dil. $Ca(OH)_2(aq)$ b) dry CaO c) conc. $Ca(OH)_2(aq)$ d) Dry slaked lime

211. Baking soda is:
a) $NaHCO_3$ b) $NaHCO_3 \cdot 6H_2O$ c) Na_2CO_3 d) $Na_2CO_3 \cdot 10H_2O$

212. Which statement is false for alkali metals?
a) Lithium is the strongest reducing agent
b) Sodium is amphoteric in nature
c) Li^+ is exceptionally small
d) All alkali metals give blue solution in liquid ammonia

213. Most abundant salt of sodium in nature is:
a) $NaNO_3$ b) Na_2SO_4 c) NaOH d) NaCl

214. Which alkaline earth metal forms peroxide on burning in air?
a) Be b) Ca c) Sr d) Ba

215. In the manufacture of sodium hydroxide, byproduct obtained is:
a) O_2 b) Cl_2 c) Na_2CO_3 d) NaCl

216. Alkaline earth metal oxide having the co-ordination number four is:
a) BeO b) MgO c) SrO d) CaO

217. What are the products formed when an aqueous solution of magnesium bicarbonate is boiled?
a) MgO, H_2O, CO_2 b) $Mg(HCO_3)_2, H_2O$ c) $Mg(OH)_2, H_2O$ d) Mg, CO_2, H_2O

218. A metal M forms water soluble MSO_4 and inert MO. MO in aqueous solution forms insoluble $M(OH)_2$ soluble in NaOH. Metal M is
a) Be b) Mg c) Ca d) Si

219. Alkali metals are characterised by:
a) Good conductors of heat and electricity
b) High melting points
c) Low oxidation potentials
d) High ionisation potentials

220. Sodium thiosulphate is used in photography
a) As AgBr grain is reduced to non-metallic silver
b) To convert metallic silver into silver salt
c) To remove reduced silver
d) To remove undecomposed AgBr in the form of $Na_3[Ag(S_2O_3)_2]$ (a complex salt)

221. In which of the following, sodium carbonate is not used?
a) In soap making b) In paper making c) In tyre making d) In baking of bread

222. Alkaline earth metals are not found free in nature because of their:
a) Low melting point
b) High boiling point
c) Thermal instability
d) Great chemical activity

223. The principal products obtained on heating iodine with concentrated caustic soda solution are:
a) NaOI + NaI b) $NaIO_3$ + NaI c) NaOI + $NaIO_3$ + NaI d) $NaIO_4$ + NaI

224. NaOCl is used as a bleaching agent and sterilising agent. It can be synthesised by the action of
a) NaCl with H_2O
b) NH_4Cl with NaOH
c) Cl_2 with cold and dilute NaOH
d) Cl_2 with hot and concentrated NaOH

225. The compound insoluble in acetic acid is:
a) Calcium oxide b) Calcium carbonate c) Calcium hydroxide d) Calcium oxalate

226. Sodium carbonate contains:
a) 5 molecules of crystalline water
b) 10 molecules of crystalline water
c) 3 molecules of crystalline water
d) No molecule of crystalline water

227. Sodium carbonate reacts with SO_2 in aqueous solution to give:
a) $NaHCO_3$ b) $NaHSO_3$ c) Na_2SO_3 d) $NaHSO_4$

228. A sudden large jump between the values of second and third ionization energies of an element would be associated with the electronic configuration:
a) $1s^2, 2s^2 2p^6, 3s^1$ b) $1s^2, 2s^2 2p^6, 3s^2 3p^1$ c) $1s^2, 2s^2 2p^6, 3s^2 3p^2$ d) $1s^2, 2s^2 2p^6, 3s^2$

229. Which of the following reacts with water with high rate?
a) Li b) Rb c) Na d) K

230. The substance used as pigment in paint is
a) Borax b) Alumina c) Lithopone d) None of these

231. Acidic solution of $S_2O_3^{2-}$ is converted to ..... in presence of I_2
a) $S_4O_6^{2-} + I^-$ b) $SO_4^{2-} + I^-$ c) $SO_3 + I^-$ d) $S_4O_6^{2-} + I_3^-$

232. Soda lime is
a) NaOH b) NaOH and CaO c) CaO d) Na_2CO_3

233. Lithopone is a mixture of:
a) Barium sulphate and zinc sulphide
b) Barium sulphide and zinc sulphide
c) Calcium sulphate and zinc sulphide
d) Calcium sulphide and zinc sulphide

234. Alkali metal chloride soluble in pyridine is:
a) LiCl b) CsCl c) NaCl d) KCl

235. The characteristic colours given by calcium, strontium and barium in the flame test are respectively
a) Brick red, apple green, crimson
b) Crimson, apple green, brick red
c) Crimson, brick red, apple green
d) Brick red, crimson, apple green

236. Sodium thiosulphate is formed when:
a) NaOH is neutralised by H_2SO_4
b) Na_2S is boiled with S
c) Na_2SO_3 is boiled with Na_2S and I_2
d) Na_2SO_4 is boiled with Na_2S

237. In the following reaction,
$NaOH + S \rightarrow A + Na_2S + H_2O$; A is
a) Na_2SO_4 b) Na_2SO_3 c) Na_2S d) $Na_2S_2O_3$

238. Sodium peroxide which is a yellow solid, when exposed to air becomes white due to the formation of
a) H_2O_2 b) Na_2O c) Na_2O and O_3 d) NaOH and Na_2CO_3

239. Sedimentary rocks laid down under water mainly contain:
a) CaO b) $Ca(OH)_2$ c) $CaCO_3$ d) $CaSO_4$

240. Potash alum is used in purification of water because:
a) It kills the micro-organisms
b) It precipitates the colloidal matter
c) It removes the hardness of water
d) It catalyses the removal of impurities

241. The main constituent of bones is:
a) $CaCO_3$ b) CaF_2 c) $CaSO_4$ d) $Ca_3(PO_4)_2$

242. Mortar is a mixture of:
a) $CaCO_3$ and CaO
b) Slaked lime and water
c) Slaked lime, sand and water
d) None of the above

243. Sodium cannot be extracted by the electrolysis of brine solution because:
a) Sodium liberated reacts with water to produce $NaOH + H_2$
b) Sodium being more electropositive than hydrogen, H_2 is liberated at cathode and not sodium
c) Electrolysis cannot take place with brine solution
d) None of the above

244. The function of sand in mortar is:
a) To decrease the hardness
b) To make the mass compact
c) To decrease the plasticity of the mass
d) To prevent the excess shrinkage because of which cracks may result

245. The most homogeneous family in periodic table is of:
a) Alkali metals b) Alkaline earth metals c) Volatile metals d) Coinage metals

246. Pick out the statement (s) which is (are) not true about the diagonal relationship of Li and Mg.
(i) Polarising powers of Li^+ and Mg^{2+} are almost same.
(ii) L like Li, Mg decomposes water very fast.
(iii) LiCl and $MgCl_2$ are deliquescent.
(iv) Like Li, Mg does not form solid bicarbonates.
a) (i) and (ii) b) (ii) and (iii) c) Only (ii) d) Only (i)

247. Which is most basic in character?
a) NaOH b) KOH c) RbOH d) LiOH

248. On strong heating sodium bicarbonate changes into
a) Sodium monoxide b) Sodium hydroxide c) Sodium carbonate d) Sodium peroxide

249. Fusion mixture is comprised of:
a) $K_2CO_3 + Na_2CO_3$ b) $KHSO_4 + NaHSO_4$ c) $K_2CO_3 + NaHSO_4$ d) $KHSO_4 + Na_2SO_3$

250. Which of the following will liberate hydrogen by its reaction with hydrochloric acid?
a) Copper b) Phosphorus c) Mercury d) Magnesium

251. Baking powder contains
a) $NaHCO_3$, $Ca(H_2PO_2)_2$ and starch b) $NaHCO_3$, $Ca(H_2PO_2)_2$
c) $NaHCO_3$, and starch d) $NaHCO_3$

252. In the hardening stage of plaster of Paris, the compound formed is
a) $CaSO_4$ b) Orthorhombic $CaSO_4 . 2H_2O$
c) $CaSO_4 . H_2O$ d) Monoclinic $CaSO_4 . 2H_2O$

253. Magnesium has polarising power closer to that of:
a) Li b) Na c) K d) Cs

254. Calcium does not combine directly with:
a) O_2 b) N_2 c) H_2 d) Carbon

255. A fire of lithium, sodium and potassium can be extinguished by
a) H_2O b) Nitrogen c) CO_2 d) Asbestose blanket

256. Halides of alkaline earth metals form hydrates such as $MgCl_2 \cdot 6H_2O$, $CaCl_2 \cdot 6H_2O$, $BaCl_2 \cdot 2H_2O$ and $SrCl_2 \cdot 2H_2O$. This shows that halides of group 2 elements:
a) Are hygroscopic in nature
b) Act as dehydrating agent
c) Can absorb moisture from air
d) All of the above

257. The process associated with sodium carbonate manufacture is known as ....process.
a) Chamber b) Haber c) Leblanc d) Castner

258. Thomas slag is
a) $CaSiO_3$ b) $Ca_3(PO_4)_2$ c) $MnSiO_3$ d) $CaCO_3$

259. The formula of Norwegian saltpetre is:
a) $NaNO_3$ b) KNO_3 c) $Ca(NO_3)_2 \cdot CaO$ d) $Ba(NO_3)_2$

260. Calcium is extracted by the electrolysis of:
a) Fused mixture of $CaCl_2$ and CaF_2
b) $CaCl_2$ solution
c) Fused mixture of $CaCl_2$ and NaF
d) $Ca_3(PO_4)_2$ solution

261. If NaOH is added to an aqueous solution of Zn^{2+} ions, a white precipitate appears and on adding excess NaOH, the precipitate dissolves. In this solution zinc exists in the:
a) Cationic part b) Anionic part c) Both in cationic and anionic parts d) There is no zinc left in the solution

262. Out of following which compound is used for preservation of wood?
a) NaCl b) $HgCl_2$ c) $ZnCl_2$ d) $CaCl_2$

263. $Ba(OH)_2$ is used to estimate the amount of:

a) N_2 b) CO_2 c) CO d) N_2O

264. In certain matters, lithium differs from other alkali metals, the main reason for this is:
   a) Small size of lithium atom and Li^+ ion
   b) Extremely high electropositivity of Li
   c) Greater hardness of Li
   d) Hydration of Li^+ ion

265. An ore of potassium is:
   a) Carnallite b) Cryolite c) Bauxite d) Dolomite

266. Order of increasing density is
   a) $Li < K < Na < Rb < Cs$ b) $Li < Na < K < Rb < Cs$
   c) $Cs < Rb < K < Na < Li$ d) $K < Li < Na < Rb < Cs$

267. The highly efficient method of obtaining beryllium is:
   a) Reduction of beryllium halide with Mg
   b) Reduction of beryllium oxide with carbon
   c) Electrolysis of fused beryllium chloride
   d) Dissociation of beryllium carbide

268. In curing cement plasters water is sprinkled from time to time. This helps in
   a) Keeping it cool
   b) Developing interlocking needle-like crystals of hydrated silicates
   c) Hydrating sand and gravel mixed with cement
   d) Converting sand into silicic acid

269. Which decomposes on heating?
   a) NaOH b) KOH c) LiOH d) CaOH

270. The solubility of silver bromide in hypo solution due to the formation of
   a) $[Ag(S_2O_3)_2]^{3-}$ b) Ag_2SO_3 c) $[Ag(S_2O_3)]^-$ d) $Ag_2S_2O_3$

271. Which element of IA group is most abundantly found in combined state?
   a) Li b) Na c) Cs d) K

272. Alkaline earth metal compounds are les soluble in water than corresponding alkali metal compounds because former have:
   a) Lower lattice energy
   b) Higher I.P.
   c) Higher covalent character
   d) Lower covalent character

273. Fluorspar is:
   a) CaF_2 b) CaO c) H_2F_2 d) $CaCO_3$

274. The most soluble compound in water is:
   a) CuS b) MnS c) K_2S d) ZnS

275. Calcium is obtained by
   a) Electrolysis of molten $CaCl_2$ b) Roasting of lime stone
   c) Reduction of $CaCl_2$ with carbon d) Electrolysis of a solution of $CaCl_2$ in water

276. The main reason for using a mercury electrolytic cell in NaOHmanufacture is that:
   a) Hg is toxic
   b) Na^+ is discharged at cathode
   c) Hg has a high vapour pressure
   d) Hg is a good conductor of electricity

277. The ionic mobility of alkali metal ions in aqueous solution is maximum for
   a) K^+ b) Rb^+ c) Li^+ d) Na^+

278. The products of the electrolysis of concentrated aqueous solution of common salt are:
   a) $Na + Cl_2$ b) $H_2 + O_2$ c) $NaOH + H_2 + Cl_2$ d) $NaOH + Cl_2 + O_2$

279. In the Down's cell KCl is added in NaCl to:

a) Lower its m.p.
b) Dissolve more of NaCl
c) Increase conductivity
d) Increase the dissociation

280. $Na_2CO_3 + Fe_2O_3 \longrightarrow A + CO_2$; A is:
a) $NaFeO_2$ b) Na_3FeO_3 c) Fe_3O_4 d) Na_2FeO_2

281. Blanc fixe used in paints is:
a) Finely divided $BaSO_4$
b) Paste of $Ba(OH)_2$
c) Suspension of $Ca(OH)_2$
d) $MgCl_2 \cdot 5MgO \cdot 5H_2O$

282. Calcium cyanide reacts with steam to form ammonia and:
a) CaO b) $Ca(HCO_3)_2$ c) $CaCO_3$ d) $Ca(OH)_2$

283. Which salt on heating does not give brown coloured gas is?
a) $LiNO_3$ b) KNO_3 c) $Pb(NO_3)_2$ d) $AgNO_3$

284. The biggest ion is:
a) Al^{3+} b) Ba^{2+} c) Na^+ d) Mg^{2+}

285. The primary standard solution for estimation of $Na_2S_2O_3$ is
a) I_2 solution b) $KMnO_4$ c) $K_2Cr_2O_7$ d) Oxalic acid

286. Which on heating with NaOH solution gives inflammable gas?
a) S b) Zn c) NH_4Cl d) I_2

287. Hypo is chemically:
a) $Na_2S_2O_3 \cdot 2H_2O$ b) $Na_2S_2O_3 . 3H_2O$ c) $Na_2S_2O_3 . 4H_2O$ d) $Na_2S_2O_3 . 5H_2O$

288. Which alkaline earth metal is the most abundant in the earth's crust?
a) Mg b) Ca c) Sr d) Ba

289. A compound X on heating gives a colourless gas. This residue is dissolved in water to obtain Y. Excess CO_2 is bubbled through aqueous solution of Y when Z is formed. Z on gentle heating gives back X. The X is
a) $CaCO_3$ b) $Ca(HCO_3)_2$ c) Na_2CO_3 d) $NaHCO_3$

290. The formula of the product formed, when sodium thiosulphate solution is added to silver bromide is
a) $Ag_2S_2O_3$ b) Ag_2S c) $Na_3[Ag(S_2O_3)_2]$ d) $Ag_3[Na(S_2O_3)_2]$

291. Concrete is a mixture of:
a) Cement, lime and water
b) Cement, sand and water
c) Cement, sand, gravel and water
d) Cement, slaked lime and water

292. The reaction of water with sodium and potassium is:
a) Reversible
b) Irreversible and endothermic
c) Exothermic
d) Endothermic

293. Which one is the highest melting point halide?
a) NaCl b) NaBr c) NaF d) NaI

294. Beryllium shows diagonal relationship with
a) Mg b) Na c) B d) Al

295. Which metal dissolves in NaOH with the evolution of H_2?
a) Be b) Ca c) Mg d) Sr

296. Which one of the following order of stability is correct?
a) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$ b) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$
c) $MgCO_3 > BaCO_3 > SrCO_3 > CaCO_3$ d) $CaCO_3 > BaCO_3 > MgCO_3 > SrCO_3$

297. Baryta water is:
a) BaO b) $Ca(OH)_2$ c) $Ba(OH)_2$ d) $BaSO_4$

298. Which reagent would enable you to remove SO_4^{2-} ions from solution containing both SO_4^{2-} and Cl^- ions?
a) NaOH b) Pb^{2+} c) $Ba(OH)_2$ d) $BaSO_4$

299. In India, at the occasion of marriages, the fireworks used give green flame. Which one of the following radicals may be present?
a) Na b) K c) Ba d) Ca

300. A substance which gives a brick red flame and breaks down on heating giving oxygen and a brown gas is:
a) Calcium carbonate
b) Magnesium nitrate
c) Magnesium carbonate
d) Calcium nitrate

301. When chlorine is passed through concentrated solution of KOH, the compound formed is:
a) KclO b) $KClO_2$ c) $KClO_3$ d) $KClO_4$

302. Which of the following does not illustrate the anomalous properties of lithium?
a) Li is much softer than the other group first metals
b) The m.p. and b.p. of Li are comparatively high
c) Li forms a nitride Li_3N unlike group first metals
d) The ion of Li and its compounds are more heavily hydrated than those of the rest of the group elements

303. A white solid reacts with dil. HCl to give colourless gas that decolourises aqueous bromine. The solid is most likely to be:
a) Sodium carbonate b) Sodium chloride c) Sodium acetate d) Sodium thiosulphate

304. Out of the following metals that cannot be obtained by electrolysis of the aqueous solution of is salts is
a) Ag b) Cr c) Cu d) Mg

305. The correct increasing covalent character is:
a) $NaCl < LiCl < BeCl_2$ b) $BeCl_2 < NaCl < LiCl$ c) $BeCl_2 < LiCl < NaCl$ d) $LiCl < NaCl < BeCl_2$

306. Portland cement has ....in its composition:
a) Maximum amount of SiO_2
b) Minimum amount of Al_2O_3
c) Minimum amount of Fe_2O_3
d) Maximum amount of CaO

307. The reaction of sodium with water is highly exothermic. The rate of reaction is lowered by:
a) Lowering the temperature
b) Mixing with alcohol
c) Mixing with acetic acid
d) Making an amalgam

308. Which of the following carbonates decomposes at lowest temperature?
a) $MgCO_3$ b) $CaCO_3$ c) $SrCO_3$ d) $BaCO_3$

309. $CaC_2 + N_2 \rightarrow A$, product A is
a) $CaCN_2$ b) $CaCN_2$ and C c) $CaCN_2 + N_2$ d) None of these

310. The metal present in Grignard reagent is:
a) Ca b) Mg c) Zn d) Fe

311. The characteristic not related to alkali metal is
a) High ionisation energy
b) Their ions are isoelectronic with noble gases
c) Low melting point
d) Low electronegativity

312. A colourless salt gives violet colour to Bunsen flame and also turns moisture litmus paper blue. It is:
a) Na_2CO_3 b) KNO_3 c) K_2CO_3 d) $Cu(OH)_2$

313. Which possesses highest lattice energy?
a) NaCl b) LiF c) Csl d) KF

314. Which of the following has the largest size in aqueous solution?

a) Rb^+ b) Na^+ c) K^+ d) Li^+

315. On prolonged exposure to air, sodium finally changes to:
a) Na_2CO_3 b) Na_2O c) NaOH d) $NaHCO_3$

316. The compound which is insoluble in hot water and NH_3 is:
a) $PbCl_2$ b) AgCl c) $BaSO_4$ d) None of these

317. Which of the following statements are correct for alkali metal compounds?
(i) Superoxides are paramagnetic in nature.
(ii) The basic strength of hydroxides increases down the group.
(iii) The conductivity of chlorides in their aqueous solutions decreases down the group.
(iv) The basic nature of carbonates in aqueous solutions is due to cationic hydrolysis.
a) (i), (ii), and (iii) only
b) (i), and (ii), only
c) (ii), (iii) and (iv) only
d) (iii) and (iv) only

318. Flash bulbs contain wire or foil of Mg packed in an atmosphere of:
a) SO_3 b) O_2 c) Air d) N_2

319. The main product obtained when a solution of sodium carbonate reacts with mercuric chloride is
a) $Hg(OH)_2$ b) $HgCO_3 . HgO$ c) $HgCO_3$ d) $HgCO_3 . Hg(OH)_2$

320. Milk of magnesia is:
a) $Mg(OH)_2$ b) $Ca(OH)_2$ c) $Ba(OH)_2$ d) None of these

321. What would you observe if excess of dilute NaOH solution is added and shaken with an aqueous solution of aluminium chloride?
a) A permanent white precipitate is formed immediately
b) No change at first but a white precipitate is formed on standing
c) A white precipitate is formed which later dissolves
d) A green precipitate which turns red on standing in air

322. Which property of $Na_2S_2O_3$ makes it useful in photography?
a) Photochemical property b) Complex formation property
c) Oxidising agent d) Reducing agent

323. Ca on exposure in moist air forms a layer on surface of:
a) $CaCO_3$ b) $Ca(OH)_2$ c) $CaCO_3 \cdot Ca(OH)_2$ d) CaO

324. Which of the following is different from the other three?
a) MgO b) SnO c) ZnO d) Cr_2O_3

325. Salt used as a purgative is:
a) NaCl b) $MgSO_4 \cdot 7H_2O$ c) $Ca_3Al_2O_6$ d) $MgCl_2 \cdot 6H_2O$

326. Tin dissolves in boiling caustic soda solution because of the formation of soluble:
a) $Sn(OH)_2$ b) $Sn(OH)_4$ c) Na_2SnO_3 d) None of these

327. Alkali metals contain:
a) 7 valence electrons b) 1 valence electron c) 4 valence electrons d) 2 valence electrons

328. The wire of flash bulbs are made up of:
a) Mg b) Ba c) Cu d) Ag

329. Addition of excess of sodium hydroxide solution to a solution of nickel sulphate results in the formation of a:
a) Green precipitate b) Pink colouration c) Blue precipitate d) Violet colouration

330. Several blocks of Mg are fixed to the bottom of a ship to:
a) Prevent action of water and salt
b) Prevent puncturing by under sea rocks
c) Keep away the sharks
d) Make the ship lighter

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

a) $KClO_3$ b) $KMnO_4$ c) Al_2O_3 d) MnO_2

332. Sodium sulphate is soluble in water whereas barium sulphate is sparingly soluble because:
a) The hydration energy of sodium sulphate is more than its lattice energy
b) The lattice energy has no role to play in solubility
c) The hydration energy of sodium sulphate is less than its lattice energy
d) None of the above

333. NaCl crystals possesses:
a) Simple cubic lattice
b) Face centred cubic lattice
c) Body centred cubic lattice
d) Octahedral lattice

334. The carbonate that will not decompose on heating is
a) Na_2CO_3 b) $CaCO_3$ c) $BaCO_3$ d) $SrCO_3$

335. The Ca^{2+} ion has the same number of electrons as:
a) Mg^{2+} b) C_2H_6 c) Cu^{2+} d) Ne

336. When washing soda is heated
a) CO_2 is released
b) $CO + CO_2$ is released
c) CO is released
d) Water vapour is released

337. Which one of the following substances is used in the laboratory for a fast drying of neutral gases?
a) Phosphorus pentoxide
b) Active charcoal
c) Anhydrous calcium chloride
d) Na_3PO_4

338. The active constituent of bleaching powder is:
a) $Ca(OCl)_2$ b) $Ca(OCl)Cl$ c) $Ca(ClO_2)_2$ d) $Ca(ClO_2)Cl$

339. Sodium metabisulphite is not:
a) An antichlor b) A bleaching agent c) An oxidizing agent d) A reducing agent

340. Which of the following substances is used in the laboratory for fast drying of neutral gases?
a) Sodium sulphate
b) Phosphorus pentoxide
c) Sodium phosphate
d) Anhydrous calcium chloride

341. Sodium thiosulphate is a
a) Reducing agent b) Oxidising agent c) Complexing agent d) Bleaching agent

342. Alkaline earth metal salts are:
a) Paramagnetic b) Diamagnetic c) Ferromagnetic d) All of these

343. Molten NaCl conducts electricity due to the presence of:
a) Free molecules b) Free electrons c) Free ions d) Atoms

344. The oxide of which metal is most stable to heat?
a) K b) Ag c) Hg d) All of these

345. A solution of sodium thiosulphate on addition of few drops of ferric chloride gives violet colour due to the formation of
a) $Na_2S_4O_6$ b) $Fe_2(SO_4)_3$ c) $Fe_2(S_2O_3)_3$ d) $Fe_2(S_2O_3)_2$

346. Excess of Na^+ ions in human system causes:
a) Diabetes b) Anaemia c) Low blood pressure d) High blood pressure

347. Which has lowest thermal stability?
a) Li_2CO_3 b) Na_2CO_3 c) K_2CO_3 d) Rb_2CO_3

348. When NaCl is dissolved in water, the sodium ions become:
a) Oxidized b) Reduced c) Hydrolysed d) Hydrated

349. The difference of water molecules in gypsum and plaster of Paris is
a) $\frac{5}{2}$ b) 2 c) $\frac{1}{2}$ d) $1\frac{1}{2}$

350. A radioactive element X decays giving two inert gases is:
a) $^{238}_{92}U$ b) $^{226}_{88}Ra$ c) $^{239}_{90}Th$ d) $^{227}_{93}Np$

351. The chloride ion is isoelectronic with potassium. The size of chloride ion is:
a) Larger than K^+ion
b) Smaller than K^+ ion
c) Same as that of K^+ ion
d) None of these

352. Which of the alkali metal chloride is expected to have highest m.p.?
a) LiCl b) NaCl c) KCl d) RbCl

353. On heating sodium metal in a current of dry ammonia gas the compound formed is:
a) Sodium nitrate b) Sodium hydride c) Sodium amide d) Sodium azide

354. Most powerful reducing agent is
a) Li b) Na c) Ca d) Mg

355. The ionic conductance is least for
a) Cs^+ b) Rb^+ c) K^+ d) Na^+

356. When carbon monoxide is passed over solid caustic soda heated to 200°C, it forms:
a) Na_2CO_3 b) $NaHCO_3$ c) HCOONa d) None of these

357. $MgBr_2$ and MgI_2 are soluble in acetone because of:
a) Their ionic nature
b) Their covalent nature
c) Their coordinate nature
d) None is correct

358. Beryl is:
a) $BaSO_4$ b) $BaCl_2 \cdot 2H_2O$ c) BeO d) $BaCO_3$

359. The property of the alkaline earth metals that increases with their atomic number is
a) Solubility of their sulphates b) Ionisation energy
c) Solubility of their hydroxides d) Electronegativity

360. Sodium chloride is known as:
a) Rock salt b) Common salt c) Table salt d) All of these

361. Bleaching powder is a compound having the molecular formula
a) CaClO b) $CaOCl_3$ c) $CaOCl_2$ d) $CaClO_3$

362. An aqueous solution of salt of sodium (NaX) on boiling with $MgCl_2$ gives white precipitate, hence anion X is:
a) HCO_3^- b) NO_3^- c) CO_3^{2-} d) SO_4^{2-}

363. Which of the following is not known?
a) K_2O b) K_2O_2 c) KO_4 d) KO_3

364. The first ionization energies of alkaline earth metals are higher than those of the alkali metals. This is because:
a) There is increase in the nuclear charge of the alkaline earth metals
b) There is decrease in the nuclear charge of the alkaline earth metals
c) There is no change in the nuclear charge
d) None of the above

365. NaOH is prepared by the method:
a) Down's cell b) Castner cell c) Solvay process d) Castner - kellner cell

366. Commonly used laboratory desiccant is:
a) Calcium chloride b) Sodium carbonate c) Sodium chloride d) Potassium nitrate

367. An aqueous solution of KI does not give a precipitate with:
a) Mg^{2+} b) Pb^{2+} c) Hg^{2+} d) Cu^{2+}

368. Both Be and Al become passive on reaction with conc. Nitric acid due to:
a) The non-reactive nature of the metal
b) The non-reactive nature of the acid
c) The formation of an inert layer of oxide on the surface of the metals

d) None of the above

369. Which of the following metals is extracted by the electrometallurgical method?
a) Fe b) Cu c) Ni d) Na

370. When K_2O is added to water, the solution is basic because it contains a significant concentration of:
a) O_2^{2-} b) O^{3-} c) OH^- d) K^+

371. The metal, that is extracted from sea water is:
a) Cl b) Ca c) Mg d) Br

372. 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. M and B can be
a) Al and NH_3 b) Li and NH_3 c) Na and NH_3 d) Mg and NH_3

373. The salts of which alkaline earth metal are used in the form of manure?
a) Mg b) Ca c) Ba d) Sr

374. Mixture of $MgCl_2$ and MgO is called
a) Portland cement b) Sorel's cement c) Double salt d) None of these

375. Which has maximum electropositive character?
a) Mg b) Al c) P d) S

376. Which one of the following reactions occur at the anode, in the Castner process of extracting sodium metal?
a) $H_2 \rightarrow 2H^+ + 2e^-$ b) $2Cl^- \rightarrow Cl_2 + 2e^-$
c) $4OH^- \rightarrow 2H_2O + O_2 + 4e^-$ d) $Na^+ + e^- \rightarrow Na$

377. Calcium is obtained by
a) Electrolysis of molten $CaCl_2$ b) Electrolysis of solution of $CaCl_2$ in water
c) Reduction of $CaCl_2$ with carbon d) Roasting of lime stone

378. Mg keeps on burning in:
a) N_2 b) CO_2 c) O_2 d) All of these

379. Baking soda or baking powder is:
a) Washing soda b) Caustic soda c) Soda ash d) Sodium bicarbonate

380. The most basic oxide among the following is:
a) Na_2O b) BaO c) As_2O_3 d) Al_2O_3

381. Bleaching powder is obtained by treating chlorine with
a) $CaCO_3$ b) $Ca(OH)_2$ c) CaO d) None of these

382. Siedlitz powder contains:
a) $CaCO_3$ b) $MgCO_3$ c) $NaHCO_3$ d) KNO_3

383. Sodium bicarbonate is manufactured by:
a) Cyanide process b) Thermite process c) Contact process d) Solvay process

384. Sodium reacts with water more vigorously than lithium because it:
a) Has higher atomic weight
b) Is more electronegative
c) Is more electropositive
d) Is a metal

385. Which one of the following on hydrolysis, gives the corresponding metallic hydroxide, H_2O_2 and O_2?
a) Li_2O b) Na_2O_2 c) NaO_2 d) Na_2O

386. The alkali metals:
a) Form salt like hydrides
b) Form salts which are predominantly covalent
c) Show decreased chemical reactivity with dry oxygen in going from Li to Cs
d) Show increasing electronegativity from Li to Cs

387. Alkali metals are soft and have relatively low m.p. and low density. This is because:
a) Interatomic bonds are weak

b) Interatomic bonds are strong
c) Of their ionization potential
d) Of their position in the periodic table

388. The starting material used in Solvay's process are
a) Sodium sulphate b) Brine solution c) Carnallite d) All of these

389. In Down's method for the extraction of sodium, the melting point of the electrolyte is lowered by adding
a) Potassium chloride
b) Calcium chloride
c) Both calcium chloride and potassium fluoride
d) Potassium fluoride only

390. In the alkaline earth metals, the element forming predominantly covalent compound is
a) Ca b) Sr c) Mg d) Be

391. Which is used to remove N_2 from air?
a) Mg b) P c) H_2SO_4 d) $CaCl_2$

392. Elements of IIA group having electronic configuration ns^2 are called alkaline earth elements because:
a) They only occur in earth
b) Their salts form only alkaline solution
c) They are form divalent cations only
d) Their oxides are non-fusible like earth matter

393. 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

394. Lithium is the only alkali metal which is not placed in kerosene but is wrapped in paraffin wax, because:
a) It reacts with kerosene
b) It floats to the surface of kerosene because of low density
c) It does not react with air and H_2O
d) None of the above

395. In which of the following processes, fused sodium hydroxide is electrolysed at 330°C temperature for extraction of sodium?
a) Castner's process b) Cyanide process c) Down's process d) Both (b) and (c)

396. When sulphur is heated with NaOH(aq) the compounds formed are:
a) $Na_2S + H_2O$
b) $Na_2SO_3 + H_2O$
c) $Na_2S + Na_2S_2O_3 + H_2O$
d) $Na_2S_2O_3 + H_2O$

397. Colemnite is
a) $Ca[B_2O_4(OH)_2].2H_2O$
b) $Ca_2B_6O_{11}.5H_2O$
c) $Ca(OH)_2$
d) $Na_2B_4O_7.2H_2O$

398. Ionic hydrides:
a) Conduct electricity in fused state
b) Are formed with elements of high ionization energy
c) Do not exist
d) Occupy the vacant spaces in metallic lattice

399. The chemical formula of plaster of Paris is
a) $CaSO_4 . \frac{1}{2} H_2O$ b) $CaSO_4 . H_2O$ c) $CaSO_4 . 2H_2O$ d) $CaSO_4 . 3H_2O$

400. Alloys of which metal are light and strong and are used in the manufacture of aeroplane parts?
a) Cr b) Sn c) Fe d) Mg

401. When magnesium is burnt in air, compounds of magnesium formed are magnesium oxide and:
a) $MgCO_3$ b) $Mg(NO_2)_2$ c) $Mg(NO_3)_2$ d) Mg_3N_2

402. The decreasing order of second ionization energy of K, Ca and Ba is:
a) Ca > Ba > K b) Ba > K > Ca c) K > Ca > Ba d) K > Ba > Ca

403. Setting of plaster of Paris is
a) Dehydration
b) Oxidation with atmospheric oxygen
c) Combination with atmospheric CO_2
d) Hydration to yield another hydrate

404. Which of the following metals has stable carbonates?
a) Al
b) Si
c) Mg
d) Na

405. Beryllium hydride is obtained by:
a) Heating Be in atmosphere of H_2
b) The action of $BeCl_2$ with $LiAlH_4$
c) The action of Be with CaH_2
d) None of the above

406. When hydrated $MgCl_2.6H_2O$ is strongly heated:
a) MgO is formed
b) $Mg(OH)_2$ is formed
c) Mg(OH)Cl is formed
d) Anhydrous $MgCl_2$ is formed

407. The weakest base among the following is:
a) NaOH
b) $Ca(OH)_2$
c) KOH
d) $Ba(OH)_2$

408. The element which does not dissolve in caustic soda is:
a) Silicon
b) Aluminium
c) Zinc
d) Cadmium

409. Magnesium can displace:
a) Cs
b) Cu
c) Rb
d) K

410. The colour of iodine solution is discharged by shaking it with aqueous solution of:
a) H_2SO_4
b) Sodium sulphide
c) Sodium sulphate
d) Sodium thiosulphate

411. Mg burns with a brilliant flame. This property is used in:
a) Fireworks
b) Military signals
c) Photographic flash bulbs
d) All of the above

412. The products obtained on heating $LiNO_3$ will be
a) $LiNO_2 + O_2$
b) $Li_2O + NO_2 + O_2$
c) $Li_3N + O_2$
d) $Li_2O + OH + O_2$

413. Bleaching action of bleaching powder is due to the liberation of
a) O_2
b) OCl^-
c) Cl_2
d) Cl^-

414. Barium burns in air to form
a) Ba_2O_2
b) BaO_2
c) $Ba(OH)_2$
d) BaO

415. The lightest metal among these is
a) Li
b) Mg
c) Ca
d) Na

416. A gas reacts with CaO and not with $NaHCO_3$ is:
a) CO_2
b) Cl_2
c) O_2
d) N_2

417. Which of the following hydroxides is insoluble in water?
a) $Ba(OH)_2$
b) $Ca(OH)_2$
c) $Be(OH)_2$
d) $Mg(OH)_2$

418. Complex forming tendency is more for
a) Na^+
b) K^+
c) Li^+
d) Rb^+

419. NO_2 is obtained by heating:
a) $CsNO_3$
b) KNO_3
c) $LiNO_3$
d) $NaNO_3$

420. Alkali metals act as
a) Good dehydrating agent
b) Good reducing agent
c) Good oxidising agent
d) None of these

421. The mineral of magnesium is:
a) Bauxite
b) Malachite
c) Carnallite
d) Haematite

422. Mortar is a mixture of

a) Cement, sand and water
b) $MgCl_2$, tar and lime
c) Lime, Portland cement and water
d) None of the above

423. In between the metals *A* and *B*, both form oxide but *B* also forms nitride, when both burn in air. So *A* and *B* are:
a) Cs, K
b) Mg, Ca
c) Li, Na
d) K, Mg

424. Calcium hydride on hydrolysis gives:
a) $CaO + H_2$
b) $Ca(OH)_2$ only
c) $Ca(OH)_2 + H_2$
d) CaO only

425. $Be(OH)_2$ is insoluble in water, while $Ba(OH)_2$ is highly soluble due to
a) Lattice energy difference
b) Common ion effect
c) Bond order
d) Hard acid

426. The number and types of bonds between two carbon atoms in CaC_2 are:
a) One sigma, one pi
b) One sigma, two pi
c) Two sigma, one pi
d) Two sigma, two pi

427. Which of the following alkaline earth metal sulphate has hydration enthalpy by higher than its lattice enthalpy:
a) $CaSO_4$
b) $BeSO_4$
c) $BaSO_4$
d) $SrSO_4$

428. NaOH is not used in:
a) Soap
b) Synthetic petrol
c) Paper
d) Synthetic fibre

429. Cement does not contain
a) Calcium
b) Aluminium
c) Sulphur
d) Iron

430. A solution of KOH in water is called:
a) Potash lye
b) Soda lye
c) Salt cake
d) None of these

431. Sodium has.....as compared to potassium:
a) Less electronegativity
b) More ionization enthalpy
c) Large atomic radius
d) Lower melting point

432. Sodium peroxide in contact with moist air turns white due to the formation of:
a) Na_2O
b) Na_2CO_3
c) $NaHCO_3$
d) NaOH

433. When $SiCl_4$ vapours are passed over hot Mg, the products formed are:
a) $SiCl_2 + MgCl_2$
b) $Mg_2Si + Cl_2$
c) $Si + MgCl_2$
d) $MgSiCl_6$

434. Which alkaline earth metal nitride is volatile?
a) Be_3N_2
b) Mg_3N_2
c) Ca_3N_2
d) None of these

435. Which alkali metal bicarbonates does not exist as solid?
a) $LiHCO_3$
b) $KHCO_3$
c) $CsHCO_3$
d) $NaHCO_3$

436. Na_2SO_3 and $NaHCO_3$ may be distinguished by treating their aqueous solution with:
a) Litmus solution
b) Dil. Acid
c) MgO
d) $MgSO_4$

437. The cation which forms a yellow precipitate with potassium chromate in acetic acid is:
a) NH_4^+
b) Ba^{2+}
c) Ca^{2+}
d) Na^+

438. The alkali metal which acts as a nutrient for plants is:
a) Na
b) K
c) Li
d) Rb

439. Glauber's salt is
a) $Na_2CO_3 .10H_2O$
b) $Na_2SO_4 .10H_2O$
c) $MgSO_4 .7H_2O$
d) $CaSO_4 .5H_2O$

440. Excess of dilute sodium hydroxide solution is gradually added with shaking to an aqueous solution of zinc sulphate. What would you observe?
a) A light blue precipitate is first formed which finally dissolves to give a deep blue solution
b) A white precipitate appears which dissolves to give a colourless solution
c) A white precipitate is formed which does not dissolve
d) No change takes place and the solution remains clear

441. Which of the following metals is most reactive towards water?
a) Na
b) K
c) Rb
d) Cs

442. Some large white transparent crystals are left out in a bowl for several days. They are then observed to have changed their form into white powder. The crystals may have been of:
a) Ammonium chloride b) Sodium chloride c) Sodium carbonate d) Calcium oxide

443. Which of the following is not soluble in NaOH?
a) $Fe(OH)_3$ b) $Zn(OH)_2$ c) $Al(OH)_3$ d) $Sn(OH)_2$

444. Which of the following metal carbonates is decomposed on heating?
a) Na_2CO_3 b) $MgCO_3$ c) K_2CO_3 d) Rb_2CO_3

445. The dark red colour of bombs in fireworks is due to the presence of
a) Na b) Sr c) Ba d) K

446. Which metal does not form ionic hydride?
a) Na b) Rb c) Ca d) Be

447. Which compound is used in photography?
a) Na_2SO_5 b) $Na_2S_2O_8$ c) $Na_2S_2O_6$ d) $Na_2S_2O_3$

448. The weakest base among NaOH, $Ca(OH)_2$, KOH and $Be(OH)_2$ is:
a) NaOH b) $Ca(OH)_2$ c) KOH d) $Be(OH)_2$

449. Which chloride is covalent and soluble in ether?
a) $BeCl_2$ b) $CaCl_2$ c) $CrCl_3$ d) $BaCl_2$

450. Slaked lime [$Ca(OH)_2$] is used in the manufacture of
a) Fire bricks b) Cement c) Medicine d) Pigment

451. Which one of the following is the highest melting halide?
a) NaCl b) NaI c) NaBr d) NaF

452. The chemical formula of feldspar is
a) $KAlSi_3O_8$ b) Na_3AlF_6
c) $NaAlO_2$ d) $K_2SO_4 . Al_2(SO_4)_3 . 4Al(OH)_3$

453. Which of the following properties of lithium does not show diagonal relationship with magnesium?
a) Formation of Li^+ ion b) Formation of Li_3N
c) Solubility of $LiHCO_3$ d) Thermal decomposition of Li_2CO_3

454. Lithium is strongest reducing agent among alkali metals due to which of the following factor?
a) Ionization energy b) Electron affinity c) Hydration energy d) Lattice energy

455. Li, Na among alkali metals show properties of:
a) Noble gases
b) Transition metal
c) Inner transition metals
d) Representative elements

456. Caesium oxide will be:
a) Very strongly basic b) Acidic c) Weakly basic d) Amphoteric

457. When ammoniacal solution of common salt is saturated with carbon dioxide, we get:
a) NH_4HCO_3 b) $(NH_4)_2CO_3$ c) $NaHCO_3$ d) $MgCO_3$

458. Microcosmic salt has the formula:
a) $Na_2HPO_4 \cdot 2H_2O$
b) $(NH_4)_2HPO_4 \cdot 2H_2O$
c) $Na(NH_4)HPO_4 \cdot 4H_2O$
d) None of these

459. 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?
a) KH > NaH > LiH > CsH > RbH
b) NaH > LiH > KH > RbH > CsH
c) LiH > NaH > KH > RbH > CsH
d) CsH > RbH > KH > NaH > LiH

460. Which of the following has minimum values of cation-anion size ratio?

a) NaCl b) KCl c) $MgCl_2$ d) CaF_2

461. Chemical *A* is used for water softening to remove temporary hardness. *A* reacts with sodium carbonate to generate caustic soda. When CO_2 is bubbled through *A*, it turns cloudy. What is *A*?
a) $CaCO_3$ b) CaO c) $Ca(OH)_2$ d) $Ca(HCO_3)_2$

462. Fusion of AgCl with Na_2CO_3 gives:
a) Ag_2CO_3 b) Silver carbide c) Ag d) Ag_2

463. Which alkaline earth metal forms complex salts?
a) Be b) Mg c) Ca d) Ba

464. Which electronic configuration represents the configuration of the most electropositive element?
a) $[He]2s^1$ b) $[Xe]6s^1$ c) $[He]2s^2$ d) $[Xe]6s^2$

465. Le-blanc process is employed in the manufacture of
a) Baking soda b) Washing soda c) Potash d) Plaster of Paris

466. Disodium hydrogen phosphate in presence of NH_4Cl and NH_4OH gives a white ppt. with a solution of Mg^{2+} ion. The precipitate is:
a) $Mg(H_2PO_4)_2$ b) $Mg_3(PO_4)_2$ c) $MgNH_4PO_4$ d) $MgHPO_4$

467. Solubility of alkaline earth metal hydroxides increases from $Be(OH)_2$ to $Ba(OH)_2$ because:
a) Hydration energy > lattice energy
b) Lattice energy > hydration energy
c) Hydration energy is equal to lattice energy
d) None of the above

468. When a crystal of caustic soda is exposed to air, a liquid layer is deposited because:
a) Crystal melts
b) Crystal loses water
c) Crystal absorbs moisture and CO_2
d) Crystal sublimes

469. The most soluble halide in water is:
a) CaF_2 b) $CaCl_2$ c) $CaBr_2$ d) CaI_2

470. Which does not form double salt?
a) Li_2SO_4 b) Na_2SO_4 c) K_2SO_4 d) Rb_2SO_4

471. The metallic lustre exhibited by sodium is due to:
a) Diffusion of Na^+ ions
b) Oscillation of loose electrons
c) Excitation of free protons
d) Existence of body centred cubic lattice

472. The activity of alkaline earth metals as reducing agents
a) Decreases from Be to Ba
b) Increases from Be to Ba
c) Increases from Be to Ca and decreases from Ca to Ba
d) Decreases from Be to Ca and increases from Ca to Ba

473. The reaction of sodium thiosulphate with I_2 gives:
a) Sodium sulphide b) Sodium sulphite c) Sodium sulphate d) Sodium tetrathionate

474. The main constituent of egg-shells is:
a) $CaCO_3$ b) $CaSiO_3$ c) $CaSO_4 \cdot \frac{1}{2}H_2O$ d) $CaSO_4 \cdot 2H_2O$

475. Which of the following is weakest base?
a) $Zn(OH)_2$ b) NaOH c) $Ca(OH)_2$ d) KOH

476. Nitrates of I group (except $LiNO_3$) on heating give:
a) O_2 b) N_2 c) NO d) NO_2

477. Which alkali metal emits largest wavelength in the flame test?
a) Na b) Li c) K d) Cs

478. The solubilities of carbonates decrease down the magnesium group due to decrease in
a) Lattice energies of solids
b) Hydration energies of cations
c) Interionic attraction
d) Entropy of solution formation

479. The bleaching action of bleaching powder is due to the formation of:
a) $CaCl_2$ b) $CaSO_4$ c) $HClO$ d) $Ca(ClO_3)_2$

480. Which is industrially prepared by the electrolysis of aqueous NaCl?
a) Na_2CO_3 b) $NaHCO_3$ c) NaOH d) NaOCl

481. Which alkaline earth metal shows some anomalous behaviour and has the same electronegativity as aluminium?
a) Ba b) Sr c) Ca d) Be

482. Oxone is name given to:
a) Ozone b) Sodium peroxide c) Sodium oxide d) Sodamide

483. Barium is extracted from its ore:
a) Dolomite b) Witherite c) Carnallite d) Gypsum

484. A chloride dissolves appreciably in cold water. When placed on a platinum wire in Bunsen flame, no distinctive colour is noticed. Which one is cation?
a) Mg^{2+} b) Ba^{2+} c) Pb^{2+} d) Ca^{2+}

485. Which of the following sulphates has the highest solubility?
a) $BeSO_4$ b) $MgSO_4$ c) $BaSO_4$ d) $CaSO_4$

486. The chemistry of lithium is very much similar to that of magnesium even though they are placed in different groups. The reason is:
a) Both have nearly the same size
b) The ratio of their charge to size is nearly the same
c) Both have similar electronic configuration
d) Both are found together in nature

487. Solvay process is used for the manufacture of
a) NaOH b) Na_2CO_3 c) NH_3 d) NaCl

488. Consider the following abbreviations for hydrated alkali ions.
$X = [Li(H_2O)_n]^+$
$Y = [K(H_2O)_n]^+$
$Z = [Cs(H_2O)_n]^+$
What is the correct order of size of these hydrated alkali ions?
a) $X > Y > Z$ b) $Z > Y > X$ c) $X = Y = Z$ d) $Z > X > Y$

489. Which hydride is most stable?
a) CsH b) NaH c) KH d) LiH

490. Least abundant metal in IIA group is:
a) Sr b) Ca c) Ra d) Be

491. Ra is placed at the bottom of alkaline earth metals. The element should:
a) Have the highest atomic volume
b) Possess the minimum density
c) Be less easily ionizable
d) Be least electropositive

492. Who discovered radium?
a) Bohr b) Fermi c) Curie d) Rutherford

493. Which gives least basic oxide?
a) Mg b) Ba c) Be d) Ra

494. The decomposition temperature is maximum for
a) $MgCO_3$ b) $CaCO_3$ c) $BaCO_3$ d) $SrCO_3$

495. Which liberates SO_2 with dilute H_2SO_4?
a) Na_2SO_4 b) $NaHSO_4$ c) Na_2SO_3 d) Na_2S

496. Gun powder is:
a) KNO_3 + Charcoal + S b) $NaNO_3 + KNO_3 + S$ c) $NaNO_3 + S$ d) None of these

497. Sorrel's cement is
a) Portland cement + MgO b) $MgCl_2.CaSiO_3.2H_2O$
c) $MgCl_2.5MgO.xH_2O$ d) $CaSiO_3.MgCO_3$

498. Zinc carbonate can be obtained from a solution of zinc chloride by adding:
a) $NaHCO_3$ b) Na_2CO_3 c) $CaCO_3$ d) $MgCO_3$

499. Calcium phosphide is:
a) Ca_3F_2 b) Ca_2P_3 c) CaP_2 d) Ca_3P

500. Which alkali metal reacts with nitrogen to form nitride?
a) Li b) Na c) Cs d) None of these

501. The metal ion, that plays an important role in muscle contraction, is
a) Be^{2+} b) Mg^{2+} c) Ca^{2+} d) Ba^{2+}

502. Which of the following on thermal decomposition yields a basic as well as an acidic oxide?
a) $KClO_3$ b) $CaCO_3$ c) NH_4NO_3 d) $NaNO_3$

503. Sorel's cement is
a) Portland cement + MgO b) $MgCl_2 . CaSiO_3 . 2H_2O$
c) $CaSiO_3 . MgCO_3$ d) $MgCl_2 . 5MgO . xH_2O$

504. When KI is added to acidified solution of sodium nitrite then
a) NO gas is liberated and I_2 is set free b) N_2 gas is liberated and HI is produced
c) N_2O gas is liberated and I_2 is set free d) N_2 gas is liberated and HOI is produced

505. Baryta is:
a) BaO b) $BaSO_4$ c) $BaCO_3$ d) $Ba(OH)_2$

506. Which pair cannot exist together in solution?
a) $NaHCO_3$ and NaOH b) $NaHCO_3$ and NaCl c) $NaHCO_3$ and Na_2CO_3 d) NaCl and Na_2CO_3

507. $CaCl_2$ is used as
a) Disinfectant b) Desiccating agent c) Medicine d) None of these

508. When carbon monoxide is passed over solid caustic soda heated to 200°C, it forms
a) Na_2CO_3 b) $NaHCO_3$ c) HCOONa d) CH_3COONa

509. When HCl gas is passed through saturated solution of $BaCl_2$ a white ppt. is obtained. This is due to:
a) Impurities in $BaCl_2$
b) Impurities in HCl
c) Precipitation of $BaCl_2$
d) Formation of complex

510. NaOH is prepared by the electrolysis of:
a) Aqueous solution of sodium chloride with platinum electrode
b) Molten sodium chloride with graphite anode and iron cathode
c) Sodium carbonate with platinum electrodes
d) Sodium carbonate with nickel electrodes

511. Oxygen is obtained from bleaching powder by:
a) The action of dilute acid
b) The action of alkali
c) Heating it with lime
d) Heating it with cobalt salt

512. Aqueous solution of $Na_2S_2O_3$ on reaction with Cl_2 gives
a) $Na_2S_4O_6$ b) $NaHSO_4$ c) NaCl d) NaOH

513. Washing soda is:
a) Na_2CO_3 b) $Na_2CO_3 \cdot H_2O$ c) $Na_2CO_3 \cdot 7H_2O$ d) $Na_2CO_3 \cdot 10H_2O$

514. Element found in plant systems which forms an important constituent of photosynthesis is:
a) Fe b) Cu c) Na d) Mg

515. Chlorine reacts with 'X' to form bleaching powder. 'X' is
a) Dry slaked lime b) Sodium hydroxide c) Acetone d) Chloral

516. Hesenclever's process is a method for the manufacture of:
a) NaOH b) HNO_3 c) H_2SO_4 d) Bleaching powder

517. The most dangerous method of preparing hydrogen would be by the action of HCl on:
a) Zn b) Fe c) K d) Al

518. Which ion forms a hydroxide highly soluble in water?
a) Ni^{2+} b) K^+ c) Zn^{2+} d) Al^{3+}

519. Which one of the following is formed on dissolving I_2 in aqueous solution of KI?
a) KIO_4 b) KIO c) KI_3 d) KIO_3

520. Beryllium and aluminium exhibit many properties which are similar. But, the two elements differ in
a) Exhibiting maximum covalency in compounds b) Forming polymeric hydrides
c) Forming covalent halides d) Exhibiting amphoteric nature in their oxides

521. Electrolysis of fused $KCl \cdot MgCl_2 \cdot 6H_2O$ gives:
a) Potassium only
b) Magnesium only
c) Magnesium and chlorine
d) Potassium, magnesium and chlorine

522. The metal X is prepared by the electrolysis of fused chloride. It reacts with hydrogen to form a colourless solid from which hydrogen is released on treatment with water. The metal is:
a) Al b) Ca c) Cu d) Zn

523. The molecular formula of potash alum is
a) $KAl_2S_4H_{48}O_{40}$ b) $K_2Al_2S_4H_{48}O_{39}$ c) $K_2Al_2S_4H_{48}O_{40}$ d) $KAl_2S_4H_{48}O_{40}$

524. Dolomite is a carbonate ore of:
a) Ca b) Mg c) Both Ca and Mg d) Neither Ca nor Mg

525. Which is known as crystal carbonate?
a) Na_2CO_3 b) $Na_2CO_3 \cdot H_2O$ c) $Na_2CO_3 \cdot 10H_2O$ d) None of these

526. Which is used in preparation of portland cement?
a) Limestone, clay and sand
b) Limestone, gypsum and sand
c) Limestone, gypsum and alumina
d) Limestone, clay and gypsum

527. The most electropositive element in alkali metals, is
a) Na b) K c) Rb d) Cs

528. Caustic soda is:
a) Efflorescent b) Deliquescent c) Hygroscopic d) Oxidant

529. Photoelectric effect is maximum in
a) Cs b) Na c) K d) Li

530. The solubilities of carbonates of magnesium group decreases down due to decrease in:
a) Inter ionic attractions
b) Entropy of solution formation
c) Lattice energy
d) Hydration energy of cation

531. Highly pure dilute solution of sodium in liquid ammonia:
a) Shows blue colour
b) Do not exhibit electrical conductivity
c) Produces sodium amide
d) Produces hydrogen gas

532. Tincal is:

a) $Na_2CO_3 \cdot 10H_2O$ b) $NaNO_3$ c) $Na_2B_4O_7 \cdot 10H_2O$ d) NaCl

533. In the Castner's process for the extraction of sodium, the anode is made of ..... metal
a) Sodium b) Nickel c) Copper d) Iron

534. Which one of the following is true?
a) NaOH is used in the concentration of bauxite ore.
b) NaOH is a primary standard in volumetric analysis.
c) Manganous hydroxide is soluble in excess of NaOH solution.
d) NaOH solution does not react with Cl.

535. Anhydrous magnesium chloride can be prepared by heating $MgCl_2 \cdot 2H_2O$:
a) In a current of dry HCl gas
b) With carbon
c) Until it fuses
d) With lime

536. The yellow light for illumination of lamps is from:
a) Mercury vapour lamp
b) Sodium vapour lamp
c) Neon gas lamp
d) None of these

537. Thomas slag is referred to as
a) Calcium silicate b) Calcium phosphate c) Barium phosphate d) Strontium silicate

538. Among the following, which is water insoluble?
a) Sodium fluoride b) Potassium fluoride c) Beryllium fluoride d) Magnesium fluoride

539. Which of the following oxides is formed when potassium metal is burnt is excess of air?
a) KO_2 b) K_2O_2 c) KO d) K_2O

540. Calcium cyanamide reacts with steam to form ammonia and.....
a) $Ca(OH)_2$ b) CaO c) $Ca(HCO_3)_2$ d) $CaCO_3$

541. Thermal decomposition of which compound yields a basic and acidic oxide simultaneously?
a) $KClO_3$ b) NH_4NO_3 c) $NaNO_3$ d) $CaCO_3$

542. Which one of the following will dissolve in water most readily?
a) I_2 b) $BaCO_3$ c) KF d) PbI_2

543. Which group of elements lose electrons more readily?
a) Li, Na, K b) F_2, Cl_2, Br_2 c) N, P, As d) O, S, Sc

544. The nitride ion in lithium nitride is composed of:
a) 7 protons +7 electrons
b) 10 protons +7 electrons
c) 7 protons +10 electrons
d) 10 protons +10 electrons

545. A firework gave bright crimson light. It is probably a salt of:
a) Ca b) Sr c) Ba d) Mg

546. One of the elements present in carnallite shows flame colouration. The colour of the flame is
a) Orange b) Green c) Yellow d) Lilac

547. Which of the following dissolves in hot conc. NaOH solution?
a) Fe b) Zn c) Cu d) Ag

548. Alkali metals have high oxidation potential and hence, they behave as
a) Oxidising agents b) Lewis bases c) Reducing agents d) Electrolytes

549. The electrolyte employed in the extraction of sodium by Down's electrolysis method is:
a) An aqueous solution of NaCl
b) Molten NaCl
c) Molten NaOH
d) A molten mixture of $MgCl_2$ and NaCl

550. Which of the following represents calcium chlorite?
a) $Ca(ClO_2)_2$ b) $CaClO_2$ c) $Ca(ClO_3)_2$ d) $Ca(ClO_4)_2$

551. Which compound gives acetylene on reaction with water?
a) Al_4C_3 b) Mg_3N_2 c) CaC_2 d) CaH_2

552. Which represents nitrolime?
a) $CaCN_2 + C$ b) $CaC_2 + N_2$ c) $Ca(CN)_2 + Ca(NO_3)_2$ d) None of these

553. The substance not likely to contain $CaCO_3$ is
a) A marble statue b) Calcined gypsum c) Sea shells d) Dolomite

554. What are the metal ions present in carnallite?
a) Mg, K b) Al, Na c) Na, Mg d) Zn, Mg

555. Sodium reacts with water less vigorously than potassium because:
a) It has higher atomic weight
b) It is less electropositive
c) It is more electronegative
d) It is a metal

556. In which of the following reactions, MgO is not formed?
a) $Mg + CO_2 \rightarrow$ b) $Mg + \text{dil. } HNO_3 \rightarrow$ c) $Mg + NO \xrightarrow{\Delta}$ d) $Mg + B_2O_3 \rightarrow$

557. Which metal is present in chlorophyll?
a) Ca b) Co c) Zn d) Mg

558. $LiAlH_4$ is used as:
a) An oxidizing agent b) A reducing agent c) A mordant d) A water softener

559. Which metal does not form ionic hydride?
a) Ba b) Mg c) Ca d) Sr

560. Which of the following metal carbonates decomposes on heating?
a) $MgCO_3$ b) Na_2CO_3 c) K_2CO_3 d) Rb_2CO_3

561. Magnesium has polarizing power closer to that of:
a) Lithium b) Sodium c) Potassium d) Caesium

562. The ionic carbide is:
a) CaC_2 b) ZnC c) SiC d) TiC

563. The correct order of solubility of the 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) $Mg > Ca > Ba > Be > Sr$

564. Compared with the alkaline earth metals, the alkali metals exhibit
a) Greater hardness b) Smaller ionic radii
c) Lower ionisation energies d) Highest boiling points

THE S-BLOCK ELEMENTS

: ANSWER KEY :

1)	a	2)	a	3)	b	4)	b	165)	c	166)	c	167)	d	168)	d
5)	b	6)	a	7)	d	8)	c	169)	d	170)	d	171)	d	172)	c
9)	b	10)	c	11)	a	12)	c	173)	d	174)	b	175)	d	176)	c
13)	c	14)	a	15)	c	16)	d	177)	b	178)	b	179)	d	180)	a
17)	c	18)	d	19)	b	20)	a	181)	d	182)	b	183)	c	184)	a
21)	b	22)	b	23)	d	24)	d	185)	d	186)	d	187)	b	188)	b
25)	d	26)	b	27)	a	28)	d	189)	a	190)	b	191)	a	192)	a
29)	a	30)	d	31)	a	32)	b	193)	b	194)	a	195)	b	196)	c
33)	b	34)	d	35)	a	36)	a	197)	d	198)	a	199)	c	200)	b
37)	c	38)	b	39)	d	40)	c	201)	b	202)	c	203)	c	204)	d
41)	b	42)	d	43)	a	44)	c	205)	b	206)	d	207)	b	208)	d
45)	a	46)	d	47)	b	48)	a	209)	a	210)	a	211)	a	212)	b
49)	a	50)	d	51)	a	52)	a	213)	d	214)	d	215)	b	216)	c
53)	a	54)	a	55)	a	56)	d	217)	a	218)	a	219)	a	220)	d
57)	b	58)	c	59)	b	60)	d	221)	c	222)	d	223)	b	224)	c
61)	a	62)	c	63)	c	64)	c	225)	d	226)	b	227)	c	228)	d
65)	a	66)	d	67)	a	68)	a	229)	b	230)	c	231)	a	232)	b
69)	d	70)	c	71)	c	72)	c	233)	a	234)	a	235)	d	236)	c
73)	d	74)	c	75)	a	76)	a	237)	d	238)	d	239)	c	240)	b
77)	d	78)	c	79)	c	80)	a	241)	d	242)	c	243)	b	244)	d
81)	c	82)	c	83)	b	84)	b	245)	a	246)	c	247)	c	248)	c
85)	b	86)	a	87)	d	88)	a	249)	a	250)	d	251)	a	252)	d
89)	c	90)	a	91)	c	92)	b	253)	a	254)	d	255)	c	256)	d
93)	c	94)	c	95)	d	96)	b	257)	c	258)	b	259)	c	260)	a
97)	b	98)	d	99)	b	100)	d	261)	b	262)	d	263)	b	264)	a
101)	c	102)	b	103)	d	104)	c	265)	a	266)	a	267)	b	268)	b
105)	c	106)	b	107)	b	108)	d	269)	c	270)	a	271)	b	272)	c
109)	b	110)	c	111)	b	112)	b	273)	a	274)	c	275)	a	276)	b
113)	b	114)	d	115)	a	116)	d	277)	b	278)	c	279)	a	280)	a
117)	c	118)	a	119)	a	120)	c	281)	a	282)	c	283)	b	284)	b
121)	a	122)	a	123)	c	124)	a	285)	a	286)	b	287)	d	288)	b
125)	b	126)	c	127)	b	128)	d	289)	a	290)	c	291)	c	292)	c
129)	b	130)	b	131)	d	132)	a	293)	c	294)	d	295)	a	296)	b
133)	b	134)	a	135)	c	136)	d	297)	c	298)	c	299)	c	300)	d
137)	d	138)	d	139)	a	140)	a	301)	c	302)	a	303)	d	304)	d
141)	c	142)	d	143)	a	144)	b	305)	a	306)	d	307)	d	308)	a
145)	d	146)	b	147)	d	148)	b	309)	b	310)	b	311)	a	312)	c
149)	c	150)	b	151)	a	152)	c	313)	b	314)	d	315)	a	316)	c
153)	d	154)	a	155)	b	156)	c	317)	b	318)	b	319)	b	320)	a
157)	d	158)	c	159)	d	160)	b	321)	c	322)	b	323)	c	324)	a
161)	b	162)	b	163)	b	164)	b	325)	b	326)	c	327)	b	328)	a

329)	a	330)	d	331)	a	332)	a	453)	a	454)	c	455)	d	456)	a
333)	b	334)	a	335)	b	336)	d	457)	c	458)	c	459)	c	460)	c
337)	c	338)	b	339)	c	340)	d	461)	c	462)	c	463)	a	464)	b
341)	a	342)	b	343)	c	344)	a	465)	c	466)	c	467)	a	468)	c
345)	c	346)	d	347)	a	348)	d	469)	d	470)	a	471)	b	472)	b
349)	d	350)	b	351)	a	352)	a	473)	d	474)	a	475)	a	476)	a
353)	c	354)	a	355)	d	356)	c	477)	b	478)	b	479)	c	480)	c
357)	b	358)	c	359)	c	360)	d	481)	d	482)	b	483)	b	484)	a
361)	c	362)	a	363)	c	364)	a	485)	a	486)	b	487)	b	488)	a
365)	d	366)	a	367)	a	368)	c	489)	d	490)	c	491)	a	492)	c
369)	d	370)	c	371)	c	372)	b	493)	c	494)	c	495)	c	496)	a
373)	b	374)	b	375)	a	376)	c	497)	c	498)	a	499)	a	500)	a
377)	a	378)	d	379)	d	380)	a	501)	c	502)	b	503)	d	504)	a
381)	b	382)	c	383)	d	384)	c	505)	a	506)	c	507)	b	508)	c
385)	b	386)	a	387)	a	388)	b	509)	c	510)	b	511)	a	512)	b
389)	c	390)	d	391)	a	392)	d	513)	d	514)	d	515)	a	516)	d
393)	c	394)	b	395)	a	396)	c	517)	c	518)	b	519)	c	520)	a
397)	b	398)	a	399)	a	400)	d	521)	d	522)	b	523)	c	524)	c
401)	d	402)	c	403)	d	404)	d	525)	b	526)	d	527)	d	528)	b
405)	b	406)	a	407)	b	408)	d	529)	a	530)	d	531)	a	532)	c
409)	b	410)	d	411)	d	412)	b	533)	b	534)	a	535)	a	536)	b
413)	c	414)	d	415)	a	416)	a	537)	b	538)	d	539)	a	540)	d
417)	c	418)	c	419)	c	420)	b	541)	d	542)	c	543)	a	544)	c
421)	c	422)	a	423)	d	424)	c	545)	b	546)	d	547)	b	548)	c
425)	a	426)	b	427)	b	428)	b	549)	b	550)	a	551)	c	552)	a
429)	c	430)	a	431)	b	432)	d	553)	b	554)	a	555)	b	556)	b
433)	c	434)	a	435)	a	436)	d	557)	d	558)	b	559)	b	560)	a
437)	b	438)	b	439)	b	440)	b	561)	a	562)	a	563)	c	564)	c
441)	d	442)	c	443)	a	444)	b								
445)	b	446)	d	447)	d	448)	d								
449)	a	450)	a	451)	d	452)	a								

THE S-BLOCK ELEMENTS

: HINTS AND SOLUTIONS :

1 **(a)**
KO_2 absorbs CO_2 and increases O_2 concentration so, it is used in space and submarines.

3 **(b)**
$BeCl_2$ exists in polymeric form.

4 **(b)**
Alkali metals on burning in air give monoxide, peroxide or superoxide.
Li forms monoxide.

$$2Li + \frac{1}{2}O_2 \rightarrow Li_2O$$

Na form peroxide as well as monoxide.

$$2Na + O_2 \rightarrow Na_2O_2$$

$$2Na + \frac{1}{2}O_2 \rightarrow Na_2O$$

K, Rb, and Cs form superoxide.

$$M(= K, Rb, Cs) + O_2 \rightarrow MO_2$$

5 **(b)**
It is a fact.

6 **(a)**
Lime stone is not used in the extraction of phosphorus from phosphorite $[Ca_3(PO_4)_2]$

7 **(d)**
$Na_2S_2O_3$ r $2Na^+ + S_2O_3^{2-}$

$$S_2O_3^{2-} + I_2 \longrightarrow S_4O_6^{2-} + I^-$$

i.e., $2Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2NaI$

8 **(c)**

$$Ca(OH)_2 + CO_2 \longrightarrow \underset{\text{Insoluble}}{CaCO_3} + H_2O$$

$$CaCO_3 + CO_2 + H_2O \longrightarrow \underset{\text{Soluble}}{Ca(HCO_3)_2}$$

9 **(b)**

$$BaO_2 + H_2SO_4 \longrightarrow H_2O_2 + BaSO_4$$

10 **(c)**
$Ca(OH)_2$ is also known as milk of lime.

12 **(c)**
Celestine is $SrSO_4$.

13 **(c)**

$$Ca_3P_2 + 6H_2O \rightarrow 3Ca(OH)_2 + \underset{\text{phosphine}}{PH_3} \uparrow$$

$$CaC_2 + 2H_2O \rightarrow Ca(OH)_2 + \underset{\text{acetylene}}{C_2H_2} \uparrow$$

$$CaCN_2 + 3H_2O \rightarrow CaCO_3 + \underset{\text{ammonia}}{2NH_3} \uparrow$$

14 **(a)**
MgO is called magnesia.

15 **(c)**
Calcium is obtained by electrolysis of a fused mass of $CaCl_2$ and KCl at about 700°C in an electrolytic cell made of graphite anode and iron cathode.

$$CaCl_2 \rightleftharpoons Ca^{2+} + 2Cl^-$$

At anode

$$2Cl^- \rightarrow Cl_2 + 2e^-$$

At cathode

$$Ca^{2+} + 2e^- \rightarrow Ca$$

16 **(d)**
NaCl is table salt; rest all are potassium salts.

17 **(c)**
A characteristic feature of Na-K alloy.

18 **(d)**
Carnallite is an ore of potassium and magnesium *i.e.*, $KCl \cdot MgCl_2 \cdot 6H_2O$.

19 **(b)**

$$CO_3^{2-} + H_2O \rightleftharpoons HCO_3^- + OH^-.$$

20 **(a)**
When $AlCl_3$ reacts with NaOH, it forms sodium meta aluminate ($NaAlO_2$). This reaction does not give gaseous product.

$$AlCl_3 + 4NaOH \rightarrow \underset{\substack{\text{sodium meta aluminate}\\ \text{(soluble)}}}{NaAlO_2} + 2H_2O + 3NaCl$$

21 **(b)**

$$CaOCl_2 + CO_2 \longrightarrow CaCO_3 + Cl_2$$

1 mol of $Cl_2 = 2 \times 35.5$ g $Cl_2 = 71.0$ g Cl_2

22 **(b)**
Due to formation of Na_2CrO_4.

23 **(d)**

CaI_2 has maximum covalent character due to large size of anion and possesses lowest lattice energy. Thus melting point is lowest.

24 **(d)**
Farther away is shell from the nucleus, more loosely are held electrons.

25 **(d)**
$CaO + 3C \longrightarrow CaC_2 + CO$

26 **(b)**
Mg and Be do not impart colour of flame.

28 **(d)**
$BaSO_4$ has high lattice energy and low hydration energy.

29 **(a)**
It is a fact.

30 **(d)**
$Be(OH)_2$ is insoluble in water and thus, possess lowest K_{sp} value.

31 **(a)**
(i) As we go down in group, in group. I, ionisation potential decreases and dissociation $(M - OH)$ bond becomes easier.

(ii) The hydroxide which can give OH^- ion most easily will have highest basicity.

∴ Ionisation energy of Cs is least among Li, Na, K, Cs

∴ CsOH furnishes OH^- most easily.

∴ CsOH is most basic.

32 **(b)**
O_2^{1-} can be oxidised to O_2 and can be reduced to O^{2-}.

33 **(b)**
Alkali metals are electropositive, hence they can reduce CO_2.

$$4Na + CO_2 \rightarrow 2Na_2O + C$$

34 **(d)**
CaO (quick lime)

$Ca(OH)_2$ – (slaked lime)

$Ca(OH)_2 + H_2O$
– an aqueous suspension of $Ca(OH)_2$ in water, call

$CaCO_3$ (lime stone)

35 **(a)**
Pearl ash is K_2CO_3; caustic potash is KOH.

36 **(a)**
It is a fact.

37 **(c)**
The solubility of hydroxides increases down the group.

38 **(b)**
On strong heating, $MgCl_2 . 6H_2O$ is hydrolysed by its own water of crystallisation.

$$MgCl_2 . 6H_2O \xrightarrow{\Delta} MgO + 2HCl + 2H_2O$$

39 **(d)**
It is a fact.

40 **(c)**
Ionic radius increases down the gp.

41 **(b)**
$Ca(OH)_2 + Cl_2 \rightarrow \quad CaOCl_2 \quad + H_2O$

bleaching powder

42 **(d)**
All are fact. It is the ammonia solvated electron $(NH_3)_x . e$ responsible for these properties.

43 **(a)**
Conductance of an ion is dependent upon its size – as follows :

$$\text{Ionic conductance} \propto \frac{1}{\text{ionic size}}$$

Thus, ionic conductance in aqueous solution increases in the order-

$$Cs^+ < Rb^+ < K^+ < Na^+ < Li^+$$

44 **(c)**
$Ba^+ + e \longrightarrow Ba$
$Be^+ \longrightarrow Be^{2+} + e$

45 **(a)**
It is a fact.

46 **(d)**
Scarlet red flame-Sr; Chrimson red-Ca; Apple green-Ba

47 **(b)**
Among the alkaline earth metals, the size of beryllium and magnesium metals is very small. Therefore, the electrons in these metals are bounded more strongly and are not excited by the energy of flame to higher energy states. Hence, these metals or their salts do not impart any colour to the flame.

48 **(a)**

Sodium metal is manufactured by the electrolysis of fused sodium chloride mixed with KCl and KF.

On electrolysis ;

At iron cathode

$$Na^+ + e^- \longrightarrow Na\ (s)(\text{metallic sodium})$$

At graphite anode :

$$2Cl^- \longrightarrow Cl_2(g) + 2e^-$$

NaCl melts at 800°C. It is difficult to attain and maintain its melting point. So, KCl and KF are mixed to lower the melting point of NaCl to about 600°C. KCl and KF are themselves not electrolysed under the voltage conditions used for sodium.

49 **(a)**

$$4KCl + 6H_2SO_4 + K_2Cr_2O_7 \longrightarrow 2CrO_2Cl_2 + 6KHSO_4 + 3H_2O$$

50 **(d)**

$$2CaOCl_2 \xrightarrow{CoCl_2} 2CaCl_2 + O_2$$

In presence of $CoCl_2$ (which act as catalyst) bleaching powder gives out oxygen.

51 **(a)**

Li has the highest E°_{OP}, among all elements.

52 **(a)**

$$\underset{(X)}{CaCO_3} \xrightarrow{\Delta} CaO + CO_2$$

$$CaO + H_2O \longrightarrow \underset{(Y)}{Ca(OH)_2}$$

$$Ca(OH)_2 + \underset{\text{(Excess)}}{CO_2} \longrightarrow \underset{(Z)}{Ca(HCO_3)_2}$$

$$Ca(HCO_3)_2 \xrightarrow{\Delta} \underset{(X)}{CaCO_3} + H_2O + CO_2$$

53 **(a)**

$$2KO_2 + CO_2 \longrightarrow K_2CO_3 + \frac{3}{2}O_2$$

54 **(a)**

$$\xleftarrow[\text{decreasing order of solubility}]{Ba(OH)_2 > Sr(LOH)_2 > Ca(OH)_2 > Mg(OH)_2}$$

55 **(a)**

M.p. order is Mg < Ra < Ba < Sr < Ca < Be.

56 **(d)**

$$Na + (x+y)NH_3 \longrightarrow [Na(NH_3)_x]^+ + [e(NH_3)_y]^-$$

Paramagnetic

57 **(b)**

The solubility of alkaline earth metal hydroxides increase down the gp. $Zn(OH)_2$ and $Al(OH)_3$ are insoluble.

58 **(c)**

Quicklime or CaO s very good hygroscopic substance.

59 **(b)**

Anhydrous $CaCl_2$ is not used to dry alcohol as it forms $CaCl_2 \cdot 4C_2H_5OH$ and also reacts with NH_3.

60 **(d)**

$$\underset{\text{Washing soda}}{Na_2CO_3 \cdot 10H_2O} \longrightarrow \underset{\text{Soda ash}}{Na_2CO_3 \cdot H_2O} + 9H_2O_v$$

61 **(a)**

It is a reason for given fact.

62 **(c)**

It is a reason for the given fact.

63 **(c)**

Mg forms complex, e.g., chlorophyll is a complex of Mg.

64 **(c)**

$$2NaCl + 2H_2O \xrightarrow{\text{Electrolysis}} 2NaOH + Cl_2 + H_2$$

anode cathode

65 **(a)**

It is also a method for manufacture of NaOH.

66 **(d)**

Alkali metals react with halogen to give halides. They are normally represented by M^+X^-.

67 **(a)**

Alkali metals are strongest reducing agents. Also, their reducing power increases down the group.

68 **(a)**

$BaSO_4$ is insoluble in acid. Refer test of SO_4^{2-}.

69 **(d)**

The metallic character increases down the group.

70 **(c)**

$$2KI + CuSO_4 \longrightarrow CuI_2 + K_2SO_4$$

unstable

$$2Cu_2I_2 \longrightarrow Cu_2I_2 + I_2$$

Hence, solution contains Cu_2I_2, I_2 and K_2SO_4.

71 **(c)**

It is a reason for given fact for given fact

72 **(c)**

$$Mg_3N_2 + 6H_2O \longrightarrow 3Mg(OH)_2 + 2NH_3$$

73 **(d)**

$CsBr_3 \longrightarrow Cs^+ + Br_3^-$

74 **(c)**

$$CaSO_4.2H_2O \xrightarrow{120^\circ} CaSO_4.\frac{1}{2}H_2O \xrightarrow{200^\circ} CaSO_4$$

gypsum — plaster of Paris — anhydrite or dead burnt plaster

The anhydrous $CaSO_4$ is called dead burnt plaster because it does not set like plaster of Paris when moistened with water.

75 **(a)**

It is a fact.

76 **(a)**

$6Li + N_2 \rightarrow \quad 2Li_3N$

lithium nitride

78 **(c)**

Atomic radii increase down the group.

79 **(c)**

It is a fact.

80 **(a)**

Carbon has no reaction with NaOH.

81 **(c)**

Both $Be(OH)_2$ and $Al(OH)_3$ are amphoteric.

82 **(c)**

It is a fact.

84 **(b)**

It is a fact.

85 **(b)**

Alkaline earth metals (ns^2) are denser than alkali metal (ns^1) because metallic bonding in alkaline earth metal is stronger

86 **(a)**

Smaller is ion, more is hydration energy.

87 **(d)**

Alkali and alkaline earth metals are extracted by the electrolysis of their fused salt.

88 **(a)**

$Be(OH)_2$ has minimum basicity and has amphoteric character as it dissolves both in acid and in alkali.

$$Be(OH_2) + 2HCl \longrightarrow BeCl_2 + 2H_2O$$

$$Be(OH_2) + 2NaOH \longrightarrow Na_2BeO_2 + 2H_2O$$

89 **(c)**

Black ash is $Na_2CO_3 + CaS$.

90 **(a)**

Na_2CO_3 loses water on standing in air.

91 **(c)**

Li, Na, K, Rb, Cs, Fr are I group members.

92 **(b)**

Bicarbonates of alkaline earth metals exist only in solution state.

93 **(c)**

K_2CO_3 is potassium carbonate; K_2CS_2 is pot. Thiocarbonate.

94 **(c)**

$Be(OH)_2$ is amphoteric as it reacts with both acids and bases.

95 **(d)**

$NaNO_2$ gives NO_2(brown) with dil. Acids whereas NaBr and $NaNO_2$ both give brown vapours Br_2 and NO_2 respectively with conc. acids.

96 **(b)**

$CaO + 3C \longrightarrow CaC_2 + CO$

97 **(b)**

Borax-$Na_2B_4O_7 . 10H_2O$.

98 **(d)**

More negative is heat of formation, greater is stability $\Delta H_f =$ $-97.7, -98.6, -103.5, -104.2$kcal for LiCl, NaCl, Cs respectively.

99 **(b)**

The solubility of alkali metal hydroxides increases from top to bottom. Hence, the order of their solubility is as

$$LiOH < NaOH < KOH < RbOH < CsOH$$

100 **(d)**

$Na_2Cr_2O_7$ is deliquescent and therefore not used as primary standard in volumetric analysis.

101 **(c)**

$$2(CaSO_4 \cdot 2H_2O) \xrightarrow[\text{Dehydration}]{120^\circ C} 2CaSO_4 \cdot H_2O + 3H_2O$$

gypsum — plaster of Paris

102 **(b)**

Amongst the elements listed, caesium is the most electropositive, therefore, CsH shall be most ionic

103 **(d)**

$2Na + 2H_2O \rightarrow 2NaOH + H_2 \uparrow$

$2NaOH + CO_2 \rightarrow Na_2CO_3 + H_2O$

$$Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$$

$$NaCl\ (molten) \xrightarrow{\text{Electrolysis}} Na^+ + Cl^-$$

$Na^+ + e^- \rightarrow Na$ (at cathode)

$Cl^- - e^- \rightarrow Cl$ (at anode)

104 **(c)**
Both Ca and P are needed for human system. Also they prevent moisture absorbing power of other components present in table salt.

105 **(c)**
$ZnS + BaSO_4$ is lithopone. It is used as white pigment

106 **(b)**
The reaction is as follows

$$2Na + O_2 \xrightarrow{300°C} Na_2O_2$$

sodium peroxide (X)

$$2Na_2O_2 + 2CO_2 \rightarrow 2Na_2CO_3 + O_2 \uparrow$$

(Y)

Sodium peroxide is used in the purification of air in submarines because it combines with CO_2 to give O_2.

107 **(b)**

$$Na + (x+y)NH_3 \rightarrow [Na(NH_3)x]^+ + [e(NH_3)_y]^-$$

Sodium dissolves in liquid ammonia to produce deep blue colour in solution.

The blue coloured solution possesses high conducting power, stromy reducing nature due to ammoniated electrons. The cation is also solvated by ammonia.

108 **(d)**
$NaHCO_3 + MgSO_4 \longrightarrow MgCO_3 + NaHSO_4$

109 **(b)**
K belongs to strong electropositive group and Cl belongs to strong electronegative group.

110 **(c)**
Mg is more powerful reductant than carbon.

111 **(b)**
Li forms Li_2O, Na forms Na_2O_2 and rest all alkali metals forms superoxides MO_2.

113 **(b)**
Caustic soda (an alkali) can absorb acidic oxides.

114 **(d)**
Carnallite $-KCl \cdot MgCl_2 \cdot 6H_2O$
It is an ore of magnesium.

115 **(a)**
Metal oxides are basic; non-metal oxides are acidic.

116 **(d)**
Cs has lowest ionisation energy and thus easily show photoelectric effect, the principle used in solar cells.

117 **(c)**
Ba imparts green colour to flame.

118 **(a)**
$NaNO_3$ decomposes on heating above 800 °C to give O_2

$$2NaNO_3 \longrightarrow Na_2O + 2NO_2 + \frac{1}{2}O_2$$

119 **(a)**
Highly electropositive metals (e.g., alkali and alkaline earth metals and Al) are extracted by the electrolysis of their fused salts.
Cathode: $Mg^{2+} + 2e \longrightarrow Mg$
Anode: $2Cl^- \longrightarrow Cl_2 + 2e$

120 **(c)**

$$\rangle C-I + MF \longrightarrow \rangle C-F + MI$$

It is Swart reaction that uses highly soluble metal fluorides. So, the correct choice is RbF.

121 **(a)**
In Holme's signal of the ship mixture of CaC_2 and Ca_3P_2 is used.

122 **(a)**
The process is also known as Gossage process.

123 **(c)**
$Cs^+(aq)$ is the smallest alkali metal cation in solution state.

124 **(a)**
Indian saltpetre is KNO_3.

125 **(b)**
$Mg + 2HNO_3 \longrightarrow Mg(NO_3)_2 + H_2$

126 **(c)**
It is a fact.

127 **(b)**
It is $_{20}Ca$.

128 **(d)**
It is a fact.

129 **(b)**

It is a fact

130 **(b)**

$CaC_2 + N_2 \longrightarrow CaCN_2 + C.$

131 **(d)**

It is a fact.

132 **(a)**

Lithium salts impart bright red colour to the flame

133 **(b)**

$Na + (x+y)NH_3 \longrightarrow [Na(NH_3)_x]^+ + [e(NH_3)_y]^-$; This ammoniated electron is responsible for blue colour of solution, reducing nature and good conductor nature of solution.

134 **(a)**

$(CaSO_4)_2 . H_2O$ is plaster of Paris. Since, on adding water, it sets into a hard mass due to the formation of gypsum, it is used for plastering the broken bones.

$$(CaSO_4)_2 . H_2O + 1\frac{1}{2}H_2O \longrightarrow \underset{\text{hard mass}}{2CaSO_4 . 2H_2O}$$

135 **(c)**

$2Mg + CO_2 \longrightarrow 2MgO + C$

Mg is more powerful reductant than carbon.

136 **(d)**

It should be $Na_2CO_3 + CaS$.

137 **(d)**

Plaster of Paris is a whit powder. It changes into a hard mass called gypsum on mixing with water. There is a slight increase in volume during this process.

$$\underset{\text{Plaster of Paris}}{CaSO_4 . \frac{1}{2}H_2O} + 1\frac{1}{2}H_2O \rightarrow \underset{\text{gypsum}}{CaSO_4 . 2H_2O} + \text{Heat}$$

138 **(d)**

Ba possesses lowest ionization potential.

139 **(a)**

$$\underset{\text{Hardness in water}}{Ca(HCO_3)_2} + Ca(OH)_2 \longrightarrow 2CaCO_3\downarrow + 2H_2O$$

140 **(a)**

$$3Mg + N_2 \longrightarrow Mg_3N_2 \xrightarrow{6H_2O} 3Mg(OH)_2 + 2NH_3$$

141 **(c)**

Gypsum is $CaSO_4 \cdot 2H_2O$.

142 **(d)**

Due to lower IP values alkali metals are strong reducing agent.

143 **(a)**

Water glass is Na_2SiO_3.

144 **(b)**

$4LiH + AlCl_3 \longrightarrow LiAlH_4 + 3LiCl$

145 **(d)**

The solubility of alkaline earth metal chlorides decreases down the group.

146 **(b)**

It is a fact.

147 **(d)**

The ease of adsorption of hydrated alkali metal cations depends upon their size in hydrated form and on the charge carried by them.

148 **(b)**

Mg^{2+} is smaller than Na^+ and larger than all others. Smaller is ion, more is hydration energy.

149 **(c)**

Chile saltpetre is $NaNO_3$.

150 **(b)**

Thomas slag or phosphatic slag is a mixture of calcium phosphate and calcium silicate $[Ca_3(PO_4)_2 . CaSiO_3]$. It is used as manure.

151 **(a)**

Follow Solvay process for Na_2CO_3.

152 **(c)**

As we go down in the group, ionic character increases hence, melting point of halides should increase but NaCl has the highest melting point (800°C) due to its high lattice energy.

153 **(d)**

Na_2CO_3 is thermally stable.

154 **(a)**

Smaller is ion, more is hydration energy.

155 **(b)**

The ionic character order is,

NaF > NaCl > NaBr > NaI (Fajan's rule).

156 **(c)**

$Na_2CO_3 + CO_2 + H_2O \longrightarrow 2NaHCO_3$

157 **(d)**

Barium salts are quite stable because of great electropositive nature of Ba. Hence, Ba compounds possess high decomposition temperature.

158 **(c)**

Alkaline earth metal carbonates are insoluble in water and lose CO_2 on heating.

159 **(d)**

Due to H-bonding

$K^+F^- + HF \longrightarrow K^+[F \cdots H — F]^-$ or $K^+[HF_2]^-$

160 **(b)**

Microcosmic salt is $Na(NH_4)HPO_4$. It is white crystalline solid.

It is obtained when NH_4Cl and Na_2HPO_4 are dissolved in hot water and cooled.

$$NH_4Cl + Na_2HPO_4 \rightarrow Na(NH_4)HPO_4 + NaCl$$

It is separated by fractional crystallisation.

It is used for the detection of certain basic radicals which forms coloured mixed phosphate with $NaPO_3$.

$$Na(NH_4)HPO_4 \xrightarrow{\Delta} NaPO_3 + NH_3 + H_2O$$

$$NaPO_3 + CoO \rightarrow NaCo\,.\,PO_4$$

blue bead

161 **(b)**

Li forms Li_2O, Na forms Na_2O_2 and rest all alkali metals forms superoxides MO_2

162 **(b)**

An intermediate reaction in Solvay process gives $CaCl_2$.

$$Ca(OH)_2 + 2NH_4Cl \longrightarrow CaCl_2 + 2NH_3 + 2H_2O$$

163 **(b)**

Ti and Cu transition metals show variable valency. Pb so variable valency due to inert pair effect, while barium shows fixed valency

164 **(b)**

The disproportionation occurs as:

$$Na_2S_2O_3 + 2HCl \longrightarrow 2NaCl + SO_2 + S + H_2O$$

165 **(c)**

Mme Curie and her husband Piere Curie isolated radium from pitch blende.

166 **(c)**

Be, Mg, Ca, Sr, Ba, Ra are alkaline earth metals in II gp.

167 **(d)**

In the Down's process of extraction of sodium.

Anode – Graphite

Cathode – Iron

Electrolyte – Mixture of NaCl, KCl and KF

168 **(d)**

Saline hydrides are ionic in nature.

169 **(d)**

Alkali metals have a tendency to lose the single valence electron and form positive ion and gain inert gas configuration but in case of caesium, the distance of the valence electron is maximum. So, force of attraction by the nucleus is least, hence, it is more reactive.

170 **(d)**

Soda ash is chemically anhydrous Na_2CO_3.

171 **(d)**

Hydration energy of smaller cations are higher than those of larger cations, hence Mg^{2+} has maximum hydration energy among these.

172 **(c)**

Chlorophyll –'a' is $C_{55}H_{72}O_5N_4Mg$; Chlorophyll-'b' is $C_{55}H_{70}O_6N_4Mg$; Both are green plant pigment.

173 **(d)**

$$BaO_2 \xrightarrow{\Delta} BaO + \frac{1}{2}O_2$$

174 **(b)**

The given substances react with water in the following manner

$$Na + H_2O \longrightarrow NaOH + H_2(g)$$

$$2Na_2O_2 + 2H_2O \longrightarrow 4NaOH + O_2(g) + H_2(g)$$

$$Ca + H_2O \longrightarrow CaO + H_2$$

$$CaH_2 + 2H_2O \longrightarrow Ca(OH)_2 + 2H_2$$

$$CaO + H_2O \longrightarrow Ca(OH)_2$$

$$CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$$

$$Ba + 2H_2O \longrightarrow Ba(OH)_2 + H_2$$

$$BaO_2 + H_2O \longrightarrow Ba^{2+} + O_2 + H_2O_2$$

Hence, Ca and CaH_2 is the pair that gives same gaseous product on reaction with water

175 **(d)**

$$2Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2NaI$$

sodium thiosulphate sodium tetrathionate

176 **(c)**

Carnallite ($KCl\,.\,MgCl_2\,.\,6H_2O$), dolomite ($MgCO_3\,.\,CaCO_3$) and sea water are the ores of magnesium, calamine ($ZnCO_3$) is an ore of zinc.

177 **(b)**

LiCl is covalent in nature and thus, soluble in weak polar organic solvents.

178 **(b)**

$CaCO_3$ is called Iceland spar.

179 **(d)**

$BeO + 2HCl \longrightarrow BeCl_2 + H_2O$;

$BeO + 2NaOH \longrightarrow Na_2BeO_2 + H_2O$.

180 **(a)**

These react with H_2SO_4 to give CO_2 used for extinguishing fire.

181 **(d)**

Solvay process is based on electrolysis of brine NaCl solution.

182 **(b)**

One mole of magnesium nitride on the reaction with an excess of water gives two moles of ammonia.

$$\underset{1\text{ mol}}{Mg_3N_2} + 6H_2O \rightarrow 3Mg(OH)_2 + \underset{2\text{ mol}}{2NH_3}$$

183 **(c)**
White wash in our houses is made by slaked lime, $Ca(OH)_2$.

184 **(a)**

$$Na_2SO_3 + S \xrightarrow{NaOH} Na_2S_2O_3$$

sodium thiosulphate

185 **(d)**
BeF_2 is linear (sp-hybridization), H_2O is angular (sp^3-hybridization).

186 **(d)**
On hydration plaster of Paris, converts into gypsum.

$$\underset{\text{plaster of Paris}}{CaSO_4 . \frac{1}{2}H_2O} + \frac{3}{2}H_2O \rightarrow \underset{\text{gypsum}}{CaSO_4 . 2H_2O}$$

187 **(b)**
The stability of carbonates of alkaline earth metals increases down the group due to increasing electropositive character of metals.

188 **(b)**
Francium (at. No. 87) is radioactive. Sodium isotopes are also radioactive (N^{24}).

189 **(a)**

$$\underset{\text{Acid salt}}{NaHCO_3} + \underset{\text{Alkali}}{NaOH} \longrightarrow Na_2CO_3 + H_2O$$

190 **(b)**
Alkali metals are highly reactive metals. They react with alcohol as

$$2C_2H_5OH + 2K \rightarrow 2C_2H_5OK + H_2$$

With water as

$$2K + 2H_2O \rightarrow 2KOH + H_2$$

With ammonia as

$$K + (x + y)NH_3 \rightarrow \underset{\text{ammoniated cation}}{[K(NH_3)_x]^+} + \underset{\text{ammoniated electrons}}{[e(NH_3)_y]^-}$$

191 **(a)**
Only Li forms monoxide: $4Li + O_2 \longrightarrow 2Li_2O$.

192 **(a)**
$MgCl_2$ is hygroscopic.

193 **(b)**
It is calcium cyanamide used under the name nitrolime.

194 **(a)**
On fusion of Na_2CO_3 and $BaSO_4$ barium carbonate is obtained

$$Na_2CO_3 + BaSO_4 \rightarrow BaCO_3 + Na_2SO_4$$

195 **(b)**
According to Fajan's rule, smaller is cation and larger is anion then more is covalent nature.

197 **(d)**
$Al(OH)_3$ is soluble in $NaOH(aq.)$ whereas $Fe(OH)_3$ is insoluble.

199 **(c)**
Na reacts with alcohol;

$$Na + C_2H_5OH \longrightarrow C_2H_5ONa + \frac{1}{2}H_2$$

200 **(b)**
Li^+ has $1s^2$ configuration, *i.e.*, nearest noble gas configuration.

201 **(b)**
$Na_2S_2O_3 . 5H_2O$ (Hypo). It is called photographer's fixer because it removes the excess AgBr in the form of soluble silver complex.

202 **(c)**
For an ionic compound to be soluble in water its hydration energy should be more than its lattice energy.

203 **(c)**

$$Na_2S_2O_3 + \underset{\text{Unexposed}}{AgBr} \longrightarrow Na_3Ag(S_2O_3)_2 + NaBr$$

The property is used for fixing in photography.

204 **(d)**
$Na_2S_2O_3$ reacts with AgBr (photography) and with I_2 (iodometric and iodimetric titrations).

205 **(b)**
Magnesium sulphate heptahydrate $[MgSO_4 . 7H_2O]$ is called epsom salt.

206 **(d)**
It is a reason for given fact.

207 **(b)**
$CaO + H_2O \longrightarrow Ca(OH)_2 +$ Energy (heat + sound)

208 **(d)**
Sodium sulphate decahydrate ($Na_2SO_4 . 10\ H_2O$) is also known as Glauber's salt.

209 **(a)**
Dead burnt is $CaSO_4$.

210 **(a)**

$$3Ca(OH)_2 + 2Cl_2 \longrightarrow Ca(OCl)_2 \cdot CaCl_2 \cdot Ca(OH)_2 \cdot H_2O (\text{or } CaOCl_2)$$

211 **(a)**
Baking soda is sodium bicarbonate.

212 **(b)**
Na is basic in nature and forms basic oxides.

213 **(d)**
NaCl as deposits on sea shores.

214 **(d)**
Ba and Ra on burning in air forms peroxides (MO_2). Rest all give oxides (MO).

215 **(b)**
Due to anodic reaction as: $2Cl^- \longrightarrow Cl_2 + 2e$.

216 **(c)**
It is a fact.

217 **(a)**

$$Mg(HCO_3)_2 \xrightarrow{\Delta} MgO + H_2O + 2CO_2$$

aqueous solution of (products)

magnesium bicarbonate

218 **(a)**
Metal *M* is Be.

$$BeO + H_2O \longrightarrow Be(OH)_2.$$

$$Be(OH)_2 + 2NaOH \longrightarrow Na_2BeO_2 + 2H_2O$$

Soluble

219 **(a)**
All metals show metallic bonding involving oscillation of electrons in them and thus, are good conductor of heat and electricity.

221 **(c)**
Rest all involve use of Na_2CO_3.

222 **(d)**
It is a reason for given fact.

223 **(b)**

$$3I_2 + 6NaOH \longrightarrow 5NaI + NaIO_3 + 3H_2O$$
(conc.)

224 **(c)**
NaOCl is used as a bleaching agent and sterilising agent. It is formed by the action of Cl_2 with cold and dilute NaOH.

$$2NaOH + Cl_2 \longrightarrow NaCl + NaOCl + H_2O$$

Cold and dil.

$$6NaOH + 3Cl_2 \longrightarrow 5NaCl + NaClO_3 + 3H_2O$$

Hot and conc.

225 **(d)**
CaC_2O_4 is insoluble in acetic acid.

226 **(b)**
$Na_2CO_3 \cdot 10H_2O$.

227 **(c)**

$$Na_2CO_3 + SO_2 \longrightarrow Na_2SO_3 + CO_2$$

228 **(d)**
Jump in IP is noticed during the change of shell.

229 **(b)**

$$2Rb + 2H_2O \rightarrow 2RbOH + H_2$$

As we go down the group reactivity with H_2O increases

ie, $\xrightarrow{Li < Na < K < Rb < Cs}$

231 **(a)**
Thiosulphate ($S_2O_3^{2-}$) is oxidised to tetrathionate ($S_4O_6^{2-}$) ion by iodine.

$$I_2 + 2S_2O_3^{2-} \longrightarrow S_4O_6^{2-} + 2I^-$$

232 **(b)**
NaOH + CaO is called soda lime. 3 : 1

233 **(a)**
It is a fact and lithopone is used as paint.

234 **(a)**
LiCl is covalent in nature and thus, soluble inorganic solvents.

235 **(d)**
Ca – brick red colour

Sr – crimson red

Ba – green.

236 **(c)**

$$Na_2S + I_2 + Na_2SO_3 \longrightarrow Na_2S_2O_3 + 2NaI$$

237 **(d)**

$$6NaOH + 4S \xrightarrow{\Delta} \underset{\text{sod. thiosulphate}}{Na_2S_2O_3} + 2Na_2S + 3H_2O$$

238 **(d)**
Sodium peroxide reacts with moisture and CO_2 of air (when exposed to air) and becomes white due to the formation of NaOH and Na_2CO_3.

$$2Na_2O_2 + 2H_2O \rightarrow 4NaOH + O_2$$

$$2NaOH + CO_2 \rightarrow Na_2CO_3 + H_2O$$

239 **(c)**
It is a fact.

240 **(b)**
Al^{3+} is very good coagulant for negatively charged dispersions in water.

241 **(d)**
Bones contain $Ca_3(PO_4)_2$.

242 **(c)**
It is a fact.

243 **(b)**
It is a reason for given fact.

244 **(d)**
It is a fact.

245 **(a)**
Alkali metals' family has closest resemblances in its members.

246 **(c)**
Lithium and magnesium shows diagonal relationship. Some points of similarity are
(i) Polarising power of Li^+ and Mg^+ are almost same.

(ii) Like Li, Mg decomposes water very slowly.

(iii) LiCl and $MgCl_2$ are deliquescent.

(iv) Like Li, Mg do not form solid bicarbonates.

247 **(c)**

$$\underset{\text{Down the group basic character increases}}{\xrightarrow{LiOH < NaOH < KOH < RbOH}}$$

248 **(c)**
Sodium bicarbonate decomposes on strong heating and gives sodium carbonate.

$$2NaHCO_3 \xrightarrow{\Delta} Na_2CO_3 + CO_2 + H_2O$$

249 **(a)**
Fusion mixture contains K_2CO_3 and Na_2CO_3.

250 **(d)**
$Mg + 2HCl \longrightarrow MgCl_2 + H_2$; $E^{\circ}_{OP_{Mg}} > E^{\circ}_{OP_H}$

251 **(a)**
Baking powder contains $NaHCO_3$, $Ca(H_2PO_2)_2$ and starch.

252 **(d)**
Plaster of Paris absorb water to form monoclinic gypsum which is a hard substance.

$$CaSO_4 \cdot \frac{1}{2}H_2O \xrightarrow{3/2H_2O} CaSO_4 \cdot 2H_2O$$

monoclinic gypsum

253 **(a)**
Li and Mg show diagonal relationship.

254 **(d)**
It is a fact.

255 **(c)**
$\because$ Carbon dioxide does not help in burning and it reacts with alkali metals to form carbonates.

$\therefore$ CO_2 is used to extinguish fire of lithium, sodium and potassium.

256 **(d)**
Halides of alkaline earth metals possess all these properties.

257 **(c)**
Le blanc method is for the manufacture of Na_2CO_3.

258 **(b)**
Thomas slag is $Ca_3(PO_4)_2$. It is used as a fertilizer. It has 14-18% of P_2O_5.

$$6CaO + P_4O_{10} \longrightarrow 2Ca_3(PO_4)_2$$

phosphatic slag

or Thomas slag

259 **(c)**
Norwegian saltpetre is basic calcium nitrate.

260 **(a)**
Alkali and alkaline earth metals are extracted by the electrolysis of their fused salt.

261 **(b)**
$Zn^{2+} + 2NaOH \longrightarrow 2Na^+ + Zn(OH)_2$
$Zn(OH)_2 + 2NaOH \longrightarrow Na_2ZnO_2 + 2H_2O$
Thus, Na_2ZnO_2 forms $2Na^+$ and $[ZnO_2]^{2-}$ ions.

262 **(d)**
From the given compounds, only $CaCl_2$ is used to preserve wood. NaCl, however is also a preservative but not for wood.

263 **(b)**
CO_2 is an acidic oxide and thus, reacts with $Ba(OH)_2$ to give insoluble $BaCO_3$.

264 **(a)**
It is a reason for given fact.

265 **(a)**
Carnallite is $KCl.MgCl_2.6H_2O$

266 **(a)**

The density of alkali metal is as :

Element : Li Na K Rb Cs

Density : 0.53 0.97 0.68 1.53 1.90

Hence, the order of increasing density is as

$$Li < K < Na < Rb < Cs$$

267 **(b)**

$BeO + C \longrightarrow Be + CO$

268 **(b)**

$$CaSO_4 . \frac{1}{2}H_2O + 1\frac{1}{2}H_2O \xrightarrow{\text{Setting}}$$

$$CaSO_4 . 2H_2O \xrightarrow{\text{Hardening}} CaSO_4 . 2H_2O$$

269 **(c)**

The stability of hydroxides of first group elements increases down the group.

270 **(a)**

The solubility of silver bromide in hypo solution due to the formation of $Na_3Ag(S_2O_3)_2$.

$$AgBr + 2Na_2S_2O_3 \longrightarrow Na_3Ag(S_2O_3)_2 + 2NaBr$$

Sod. argentothiosulphate

(colourless)

271 **(b)**

The abundance ratio is Na > K > Li > Cs > Fr

272 **(c)**

It is a reason for given fact.

273 **(a)**

Fluorspar (CaF_2) is an ore of calcium.

274 **(c)**

Alkali metal compounds are more ionic and soluble in water.

275 **(a)**

$CaCl_2 \rightarrow Ca^{2+} \quad 2Cl^-$

(molten) cathode anode

Cathode $Ca^{2+} + 2e^- \rightarrow Ca$

Anode $2Cl^- \rightarrow 2e^- + Cl_2$

276 **(b)**

Na^+ is preferentially discharged on Hg electrode.

277 **(b)**

Li^+ is having largest hydrated ionic size while Rb^+ is having smallest.

Smaller the size, greater the mobility.

278 **(c)**

At anode : $2Cl^- \longrightarrow Cl_2 + 2e$

At cathode: $2H^+ + 2e \longrightarrow H_2$

279 **(a)**

The m.p. of NaCl is lowered on addition of KCl.

280 **(a)**

$Na_2CO_3 + Fe_2O_3 \longrightarrow 2NaFeO_2$

281 **(a)**

Blanc fixe is finely divided $BaSO_4$.

282 **(c)**

$CaCN_2 + 3H_2O \longrightarrow CaCO_3 + 2NH_3$

283 **(b)**

$$KNO_3 \longrightarrow KNO_2 + \frac{1}{2}O_2$$

Rest all give NO_2

284 **(b)**

Cationic radius increases down the group and decreases along the period.

285 **(a)**

Standard solution of iodine is used to estimate $Na_2S_2O_3$ (hypo) solution. It is oxidised to sodium tetrathionate by iodine.

$$2Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + 2NaI$$

286 **(b)**

$Zn + 2NaOH \longrightarrow Na_2ZnO_2 + H_2$

287 **(d)**

It is chemical formula of hypo.

288 **(b)**

Abundance ratio is Ca > Mg > Be > Sr~Ba > Ra.

289 **(a)**

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$

(X)

$$CaO + H_2O \longrightarrow Ca(OH)_2$$

(Y)

$$Ca(OH)_2 + 2CO_2 \longrightarrow Ca(HCO_3)_2$$

(Z)

$$Ca(HCO_3)_2 \xrightarrow{\Delta} CaCO_3 \rightarrow CO_2 + H_2O$$

(X)

290 **(c)**

When sodium thiosulphate solution is added to AgBr, then sodium argentothiosulphate is obtained.

$$AgBr + 2Na_2S_2O_3 \longrightarrow \underset{\text{(colourless)}}{Na_3[Ag(S_2O_3)_2]} + NaBr$$

sodium argentothiosulphate

291 **(c)**
It is a fact

292 **(c)**

$$Na + H_2O \longrightarrow NaOH + \frac{1}{2}H_2; \quad \Delta H = -ve$$

293 **(c)**
NaF possesses most ionic character.

294 **(d)**
The elements of IInd period show similar properites as the elements of III period which are diagonally placed to them.

II period	Li	Be	B	C	N
III period	Na	Mg	Al	Si	P

295 **(a)**

$$Be + 2NaOH \longrightarrow Na_2BeO_2 + H_2$$

296 **(b)**
In II-A group, the stability of carbonates increase with the rise in atomic number due to small size of the resulting oxide ion.
i.e.,

$$BeCO_3 < MgCO_3 < CaCO_3 < SrCO_3 < BaCO_3$$

297 **(c)**
Aqueous solution of baryta (BaO) is called baryta water, *i. e.*, $Ba(OH)_2$.

298 **(c)**
Ba^{2+} forms insoluble $BaSO_4$, Pb^{2+} forms $PbCl_2$ and $PbSO_4$ both insoluble in cold water.

299 **(c)**

Na	K	Ba	Ca
yellow	pale violet	apple green	brick red crimson

300 **(d)**

$$Ca(NO_3)_2 \longrightarrow CaO + 2NO_2 + \frac{1}{2}O_2$$

Ca imparts brick red colour to flame.

301 **(c)**

$$6KOH + 3Cl_2 \longrightarrow KClO_3 + 5KCl + 3H_2O$$

302 **(a)**
Li is much softer than the other group first metals. Actually, Li is harder than other alkali metals

303 **(d)**

$$Na_2S_2O_3 + 2HCl \longrightarrow 2NaCl + SO_2 + S + H_2O$$
$$SO_2 + Br_2 + 2H_2O \longrightarrow H_2SO_4 + 2HBr$$

304 **(d)**
Magnesium (Mg) cannot be obtained by the electrolysis of its aqueous salt solution because when it is liberated at cathode, at once reacts with H_2O to give metal hydroxide and hydrogen.

305 **(a)**
Follow Fajan's rule.

306 **(d)**
It is a fact.

307 **(d)**
Hg covers surface of sodium to an extent and thus, surface area available for reaction decreases.

308 **(a)**
On moving down the second group the thermal stability of alkaline earth metal carbonates increases.
Hence, $MgCO_3$, being the carbonate of upper element, decomposes at lowest temperature.

309 **(b)**
When calcium carbide reacts with nitrogen at 1000°C, calcium cyanamide and carbon is formed.

$$CaC_2 + N_2 \xrightarrow{1000°C} \underset{\text{calcium cyanamide}}{CaCN_2} + C$$

310 **(b)**
Grignard reagents are $RMgX$.

311 **(a)**
Alkali metals have low ionisation energy. They posses minimum value of ionisation energy in their period.

312 **(c)**
Violet colour to flame is characteristic of potassium. Also aqueous solution of $K_2CO_3$is alkaline.

313 **(b)**
LiF has smallest cation and smallest anion. Thus, coulombic forces are strongest.

314 **(d)**
The order of the size of hydrated ions of I group metals is,

$$Li^+(aq.) > Na^+(aq.) > K^+(aq.) > Rb^+(aq.) > Cs^+(aq \ldots\ldots\ldots\ldots)$$

315 **(a)**

$Na \xrightarrow{O_2} Na_2O_2 \xrightarrow{H_2O} NaOH \xrightarrow{CO_2} Na_2CO_3$

316 **(c)**
$BaSO_4$ is insoluble in NH_3 and hot water.

317 **(b)**
(i) The alkali metal superoxides contain O_2^- ion, which has an unpaired electron, hence they are paramagnetic in nature.
(ii) The basic character of alkali metal hydroxides increases on moving down the group.
(iii) The conductivity of alkali metal chlorides in their aqueous solution increases on moving down the group because in aqueous solution alkali metal chlorides ionize to give alkali metal ions. On moving down the group the size of alkali metal ion increases, thus degree of hydration decreases, due to this reason their conductivity in aqueous solution increases on moving down the group.
(iv) DIAGRAM
$CO_3^{2-} + 2H_2O \rightarrow H_2CO_3 + 2OH^-$
Thus, basic nature of carbonates in aqueous solution is due to anionic hydrolysis.

318 **(b)**
$2Mg + O_2 \longrightarrow 2MgO + Light$

319 **(b)**
Basic mercuric carbonate is abtained in this reaction.

$Na_2CO_3 + 2HgCl_2 \rightarrow HgCO_3 . HgO + 2NaCl + Cl_2 + CO_2$

320 **(a)**
A suspension of $Mg(OH)_2$ in water is used as antacid under the name of milk of magnesia.

321 **(c)**
$AlCl_3 + 3NaOH \longrightarrow Al(OH)_3 + 3NaCl$
$Al(OH)_3 + 3NaOH \longrightarrow \underset{\text{Soluble}}{Na_3AlO_3} + 3H_2O$

322 **(b)**
Sodium thiosulphate ($Na_2S_2O_3$) is useful in photography due to its complex formation property. It is used in photography as a fixer since, it dissolves unexposed silver bromide.

323 **(c)**
$Ca + H_2O \longrightarrow CaO + H_2$;
$CaO + H_2O \longrightarrow Ca(OH)_2$
$Ca(OH)_2 + CO_2 \longrightarrow CaCO_3 + H_2O$

324 **(a)**
MgO is basic; rest all are amphoteric.

325 **(b)**
Epsom salt is used as purgative.

326 **(c)**
$Sn + 2NaOH + H_2O \longrightarrow Na_2SnO_3 + 2H_2$.

327 **(b)**
Alkali metals have ns^1 configuration.

328 **(a)**
It is an use of Mg.

329 **(a)**
$Ni(OH)_2$ is green insoluble mass in alkaline medium.

330 **(d)**
Mg due to lightness and toughness is used in ships.

332 **(a)**
For an ionic compound if lattice energy < its hydration energy, it is water soluble.

333 **(b)**
NaCl has fcc structure.

334 **(a)**
Na_2CO_3 will not decompose on heating.

All alkali metal (IA group) carbonates (except Li_2CO_3) are highly stable and not decomposes on heating. Carbonates of alkaline earth metals (II A group) decompose into CO_2 and metal oxide.

335 **(b)**
Both have 18 electrons.

336 **(d)**
$Na_2CO_3 .10H_2O \xrightarrow{\Delta} Na_2CO_3 . H_2O \xrightarrow{\Delta} Na_2CO_3 + H_2O \uparrow$

337 **(c)**
Anhydrous $CaCl_2$ is used for fast drying of neutral gases.

339 **(c)**
It is a fact.

340 **(d)**
Anhydrous calcium chloride is used in the laboratory for fast drying of neutral gases

341 **(a)**
The presence of excess of sulphur makes sodium thiosulphate a useful reducing agent.
$2Na_2S_2O_3 + I_3 \rightarrow Na_2S_4O_6 + 2NaI$
This reaction is applied in volumetric estimation of iodine. In this reaction sodium thiosulphate acts as a reducing agent.

342 **(b)**
The alkaline earth metal salts do not contain unpaired electrons.

343 **(c)**

Molten NaCl has Na^+ and Cl^- ions.

344 **(a)**
Ag and Hg oxides decompose on heating.

345 **(c)**
When a few drops of $FeCl_3$ solution is added to hypo solution, a violet colour of ferric thiosulphate is obtained.

$$3Na_2S_2O_3 + 2FeCl_3 \rightleftharpoons \underset{\text{violet colour}}{Fe_2(S_2O_3)_3} + 6NaCl$$

This colour disappears quickly due to reduction of ferric chloride by thiosulphate.

$$2FeCl_3 + 2Na_2S_2O_3 \rightarrow 2FeCl_2 + Na_2S_4O_6 + 2NaCl$$

346 **(d)**
High blood pressure is developed if Na^+ becomes more in human blood.

347 **(a)**
Li_2CO_3 decomposes on heating:

$$Li_2CO_3 \longrightarrow Li_2O + CO_2.$$

348 **(d)**

$$NaCl + H_2O \longrightarrow Na^+(aq) + Cl^-(aq)$$

349 **(d)**

$$\text{Formula of gypsum} = CaSO_4.2H_2O$$

$$\text{Formula of plaster of Paris} = CaSO_4.\frac{1}{2}H_2O$$

$$\text{Difference of water molecule} = 2H_2O - \frac{1}{2}H_2O$$

$$= 1\frac{1}{2}H_2O$$

350 **(b)**

$$^{226}_{88}Ra \longrightarrow {}^{222}_{86}Rn + {}^{4}_{2}He$$

351 **(a)**
Effective nuclear charge (ENC) of K^+ > ENC of Cl^- and thus, shells are pulled more effectively in K^+ ion.

352 **(a)**
The lattice energy of alkali metal halides decreases down the group due to increase in size of alkali metals. Thus,

LiCl	NaCl	KCl	RbCl	CsCl
883°C	808°C	772°C	717°C	645°C

353 **(c)**

$$Na + NH_3 \longrightarrow NaNH_2 + \frac{1}{2}H_2$$

354 **(a)**
Alkali metals are strongest reducing agent among elements of Periodic Table. The reducing character decreases down the group.

$\therefore$ Li is strongest reducing agent among Li, Na, Mg and Ca.

355 **(d)**
Due to small size of Na^+, it is heavily hydrated and become large molecule.

Ionic conductance increases down the group in alkali metals. Order of ionic conductance

$$Na^+ < K^+ < Rb^+ < Cs^+$$

356 **(c)**

$$CO + NaOH \xrightarrow[\text{High } P]{200^0C} HCOONa$$

The only reaction in which carbon monoxide (a neutral oxide of carbon) acts as an acid.

357 **(b)**
Be and Mg salts possess covalent nature.

358 **(c)**
Beryl is an ore of Be, *i.e.*, (BeO).

360 **(d)**
These are various names for NaCl.

362 **(a)**

$$2NaHCO_3 + MgCl_2 \longrightarrow MgCO_3 + 2NaCl + H_2O$$

363 **(c)**
K_2O is pot. Oxide; K_2O_2 is pot. Peroxide; KO_3 is ozonide.

364 **(a)**
It is reason for the given fact.

365 **(d)**
Follow text.

366 **(a)**
$CaCl_2$ is hygroscopic in nature.

367 **(a)**
KI reacts with Pb^{2+}, Hg^{2+} and Cu^{2+} to give insoluble iodides of Pb, Hg and Cu.

368 **(c)**
Both Be and Al are rendered passive due to the formation of inert, insoluble and imprevious oxide layer on their surface.

370 **(c)**

$$K_2O + H_2O \longrightarrow \underset{\text{Alkali}}{2KOH}$$

371 **(c)**
Mg is found in sea water.

372 **(b)**
The formula of 'A' is M_3N. It suggests that M is a monovalent metal.

$$\underset{(M)}{6Li} + N_2 \rightarrow \underset{(A)}{2Li_3N} \xrightarrow{\Delta} 6Li + N_2$$

lithium nitride

$$Li_3N + 3H_2O \rightarrow 3LiOH + NH_3$$

(B)

$$CuSO_4 + 4NH_3 \rightarrow [Cu(H_3)_4]SO_4$$

blue solution

Hence, M and B are Li and NH_3 respectively.

373 **(b)**
Salts of calcium are used in the form of manure *e.g.,* triple superphosphate of lime $[Ca(H_2PO_4)_2H_2O]$.

374 **(b)**
Mixture of $MgCl_2$ and MgO is called Sorel's cement. It is $MgCl_2 . 5MgO . xH_2O$.

375 **(a)**
The electropositive character increase down the gp. and decreases along the period.

376 **(c)**
In Castner process the process of extracting sodium metal can be written as,

$$4NaOH \longrightarrow 4Na^+ + 4OH^-$$

Its oxidation reaction which occurs at anode is

$$4OH^- \longrightarrow 2H_2O + O_2 + 4e^-$$

377 **(a)**
Calcium is manufactured by the electrolysis of a molten mixture of calcium chloride containing some CaF_2.

$$CaCl_2 \rightleftharpoons Ca^{2+} + 2Cl^-$$

$$Ca^{2+} + 2e^- \rightarrow Ca \text{ (at cathode)}$$

378 **(d)**

$$3Mg + N_2 \longrightarrow Mg_3N_2$$

$$2Mg + O_2 \longrightarrow MgO$$

$$2Mg + CO_2 \longrightarrow 2MgO + C$$

379 **(d)**
Baking soda is $NaHCO_3$.

380 **(a)**
The basic character of oxides decreases along the period.

381 **(b)**
Bleaching powder is obtained by treating chlorine with slaked lime.

$$Ca(OH)_2 + Cl_2 \rightarrow CaOCl_2 + H_2O$$

Slaked lime bleaching powder

382 **(c)**
Siedlitz powder contains $NaHCO_3$.

383 **(d)**
$NaHCO_3$ is manufactured as byproduct in Solvay process for Na_2CO_3.

384 **(c)**
It is a reason for given fact.

385 **(b)**

$$Na_2O_2 + 2H_2O \rightarrow H_2O_2 + 2NaOH$$

$$2H_2O_2 \xrightarrow{NaOH} 2H_2O + O_2$$

Water used during the reaction reacts with Na_2O_2 to from NaOH which tends to decompose H_2O_2.

386 **(a)**
A characteristics of alkali metals.

387 **(a)**
It is a reason for given fact.

388 **(b)**
When CO_2 gas is passed through a brine solution (28% NaCl) saturated with ammonia, it gives sodium bicarbonate which on drying and heating gives sodium carbonate.

389 **(c)**
In Down process, sodium is manufactured by the electrolysis of fused sodium chloride in the presence of $CaCl_2$ and KF using graphite anode and iron cathode.

$$NaCl \rightleftharpoons Na^+ + Cl^-$$

$$Na^+ + e^- \longrightarrow Na \text{ (at cathode)}$$

$$2Cl^- \rightarrow Cl_2 + 2e^- \text{(at anode)}$$

$CaCl_2$ + KF lower the melting point from the 1085 K to 850 K.

390 **(d)**
From Be to Ba ionic character increases

391 **(a)**
Mg combines directly with N_2.

392 **(d)**
It is a fact.

393 **(c)**
On moving down the group, lattice energy remains almost constant as the sulphate is so big that small increase in size of the cations does not make difference. Hydration energy causes decrease in the solubility of the sulphates as the ionic size increases. Thus, the correct order is

$$Be > Mg > Ca > Sr > Ba$$

394 **(b)**

It is a reason for given fact.

396 **(c)**

$4S + 6NaOH \longrightarrow Na_2S_2O_3 + 2Na_2S + 3H_2O$

398 **(a)**

On fusion ions are separated from each other.

$NaH \xrightarrow{\Delta} Na^+ + H^-$

399 **(a)**

Plaster of Paris $CaSO_4 . \frac{1}{2}H_2O$, gypsum $CaSO_4 . 2H_2O$.

400 **(d)**

Mg alloys are lighter.

401 **(d)**

$5Mg + Air(N_2 + O_2) \longrightarrow Mg_3N_2 + 2MgO.$

402 **(c)**

The effective nuclear charge order $K^+ > Ca^+ > Ba^+$.

403 **(d)**

Setting of plaster of Paris is exothermic process

$$CaSO_4 \cdot \frac{1}{2}H_2O \xrightarrow{H_2O} CaSO_4 \cdot 2H_2O$$

orthorhombic

$$\xrightarrow{\text{Heating}} CaSO_4 \cdot 2H_2O$$

mono orthorhombic

gypsum

404 **(d)**

When carbonates are heated, they decompose to form the oxide. Sodium carbonate and potassium carbonate do not decompose. The carbonate become more difficult to decompose as we go down the 1st group

405 **(b)**

Hydrides of alkaline earth metals (except Be) are obtained by heating them in hydrogen. BeH_2 is obtained by

$2BeCl_2 + LiAlH_4 \longrightarrow 2BeH_2 + LiCl + AlCl_3$

407 **(b)**

The basic character of metal oxides and hydroxides decreases along the period and increases down the gp.

408 **(d)**

Cd does not react with NaOH.

409 **(b)**

E°_{OP} of Mg > E°_{OP} of Cu.

410 **(d)**

$2Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2NaI$

411 **(d)**

These are uses of Mg.

412 **(b)**

$LiNO_3$ behaves differently from other alkali metal nitrates.

$$2LiNO_3 \xrightarrow{\Delta} Li_2O + 2NO_2 + \frac{1}{2}O_2$$

$$NaNO_3 \xrightarrow{\Delta} NaNO_2 + \frac{1}{2}O_2$$

413 **(c)**

Bleaching action of bleaching powder is due to Cl_2, it liberate with dilute acids or even CO_2.

$$CaOCl_2 + CO_2 \rightarrow CaCO_3 + Cl_2$$

414 **(d)**

Alkaline earth metals combine directly with O_2 to form oxides which when further heated in presence of excess of O_2 form peroxides. Thus, BaO is formed

416 **(a)**

$CaO + CO_2 \longrightarrow CaCO_3$; CO_2 does not react with $NaHCO_3$.

417 **(c)**

The solubility of hydroxides of alkaline earth metals in water increases on moving down the group

418 **(c)**

The complex forming tendency is more in Li^+ due to its small size. The tendency of complex formation decreases as the size increases.

419 **(c)**

$$2LiNO_3 \longrightarrow Li_2O + 2NO_2 + \frac{1}{2}O_2$$

420 **(b)**

Alkali metals have only one electron in their ultimate shell, hence they can easily donate electron and act as reductant *e.g.,*

$$Fe_2O_3 + 6Na \rightarrow 2Fe + 2Na_2O$$

421 **(c)**

Carnallite is $KCl \cdot MgCl_2 \cdot 6H_2O$.

423 **(d)**

$K + O_2 \longrightarrow KO_2$; $2Mg + O_2 \longrightarrow 2MgO$;
$3Mg + N_2 \longrightarrow Mg_3N_2$.

424 **(c)**

$CaH_2 + 2H_2O \longrightarrow Ca(OH)_2 + 2H_2$

426 **(b)**

C_2^{2-} is $[C \equiv C]^{2-}$

427 **(b)**
$BeSO_4$ is soluble in water.

428 **(b)**
In rest all NaOH is used.

429 **(c)**
Cement is mixture of Ca and Al silicates. It has some Fe_2O_3 also. It does not have sulphur.

430 **(a)**
$KOH(aq.)$ is potash lye; NaOH(aq.) is soda lye; anhydrous Na_2SO_4 is salt cake.

431 **(b)**
Ionization enthalpy decreases down the group.

432 **(d)**

$$Na_2O_2 + H_2O \longrightarrow 2NaOH + \frac{1}{2}O_2$$

433 **(c)**

$$SiCl_4 + 2Mg \longrightarrow 2MgCl_2 + Si$$

434 **(a)**
Except Be_3N_2, rest all are non-volatile nitrides.

435 **(a)**
$LiHCO_3$ is not stable in solid state.

436 **(d)**
Na_2CO_3 reacts with $MgSO_4$ to give basic magnesium carbonate.

$$2MgSO_4 + 2Na_2CO_3 + H_2O \longrightarrow MgCO_3 \cdot Mg(OH)_2 + 2Na_2SO_4 + CO_2$$

437 **(b)**
$BaCrO_4$ is yellow solid, insoluble in CH_3COOH.

438 **(b)**
K is used as fertilizer (NPK) for nutrition of plants.

439 **(b)**
(a) $Na_2CO_3 . 10H_2O$ – Washing soda or sol soda.

(b) $Na_2SO_4 . 10\ H_2O$ – Glauber's salt.

(c) $MgSO_4 . 7\ H_2O$ – Epsom salt

440 **(b)**

$$ZnSO_4 + 2NaOH \longrightarrow \underset{\text{ppt.}}{Zn(OH)_2} + Na_2SO_4$$

$$Zn(OH)_2 + 2NaOH \longrightarrow \underset{\text{soluble}}{Na_2ZnO_2} + 2H_2O$$

442 **(c)**
Due to efflorescence (to give out H_2O) nature of $Na_2CO_3 \cdot 10H_2O$.

443 **(a)**
$Fe(OH)_3$ is not soluble in NaOH

(b) $Zn(OH)_2 + NaOH \rightarrow \underset{\text{sod. Zincate}}{Na_2ZnO_2} + 2H_2O$

(soluble)

(c) $Al(OH)_3 + NaOH \rightarrow \underset{\text{sod. aluminate}}{NaAlO_2} + 2H_2O$

(soluble)

(d) $Sn(OH)_2 + NaOH \rightarrow \underset{\text{sod. stannate}}{Na_2SnO_2} + 2H_2O$

(soluble)

444 **(b)**

$$MgCO_3 \xrightarrow{\text{Heat}} MgO + CO_2$$

The metal oxide of which is stable, has unstable carbonate

445 **(b)**
Due to the presence of Sr, the bombs becomes dark red in colour

446 **(d)**
Be forms polymeric hydride.

447 **(d)**
Hypo or sodium thiosulphate ($Na_2S_2O_3$) is used in the fixing of image. It dissolves unaffected AgBr but leaves metallic silver unchanged.

$$\underset{\text{Hypo}}{2Na_2S_2O_3} + AgBr \rightarrow \underset{\text{soluble}}{Na_3[Ag(S_2O_3)_2]} + NaBr$$

448 **(d)**
Alkali metal hydroxides are more stronger base than alkaline earth metal hydroxides. Also basic character of hydroxides of alkaline earth metals increase down the gp.

449 **(a)**
$BeCl_2$ is covalent in nature.

451 **(d)**
Because of the smaller size of F-ions, NaF has the highest lattice energy and hence, the highest melting point

452 **(a)**
The chemical formula of feldspar is $KAlSi_3O_8$.

453 **(a)**
Formation of $Li^+(M^+)$ ion is the property of first group elements, *i.e.,* alkali metals, not that of second group elements.

454 **(c)**

Higher heat of hydration for Li^+ shows more negative ΔH for the reaction,

$Li(s) + Aq. \longrightarrow Li^+(aq.);\ \Delta H = HS + IE - H_h$

455 **(d)**

The members of II and III period in periodic table are referred as representative elements.

456 **(a)**

The basic character of oxides increases down the gp.

457 **(c)**

$NaCl + NH_4OH + CO_2 \longrightarrow NaHCO_3 + NH_4Cl$

458 **(c)**

It is sodium ammonium hydrogen phosphate.

459 **(c)**

The thermal stability of hydrides decreases from LiH to CsH.

460 **(c)**

Mg^{2+} is smallest cation; Cl^- is larger than F^-.

461 **(c)**

$Ca(OH)_2 + Ca(HCO_3)_2 \rightarrow 2CaCO_3 \downarrow + H_2O$

(A)

Temporary hardness of water is removed by $Ca(OH)_2$. It converts bicarbonates into insoluble calcium and magnesium carbonate which are removed by filtration.

$Ca(OH)_2 + Na_2CO_3 \rightarrow CaCO_3 + 2NaOH$

A sodium carbonate caustic soda

$Ca(OH)_2 + 2CO_2 \rightarrow Ca(HCO_3)_2$

(A) calcium bicarbonate

(cloudy)

462 **(c)**

As salt on heating gives Ag,

$2AgCl + Na_2CO_3 \longrightarrow Ag_2CO_3 + 2NaCl$

$\downarrow \Delta$

$2Ag + CO_2 + \frac{1}{2}O_2$

463 **(a)**

Be being smallest alkaline earth metal have highest charge size ratio and thus, forms complex salts, *e.g.*, $[BeF_3]^-, [BeF_4]^{2-}$

464 **(b)**

The electropositive character increases down the group; (a) and (b) are 1 group elements.

465 **(c)**

In Le-blanc process, potassium chloride of carnallite is converted to K_2SO_4 which is then heated with coal and lime stone to giveK_2CO_3. (Potash or pearl ash)

466 **(c)**

It is a method to precipitate Mg^{2+} ion in VI gp, of qualitative analysis.

467 **(a)**

For an ionic compound to be soluble in water its hydration energy should be more than its lattice energy.

468 **(c)**

NaOH absorbs moisture and CO_2 from air to form Na_2CO_3;

$2NaOH + CO_2 \rightarrow Na_2CO_3 + H_2O$

469 **(d)**

The solubility order: $CaF_2 < CaCl_2 < CaBr_2 < CaI_2$.

470 **(a)**

Li does not form double salts.

471 **(b)**

It is a fact.

472 **(b)**

The standard oxidation potential increases from Be to Ba, hence their reducing property also increases from Be to Ba.

473 **(d)**

$Na_2S_4O_6$ is sodium tetrathionate.

474 **(a)**

Egg-shells are made up of $CaCO_3$.

475 **(a)**

The hydroxides of alkali and alkaline earth metals are strong bases. Thus, $Zn(OH)_2$ is the weakest base

476 **(a)**

$MNO_3 \xrightarrow{\Delta} MNO_2 + \frac{1}{2}O_2$

477 **(b)**

Li has highest ionisation enthalpy and use larger energy of flame and thus emits red light (longer wave length).

478 **(b)**

Solubilities of carbonates decrease down the group because lattice energy decrease is almost constant while decrease in hydration energy downs sharply, finally difference of hydration energy and lattice energy decrease thus solubility decreases.

479 **(c)**
In presence of dil. acids, bleaching powder loses oxygen.

$$2CaOCl_2 + H_2SO_4 \longrightarrow CaCl_2 + CaSO_4 + 2HClO$$
$$HClO \longrightarrow HCl + [O]$$

This oxygen is used for oxidation–bleaching.

480 **(c)**
Cathode: $2H_2O + 2e \longrightarrow H_2 + 2OH^-$
Anode: $2Cl^- \longrightarrow Cl_2 + 2e$

481 **(d)**
Due to small size and almost same charge mass ratio.

482 **(b)**
Oxone is Na_2O_2 + dil. HCl, used for bleaching of delicate fibres.

483 **(b)**
Witherite is $BaSO_3$.

484 **(a)**
$PbCl_2$ is insoluble in cold water. Mg^{2+} and Pb^{2+} do not show flame colour.

485 **(a)**
$BeSO_4$ is most soluble because hydration energy is more than lattice energy

$$BeSO_4 > MgSO_4 > CaSO_4 > SrSO_4 > BaSO_4$$

Hydration energy decreases, hence solubility decreases

486 **(b)**
Li-Mg shows diagonal relationship due to this fact.

487 **(b)**
Solvay process is used for the manufacture of Na_2CO_3.

488 **(a)**
All alkali metal salts are soluble in water. The degree of hydration depends upon the size of the cation. Smaller the size of cation, greater is its charge density and hence, greater is its tendency to withdraw electrons from molecules which are thus polarised. Li^+ ion being smallest in size among alkali metal ions is the most extensively hydrated while Cs^+ ion the largest alkali metal ion is the least hydrated. The size of hydrated alkali ions is as

$$Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$$

(Relative ionic radii in water)

(Relative degree of hydration)

489 **(d)**
The stability and basic character of hydrides decreases down the group.

490 **(c)**
Ra is radioactive and thus, decays instantaneously.

491 **(a)**
Atomic volume increases down the group.

492 **(c)**
Mme Curie and her husband Piere Curie isolated radium from pitch blende.

493 **(c)**
The basic character of metal oxides and hydroxides decreases along the period and increases down the gp

494 **(c)**
Greater the electropositive character, more will be stability and high decomposition temperature.

∴ Among given choices barium has highest electropositive character and hence, highest decomposition temperature.

495 **(c)**

$$Na_2SO_3 + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O + SO_2$$

496 **(a)**
Gun powder is an explosive mixture containing KNO_3 + Charcoal + S

498 **(a)**

$$ZnCl_2 + 2NaHCO_3 + \longrightarrow ZnCO_3 + 2NaCl + H_2O + CO_2$$

499 **(a)**
P^{3-} ions are phosphide ion.

500 **(a)**
Only Li combines directly with nitrogen to form lithium nitride,

$$6Li + N_2 \longrightarrow 2Li_3N$$

502 **(b)**

$$CaCO_3 \xrightarrow{\Delta} \underset{\text{basic oxide}}{CaO} + \underset{\text{Acidic oxide}}{CO_2}$$

503 **(d)**
Sorel's cement – $MgCl_2 \,.\, 5MgO \,.\, xH_2O$.

504 **(a)**
When KI is added to acidified solution of sodium nitrite NO gas is liberated and I_2 is set free.

$$2I^- + 4H^+ + 2NO_2^- \longrightarrow 2NO + I_2 + 2H_2O$$

505 **(a)**

Baryta is BaO.

506 **(c)**

$\because$ $NaHCO_3$ is more soluble than Na_2CO_3 in water.

$\therefore$ Na_2CO_3 cannot exist in water along with $NaHCO_3$.

507 **(b)**

$CaCl_2$ is used as desiccating agent.

508 **(c)**

When carbon monoxide is passed over solid caustic soda at 200°C, sodium formate is obtained.

$$CO + NaOH \xrightarrow{200°C/10\ atm} \underset{\text{sodium formate}}{HCOONa}$$

509 **(c)**

$[Ba^{2+}][Cl^-]^2 > K_{sp}$ of $BaCl_2$

510 **(b)**

At anode: $2Cl^- \longrightarrow Cl_2 + 2e$

At cathode: $2H^+ + 2e \longrightarrow H_2$

511 **(a)**

In presence of dil. Acids, bleaching powder loses oxygen.

$$2CaOCl_2 + H_2SO_4 \longrightarrow CaCl_2 + CaSO_4 + 2HClO$$
$$HClO \longrightarrow HCl + [O]$$

This oxygen is used for oxidation—bleaching.

512 **(b)**

Sodium thiosulphate, $Na_2S_2O_3$ gets oxidised by chlorine water.

$$Na_2S_2O_3 + 4Cl_2 + 5H_2O \rightarrow 2NaHSO_4 + 8HCl$$

513 **(d)**

Washing soda is chemically $Na_2CO_3 \cdot 10H_2O$.

514 **(d)**

Mg is present in chlorophyll.

515 **(a)**

$$Cl_2 + Ca(OH)_2 \rightarrow CaOCl_2 + H_2O$$

Compound 'X' is dry slaked lime.

516 **(d)**

Hasenclever plant (old method), Beckmann's plant (new method) are the commercial method to obtain bleaching powder by:

$$2Cl_2 + 3\underset{\substack{\text{Dry slaked}\\ \text{lime}}}{Ca(OH)_2} \longrightarrow \underbrace{Ca(OCl_2) + CaCl_2 \cdot Ca(OH)_2H_2O}_{\text{Bleaching powder}} + H_2O$$

517 **(c)**

K reacts with HCl violently.

518 **(b)**

Alkali metal hydroxide are highly soluble in water.

519 **(c)**

$KI + I_2 \longrightarrow KI_3$

520 **(a)**

Be ($Z = 4$) has maximum covalency of 4 while Al($Z = 13$) has maximum covalency of 6.

521 **(d)**

At Cathode: $K^+ + e \longrightarrow K$ and $Mg^{2+} + 2e \longrightarrow Mg$

At Anode: $2Cl^- \longrightarrow Cl_2 + 2e$

522 **(b)**

Only Ca in given choices reacts with water to give H_2.

523 **(c)**

The composition of potash alum is

$$K_2SO_4 \,.\, Al_2(SO_4)_3 \,.\, 24H_2O$$

or $$K_2Al_2S_4H_{48}O_{40}$$

It is a double salt of potassium sulphate and aluminium sulphat.

524 **(c)**

Dolomite is $CaCO_3 \cdot MgCO_3$.

525 **(b)**

Crystal carbonate is monohydrate of Na_2CO, *i.e.*, $Na_2CO_3H_2O$

526 **(d)**

It is a fact.

527 **(d)**

Electropositive character increases as we move down the group because of the increase in atomic size, atoms have more tendency to lose electrons. Hence, Cs is most electropositive element in alkali metals.

528 **(b)**

A deliquescent substance absorbs water to the extent that it forms a saturated solution.

529 **(a)**

Group first elements are so highly electropositive that they emit electron, even when exposed to light (photoelectric effect) and this character increases on moving down the group from lithium towards caesium

530 **(d)**

The hydration energy of cations decrease with increase in size of cation.

531 **(a)**

Due to ammonia solvated electrons.

532 **(c)**

Tincal is also known as borax; a natural mineral of Na and B.

534 **(a)**

Baeyer's process or concentration of bauxite ore- Impure bauxite is treated with NaOH with which it forms water soluble sodium meta aluminate complex.

$$Al_2O_3 . 2H_2O + 2NaOH + 3H_2O \xrightarrow{420-425K} \underset{\text{sod. metaaluminate}}{2NaAlO_2}$$

Impurities such as Fe_2O_3, TiO_2 and silica are left behind. Pure alumina is recovered from solution.

$$NaAlO_2 + 2H_2O \rightarrow Al(OH)_3 + NaOH$$

$$2Al(OH)_3 \xrightarrow{\Delta} Al_2O_3 + 2H_2O$$

535 **(a)**

$$MgCl_2 \cdot 2H_2O \xrightarrow{\text{Dry HCl}} MgCl_2 + 2H_2O$$

536 **(b)**

Sodium vapours on heating emit yellow light.

540 **(d)**

$$CaCN_2 + 3H_2O \longrightarrow CaCO_3 + NH_3$$

541 **(d)**

$$CaCO_3 \longrightarrow \underset{\text{(Base)}}{CaO} + \underset{\text{(Acid)}}{CO_2}$$

542 **(c)**

All the alkali halides except lithium fluoride are freely soluble in water. I_2 (non-polar) is least soluble in water. Group IIA carbonates ($BaCO_3$) are insoluble in water. PbI_2 is sparingly soluble in cold water but quite soluble in hot water. KF (most polar) is most readily soluble in water.

543 **(a)**

I group elements possess lowest ionization enthalpy.

544 **(c)**

N^{3-} has $7p$, $10e$ and $7n$.

545 **(b)**

Sr imparts crimson red light to flame.

546 **(d)**

The formula of carnallite is $KCl . MgCl_2 . 6H_2O$. In this formula only potassium gives colour (lilac) to flame, whereas magnesium does not give flame colouration.

547 **(b)**

Zn dissolves in conc. NaOH due to the formation of sodium zincate.

$$Zn + 2NaOH \rightarrow Na_2ZnO_2 + 2H_2O + 3NaCl$$

549 **(b)**

Alkali metals cannot be obtained by electrolysis of their aqueous salt solutions.

550 **(a)**

Salts of $HClO_2$ are chlorites.

551 **(c)**

$$CaC_2 + 2H_2O \longrightarrow Ca(OH)_2 + C_2H_2$$

552 **(a)**

Nitrolim is $CaCN_2 + C$.

553 **(b)**

Calcined gypsum does not contain $CaCO_3$.

554 **(a)**

Formula of carnallite is $KCl . MgCl_2 . 6H_2O$ so, carnallite contains K and Mg.

555 **(b)**

The reactivity of alkali metals increases down the group.

556 **(b)**

$$Mg + 2HNO_3 \longrightarrow Mg(NO_3)_2 + H_2 \uparrow$$

dil.

Hence, MgO is not formed in this reaction.

558 **(b)**

It is used as reducing agent in organic reactions.

559 **(b)**

Be, Mg form polymeric hydrides.

560 **(a)**

On heating, it decomposes with evolution of CO_2.

$$MgCO_3 \xrightarrow{\Delta} MgO + CO_2$$

561 **(a)**

Lithium and magnesium shows diagonal relationship.

562 **(a)**

Ca^{2+} and C_2^{2-} ions.

563 **(c)**

The solubility of sulphates of alkaline earth metals decreases regularly on moving down the group because solubility product decreases from $BeSO_4$ to $BaSO_4$. Hence, the order of solubility of their sulphates is

$BeSO_4$ $> MgSO_4$ $> CaSO_4$ $> SrSO_4$ $> BaSO_4$

K_{sp} : very high 10×10^{-7} 2.4×10^{-5} 7.6×10^{-9}

564 **(c)**

Because of the larger size and smaller nuclear charge, alkali metals have low ionisation potential relative to alkaline earth metals