

10.THE S-BLOCK ELEMENTS

Single Correct Answer Type

1. Select the correct statement(s)
 - a) Presence of MgCl_2 in table salt causes it to clump
 - b) Addition of NaHCO_3 to table salt converts MgCl_2 to non-hygroscopic salt
 - c) Both (a) and (b)
 - d) None of the above
2. In which of the following the hydration energy is higher than the lattice energy?
 - a) BaSO_4
 - b) MgSO_4
 - c) RaSO_4
 - d) SrSO_4
3. Select the correct statement(s)
 - a) Beryllium and magnesium hydride are covalent and polymeric
 - b) CaH_2 , SrH_2 and BaH_2 are ionic
 - c) BeH_2 contains three-centre two-electron bond
 - d) All of the above are correct statements
4. A metal M readily forms water soluble MSO_4 . It also forms oxide MO which becomes inert on heating. Hydroxide $\text{M}(\text{OH})_2$ is insoluble in water but soluble in NaOH solution. What is M ?
 - a) Mg
 - b) Ba
 - c) Ca
 - d) Be
5. Slaked lime and chlorine reacts to produce
 - a) Quicklime
 - b) CaCl_2
 - c) CaOCl_2
 - d) Mixture of CaCl_2 and $\text{Ca}(\text{OCl}_2)$
6. Identify the correct statement
 - a) Gypsum is obtained by heating plaster of Paris
 - b) Plaster of Paris can be obtained by hydration of gypsum
 - c) Plaster of Paris contains higher percentage of calcium than does gypsum
 - d) Plaster of Paris obtained from gypsum by oxidation
7. Alkaline earth metals are
 - a) Reducing agent
 - b) Dehydrating agent
 - c) Amphoteric
 - d) Oxidizing agent
8. A compound which can be used in space vehicles both to absorb CO_2 and liberate O_2 is
 - a) NaOH
 - b) Na_2O
 - c) Na_2O_2
 - d) $\text{CaO} + \text{NaOH}$
9. Which of the following is not used as food preservatives?
 - a) NaCl
 - b) CH_3COOH
 - c) $\text{C}_6\text{H}_5\text{COONa}$
 - d) HCHO
10. Which is used in the treatment of manic-depressive disorders?
 - a) Na_2CO_3
 - b) Li_2CO_3
 - c) K_2CO_3
 - d) MgCO_3
11. $\text{Na}_2[\text{Be}(\text{OH})_4]$ is formed when
 - a) BeO reacts with NaOH solution
 - b) Be reacts with NaOH solution
 - c) Both (a) and (b) correct
 - d) None of the above is correct
12. Be and Al do not resemble in
 - a) Both become passive on reaction with HNO_3 due to formation of oxide layer
 - b) Their chlorides are Lewis bases
 - c) Chlorides exist in polymeric form
 - d) Hydroxides are soluble in alkali as well as in acid
13. Which of the following statements are true about II A group elements?
 - a) All form nitrides in air
 - b) Be is amphoteric
 - c) MH_2 is ionic 'salt-like' hydride
 - d) All of the above are correct statements
14. Select the incorrect statement
 - a) NaOH can be stored in a vessel made of Al
 - b) HNO_3 can be stored in a vessel made of Be/Al alloy
 - c) HF can be stored in a vessel made of wax

- d) HF attacks glass
15. Automobile grease is obtained from
 a) CH_3COONa b) $\text{C}_{17}\text{H}_{35}\text{COONa}$ c) $\text{CH}_3\text{CH}_2\text{COOLi}$ d) $\text{C}_{17}\text{H}_{35}\text{COOLi}$
16. Metal carbides on reaction with H_2O form CH_4 . Carbide can be
 a) CaC_2 b) Mg_3C_2 c) Be_2C d) SiC
17. Match compounds/metal in (X) with their uses in (Y)

X	Y
A. Liquid sodium metal	1. Breathing apparatus submarine
B. Potassium stearate	2. Explosive
C. Potassium nitrate	3. Coolant in nuclear reaction
D. Potassium superoxide	4. Soft soap

Hence, correct order is

A B C D

a) 1 3 2 4

b) 3 4 2 1

c) 2 1 3 4

d) 4 2 3 1

18. Which cannot be used to generate H_2 ?
 a) $\text{Al} + \text{NaOH}$ b) $\text{Zn} + \text{NaOH}$ c) $\text{Mg} + \text{NaOH}$ d) $\text{LiH} + \text{H}_2\text{O}$
19. The deep colour produced when iodine is dissolved in a solution of potassium iodide is caused by the presence of
 a) I_2 b) I^- c) I_3^- d) I_2^-
20. CO_2 cannot be obtained by heating
 a) Na_2CO_3 b) CaCO_3 c) Li_2CO_3 d) $\text{Ca}(\text{HCO}_3)_2$
21. Lattice energy of IIA group compounds (oxides, carbonates, fluorides)
 a) Decreases as size of the ion increases b) Increases as size of the ion increases
 c) Constant for a given type of anion d) All of the above are incorrect
22. Select the correct statement(s)
 a) CaCO_3 is more soluble in a solution of CO_2 on heating H_2O
 b) NaCO_3 is converted to Na_2O and CO_2 on heating
 c) Li_2CO_3 is thermally stable
 d) Presence of CaCl_2 or CaSO_4 in water causes temporary hardness
23. The decomposition temperature is maximum for
 a) MgCO_3 b) CaCO_3 c) BaCO_3 d) SrCO_3
24. Which is/are coloured and paramagnetic?
 a) KO_2 b) K_2O_3 c) Both (a) and (b) d) None of the
25. Which is main constituent of egg-shell?
 a) CaCO_3 b) CaSiO_3 c) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ d) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
26. Gun powder spontaneously react when ignited. Reaction can be
 a) $2\text{KNO}_3(s) + 4\text{C}(s) \rightarrow \text{K}_2\text{CO}_3(s) + 3\text{CO}(g) + \text{N}_2(g)$
 b) $2\text{KNO}_3(s) + 2\text{S}(s) \rightarrow \text{K}_2\text{SO}_4(s) + \text{SO}_2(g) + \text{N}_2(g)$
 c) Both (a) & (b)
 d) None of the above
27. Match compounds given in (X) with their uses in (Y)

X	Y
A. Na_2CO_3	1. glass
B. Na_2SO_4	2. bleach

C. NaOH	3. SO ₂ absorber
D. NaOCl	4. detergent

Hence, correct order is

A B C D

a) 4 1 3 2

c) 2 4 1 3

b) 1 3 4 2

d) 3 2 4 1

28. Which does not exist in solid state?

a) NaHCO₃

b) NaHSO₃

c) LiHCO₃

d) CaCO₃

29. Magnalium contains

a) Aluminium + magnesium

c) Magnesium + iron

b) Magnesium + copper

d) Magnesium + silver

30. Be and Al resemble in the following but not in

a) Both form electron deficient hydrides

c) Both form amphoteric oxides

b) Both are rendered passive by HNO₃

d) Both have sp-hybridisation in their com

31. Gypsum is

a) CaSO₄ · 2H₂O

b) CaCO₃ · 2H₂O

c) CaSO₄ · $\frac{1}{2}$ H₂O

d) SiO₂

32. Plaster of Paris is hardened by

a) Giving out water

b) Uniting with water

c) Changing into CaCO₃

d) Liberating CO₂

33. Which can dissolve I₂?

a) KI

b) NaI

c) Both (a) and (b)

d) None of these

34. Flame test is not given by

a) Ca

b) Ba

c) Mg

d) Li

35. Lightest alkaline earth metal is

a) Be

b) Mg

c) Ca

d) Sr

36. Setting of plaster of Paris is

a) Oxidation with atmospheric oxygen

c) Dehydration

b) Combination with atmospheric CO₂

d) Hydration to yield another hydrate

37. Which is used as a treatment for bipolar disorder (an illness that involves alternating periods of depression)?

a) Li₂CO₃

b) K₂CO₃

c) LiCl

d) LiCH₃

38. A colourless solid (X) on heating evolved CO₂ and also gave a white residue, soluble in water. Residue also gave CO₂ when treated with dilute acid. [X] is

a) Na₂CO₃

b) CaCO₃

c) Ca(HCO₃)₂

d) NaHCO₃

39. Burning of Mg is extinguished by

a) Throwing N₂ liquid

b) Throwing sand

c) Throwing ice

d) Throwing water

40. When Cl₂ is passed into moist slaked lime, compound formed is

a) CaO₂Cl₂

b) CaO₂Cl

c) CaOCl₂

d) CaCl₂O₄

41. The deliquescent among the following is

a) CaCl₂

b) FeSO₄ · 7H₂O

c) CuSO₄ · 5H₂O

d) BaCl₂ · 2H₂O

42. Out of the following statements

I. Cs⁺ is highly hydrated

II. Li has highest melting point among Li, Na, K and Rb

III. Only Li forms nitride out of alkali metals

The correct statements are

a) I and II

b) II and III

c) I and III

d) I, II and III

43. Select the correct statement

a) Be and Al show diagonal relationship

c) Al forms AlF₆²⁻, on octahedral complex

b) Be form tetrahedral complexes [Be(C₂O₄)₂]²⁻

d) All of the above are correct statement

44. Which is most stable out of the following?

a) [Be(H₂O)₄]²⁺

b) [Mg(H₂O)₄]²⁺

c) [Ca(H₂O)₄]²⁺

d) [Sr(H₂O)₄]²⁺

45. Which of the following is/are correct statement(s)?
 a) $\text{Ca}_3(\text{PO}_4)_2$ in part of bones
 b) $3\text{Ca}_3(\text{PO}_4)_2 \cdot \text{CaF}_2$ is part of enamel o teeth
 c) Ca^{2+} ions are important in blood clotting
 d) All of the above are correct
46. What is impurity (as a salt) associated with table salt obtained from sea-water?
 a) NaHCO_3
 b) MgCO_3
 c) MgCl_2
 d) NaI
47. Which disproportionate into M_2O_2 (peroxide) and M (metal) on heating?
 a) Li_2O
 b) Na_2O
 c) Both (a) & (b)
 d) None of these
48. Epsom salt is
 a) $\text{BaSO}_4 \cdot 2\text{H}_2\text{O}$
 b) $\text{CaSO}_4 \cdot \text{H}_2\text{O}$
 c) $\text{MgSO}_4 \cdot 2\text{H}_2\text{O}$
 d) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$
49. Which are involved in various physiological functions in animals?
 a) Na^+
 b) K^+
 c) Both (a) and (b)
 d) None of these
50. Setting of cement is
 a) Exothermic reaction
 b) Endothermic reaction
 c) Neither endothermic nor exothermic
 d) None of the above
51. Noble gases (like He, Ne, Ar, Kr etc.) are isolated from air. One of the steps is/are
 a) Heating air with Li or Mg
 b) Bubbling air into NaOH solution
 c) Both (a) and (b) are correct
 d) None of the above is correct
52. Select the correct statement(s)
 a) CaCO_3 is more soluble in a solution of CO_2 than in H_2O
 b) Na_2CO_3 is converted to Na_2O ad CO_2 on heating
 c) Li_2CO_3 is thermally stable
 d) Presence of CaCl_2 or CaSO_4 in water causes temporary hardness
53. Which is used for fixing atmospheric nitrogen?
 a) CaCN_2 (nitrolim)
 b) Li_3N
 c) Mg_3N_2
 d) All of these
54. CO_2 gas along with solid (Y) is obtained when sodium salt (X) is heated. (X) is again obtained when CO_2 gas is passed into aqueous solution (Y). (X) and (Y) are
 a) $\text{Na}_2\text{CO}_3, \text{Na}_2\text{O}$
 b) $\text{Na}_2\text{CO}_3, \text{NaOH}$
 c) $\text{NaHCO}_3, \text{Na}_2\text{CO}_3$
 d) $\text{Na}_2\text{CO}_3, \text{NaHCO}_3$
55. Which is the major constituent of gun powder?
 a) Nitre
 b) Sulphur
 c) Charcoal
 d) Chile salt petre
56. The electron affinity of Be is similar to
 a) He
 b) B
 c) Li
 d) Na
57. The pair whose both species are used in antacid medicinal preparation is
 a) NaHCO_3 and $\text{Mg}(\text{OH})_2$
 b) Na_2CO_3 and $\text{Ca}(\text{HCO}_3)_2$
 c) $\text{Ca}(\text{HCO}_3)_2$ and $\text{Mg}(\text{OH})_2$
 d) $\text{Ca}(\text{OH})_2$ and NaHCO_3
58. Match the compound (given in X) with their colours (given in Y)
- | X | Y |
|--------------------------|------------------|
| A. Li_3N | 1. Pale yellow |
| B. K_2O | 2. Orange |
| C. Cs_2O | 3. Bright Yellow |
| D. Rb_2O | 4. Ruby red |
- A B C D
 a) 4 1 2 3
 b) 2 3 1 4
 c) 1 2 3 4
 d) None of these
59. Baking powder contains
 a) $\text{NaHCO}_3, \text{Ca}(\text{H}_2\text{PO}_2)_2$ and starch
 b) $\text{NaHCO}_3, \text{Ca}(\text{H}_2\text{PO}_2)_2$
 c) NaHCO_3 , starch
 d) NaHCO_3
60. Portland cement does not contain
 a) CaSiO_4
 b) CaSiO_3
 c) $\text{Ca}_3\text{Al}_2\text{O}_6$
 d) $\text{Ca}_3(\text{PO}_4)_2$
61. Reagent used as fixer in photography
 a) AgBr
 b) AgNO_3
 c) $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$
 d) Both (a) and (c)
62. The charge/size ratio of a cation determines its polarizing power. Which one of the following sequences

76. A covalent chloride is
 a) BeCl_2 b) NaCl c) MgCl_2 d) CaCl_2
77. There is loss in weight when mixture of Li_2CO_3 and $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
 a) Li_2CO_3 b) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ c) Both (a) and (b) d) None of these
78. Following are the ionization potential values of
 (I_1)899 kJ mol^{-1} , (I_2)1757 kJ mol^{-1} ,
 (I_3)15000 kJ mol^{-1}
 a) Na b) K c) Be d) Ne
79. II A (alkaline earth metals) and II B (zinc family) resemble
 a) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ is isomorphous with $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$
 b) II A and II B cations are not precipitated by H_2S in acidic medium
 c) Both (a) and (b)
 d) None of the above
80. Which one among the following is the most soluble in water?
 a) LiI b) LiBr c) LiCl d) LiF
81. M_2O_3 (sesquioxides) is paramagnetic in nature. It is due to the presence of
 a) Peroxide ion b) Superoxide ion c) Oxide ion d) All of the above
82. Which of the following is not an ore of magnesium
 a) Carnallite b) Magnesite c) Dolomite d) Gypsum
83. The element whose electronic configuration is $1s^2 2s^2 2p^6 3s^2$ is
 a) Non-metal b) Noble gas c) Metalloid d) Metal
84. Which is used to treat acid indigestion?
 a) $\text{Be}(\text{OH})_2$ b) KOH c) $\text{Mg}(\text{OH})_2$ d) $\text{Ca}(\text{OH})_2$
85. Which of the following is best CO_2 absorber as well as source of O_2 in submarines?
 a) KO_2 b) NaOH c) KOH d) LiOH
86. Which is the incorrect statement?
 a) The heat of hydration of the dipositive alkaline earth metal ions decrease with an increase in their ionic size
 b) NaNO_3 forms Na_2O on heating
 c) Hydration of alkali metal ion is less than that of II A
 d) Alkaline earth metal ions, because of their much larger charge to size ratio, exert a much stronger electrostatic attraction on the oxygen of water molecule surrounding them
87. The activity of alkaline earth metals as reducing agent
 a) Decreases from Be to Ba
 b) Increases from Be to Ba
 c) Increase from Be to Ca and decreases from Ca to Ba
 d) Decreases from Be to Ca and increases from Ca to Ba
88. Which is not obtained when metal carbides react with H_2O ?
 a) $\text{Al}_4\text{C}_3 + \text{H}_2\text{O} \rightarrow \text{CH} \equiv \text{CH}$ b) $\text{CaC}_2 + \text{H}_2\text{O} \rightarrow \text{CH} \equiv \text{CH}$
 c) $\text{Mg}_4\text{C}_3 + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{C} \equiv \text{C}$ d) $\text{Be}_2\text{C} + \text{H}_2\text{O} \rightarrow \text{CH}_4$
89. Which of the following is preferentially formed on reaction of oxygen and potassium?
 a) K_2O_2 b) KO_2 c) K_2O d) K_2O_3
90. Which salt can be used to identify coloured cation?
 a) Borax b) Microcosmic salt c) Both (a) and (b) d) None of these
91. The stability of K_2O , K_2O and KO_2 is in order $\text{K}_2\text{O} < \text{K}_2\text{O}_2 < \text{KO}_2$. This increasing stability at the size of metal ion increases is due to stabilization of
 a) Larger cation by smaller anions through lattice energy effects
 b) Larger cation by larger anions through lattice energy effects
 c) Smaller cations by smaller anions through mp
 d) Smaller cations by larger anions through mp

92. In alkaline earth metal sulphates, the value of hydration energy decrease down the group because of the
a) Decrease in size b) Increase in size c) Greater lattice energy d) None of these
93. Li_2CO_3 is
a) Added to bauxite in the electrolytic production of aluminium
b) Used to toughen glass
c) Used as medicine as it affects the balance between Na^+ and K^+ , and Mg^{2+} and Ca^{2+}
d) All of the above are correct
94. Select the correct statement(s)
a) Mg^{2+} ions are necessary for the activation of phosphate transfer enzymes
b) Mg is present in chlorophyll used in photosynthesis in green plants
c) Operation of $\text{Na}^+ - \text{K}^+$ pumps is biological
d) All of the above are correct statements
95. Which one of the following is correct sequence followed by molar ionic conductance of the ions?
a) $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+$ b) $\text{Rb}^+ < \text{K}^+ < \text{Na}^+ < \text{Li}^+$
c) $\text{Sr}^{2+} < \text{Ca}^{2+} < \text{Mg}^{2+} < \text{Be}^{2+}$ d) $\text{Na}^{2+} < \text{K}^+ < \text{Li}^+ < \text{Rb}^+$
96. When NO is passed into KOH solution, products are
a) N_2 b) N_2O c) Both (a) and (b) d) None of these
97. Which of the following mixtures cannot be prepared?
a) $\text{NaHCO}_3 + \text{Na}_2\text{CO}_3$ b) $\text{Na}_2\text{CO}_3 + \text{NaOH}$ c) $\text{NaHCO}_3 + \text{NaOH}$ d) $\text{H}_2\text{CO}_3 + \text{NaHCO}_3$
98. Estimation of calcium and magnesium is done by
a) EDTA b) Oxalate c) Phosphate d) None of these
99. Mg and Li are similar in their properties due to
a) Same e/m ratio b) Same electron affinity c) Same group d) Same radius
100. Select the correct statement(s)
a) Mg^{2+} ions are necessary for the activation of phosphate transfer enzymes
b) Mg is present in chlorophyll used in photosynthesis in green plants
c) Operation of $\text{Na}^+ - \text{K}^+$ pumps is biological
d) All of the above are correct statements
101. The common name, "cream of tartar" refers to
a) $\text{KHC}_4\text{H}_4\text{O}_6$ b) $\text{K}(\text{SbO})\text{C}_4\text{H}_4\text{O}_6$
c) $\text{KNaC}_4\text{H}_4\text{O}_6$ d) $\text{Mg}_2(\text{OH})_2(\text{C}_4\text{H}_4\text{O}_6)\text{H}_2\text{O}$
102. The alkalide ion is
a) Diamagnetic b) Represented as $\bar{\text{C}}\text{H}_3$ c) Paramagnetic d) Represented as CH_3
103. Which is the most stable halide of alkali metal?
a) Sodium fluoride b) Sodium bromide c) Sodium chloride d) Sodium iodide
104. Choose the incorrect statement
a) BeCO_3 is kept in the atmosphere of CO_2 since it is least thermally stable
b) Be dissolves in alkali forming $[\text{Be}(\text{OH})_4]^{2-}$
c) BeF_2 forms complex ion with NaF in which Be goes with cation
d) BeF_2 forms complex ion with NaF in which Be goes with anion
105. Some of alkali metal salts are coloured. Na_2CrO_4 –yellow, KMnO_4 –pink, K_2MnO_4 –green. It is due to
a) Cations are coloured ions b) Anions are coloured ions
c) Both (a) & (b) are correct d) None of the above is correct
106. Which is a pair of paramagnetic species?
a) KO_2, NO_2 b) $\text{K}_2\text{O}_2, \text{KO}_2$ c) $\text{K}_2\text{O}, \text{NO}_2$ d) $\text{NO}_2, \text{N}_2\text{O}_2$
107. Following are the ionization potential values of
 $(I_1)899 \text{ kJ mol}^{-1}$, $(I_2)1757 \text{ kJ mol}^{-1}$,
 $(I_3)15000 \text{ kJ mol}^{-1}$
a) Na b) K c) Be d) Ne
108. Which is the incorrect statement?

- a) The heats of hydration of the dipositive alkaline earth metal ions decrease with an increase in their ionic size
- b) NaNO_3 forms Na_2O on heating
- c) Hydration of alkali metal ion is less than that of II A
- d) Alkaline earth metal ions, because of their much larger charge to size ratio, exert a much stronger electrostatic attraction on the oxygen of water molecule surrounding them
109. A basic refractory material among the following is
- a) Al_2O_3 b) SiO_2 c) Fe_2O_3 d) CaO
110. Which has least molar solubility in H_2O ?
- a) LiCl b) NaCl c) KCl d) CsCl
111. Which will give N_2O on heating?
- a) NH_4NO_2 b) NH_4NO_3 c) NaNO_3 d) LiNO_3
112. All alkali metals form following compound except
- a) Amide, MNH_2 b) Superoxide like KO_2
- c) Ionic 'salt-like' hydride MH d) Basic oxides
113. Which one of the following has magnesium?
- a) Vitamin B_{12} b) Chlorophyll c) Haemocyanin d) Carbonic anhydrase
114. CaCl_2 is used as
- a) Disinfectant b) Desiccant agent c) Medicine d) None of these
115. Out of AgF , CaF_2 , BeF_2 , MgF_2
- a) AgF and BeF_2 are soluble, and CaF_2 and MgF_2 are insoluble in water
- b) AgF is soluble, others insoluble
- c) AgF is insoluble, others are soluble
- d) All of the above
116. Nitrate can be converted into metal oxide on heating in case of
- a) Li b) Na c) Both (a) and (b) d) None of these
117. Lattice energy (numerical value) of chloride of alkali metals is in order
- a) $\text{LiCl} > \text{NaCl} > \text{KCl} > \text{RbCl} > \text{CsCl}$ b) $\text{LiCl} < \text{NaCl} < \text{KCl} < \text{RbCl} < \text{CsCl}$
- c) $\text{NaCl} < \text{KCl} < \text{LiCl} < \text{RbCl} < \text{CsCl}$ d) $\text{NaCl} < \text{KCl} < \text{RbCl} < \text{CsCl} < \text{LiCl}$
118. Alkali metal dissolve in liquid NH_3 , then which of the following observation are true?
- a) H_2 gas is liberated
- b) Solution is blue due to the presence of solvated electrons
- c) Solution is conducting
- d) All of the above are correct
119. On strong heating $\text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ the product obtained is
- a) MgCl_2 b) MgO c) $\text{MgCl}_2 \cdot 2\text{H}_2\text{O}$ d) $\text{MgCl}_2 \cdot 4\text{H}_2\text{O}$
120. Which one of the following hydroxide is insoluble in water?
- a) $\text{Ca}(\text{OH})_2$ b) $\text{Ba}(\text{OH})_2$ c) $\text{B}(\text{OH})_2$ d) $\text{Mg}(\text{OH})_2$
121. The substance used as pigment in paint is
- a) Borax b) Alumina c) Lithophone d) None of these
122. Intermediate formed by heating microcosmic salt and which forms coloured bead with coloured cation
- a) NH_3 b) H_3PO_3 c) NaPO_3 d) H_2O
123. Lithopone is mixture of
- a) $\text{ZnCO}_3, \text{BaCO}_3$ b) $\text{ZnS}, \text{Na}_2\text{SO}_4$ c) $\text{ZnSO}_4, \text{BaSO}_4$ d) $\text{ZnS}, \text{BaSO}_4$
124. The correct order of increasing ionic character is
- a) $\text{BeCl}_2 < \text{BaCl}_2 < \text{MgCl}_2 < \text{CaCl}_2$ b) $\text{BeCl}_2 < \text{MgCl}_2 < \text{BaCl}_2 < \text{CaCl}_2$
- c) $\text{BeCl}_2 < \text{BaCl}_2 < \text{MgCl}_2 < \text{CaCl}_2$ d) $\text{BeCl}_2 < \text{CaCl}_2 < \text{MgCl}_2 < \text{BaCl}_2$
125. Which of the following changes is not realized in the laboratory?
- a) Absorption of NO by alkaline sodium sulphite to form a compound
- b) Combustion of metallic Mg in CO_2
- c) Heating hydrated magnesium chloride to get the anhydrous salt

- d) 'Displacement' of chlorine from KClO_3 by iodine to form KIO_3
126. Molten sodium chloride conducts electricity due to the presence of
 a) Free electrons b) Ions c) Na atom d) Cl atom
127. Which is/are not the correct configuration of s-block elements?
 a) $[\text{Ar}]3d^{10}4s^2$ b) $[\text{Ar}]3d^{10}4s^1$ c) Both (a) and (b) d) None of these
128. The pair of amphoteric hydroxide is
 a) $\text{Al}(\text{OH})_3, \text{LiOH}$ b) $\text{Be}(\text{OH})_2, \text{Mg}(\text{OH})_2$ c) $\text{B}(\text{OH})_3, \text{Be}(\text{OH})_2$ d) $\text{Be}(\text{OH})_2, \text{Zn}(\text{OH})_2$
129. Lithium shows similarities with magnesium in its chemical behavior because
 a) Similar size, greater electronegativity and lower polarizing power
 b) Similar size, same electronegativity and lower polarizing power
 c) Similar size, same electronegativity and similar high polarizing power
 d) None of the above
130. Alkali metals resemble IB (copper family) in the following respects
 a) +1 valency b) Sulphates are water soluble
 c) Oxides are strong bases d) Oxides are strong acids
131. The alkali metals dissolve in liquid NH_3 , it is found that
 a) The dilute solutions are blue but the colour changes to bronze with increasing concentration
 b) The blue colour is due to the presence of solvated electrons
 c) The blue solutions are paramagnetic but the bronze-coloured solutions are diamagnetic
 d) All of the facts given above are found
132. MO_3 on hydrolysis forms (M is an alkali metal)
 a) MOH and H_2 b) MOH and O_2 c) MOH and M_2O_2 d) MOH and H_2O_2
133. Mg and Zn do not resemble in following properties
 a) Oxides are amphoteric b) Carbonates on heating form metal oxides
 c) Widely used as electrodes d) Used to prevent corrosion
134. In water
 a) Temporary hardness is due to the bicarbonates of Ca^{2+} and Mg^{2+}
 b) Permanent hardness is due to chlorides and sulphates of Ca^{2+} and Mg^{2+}
 c) Hardness can be removed by adding phosphates
 d) All of the above properties are true
135. Which is used to treat acid indigestion?
 a) $\text{Be}(\text{OH})_2$ b) KOH c) $\text{Mg}(\text{OH})_2$ d) $\text{Ca}(\text{OH})_2$
136. When SO_2 gas is passed into aqueous Na_2CO_3 product formed is
 a) NaHSO_4 b) Na_2SO_4 c) NaHSO_3 d) Na_2SO_3
137. Following compounds are used in fire-works
 a) LiNO_3 b) BaCl_2 c) $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$ d) All of these
138. In polymeric $(\text{BeCl}_2)_n$, there are
 a) Three centre two-electron bonds b) Three centre three-electron bonds
 c) Two centre three-electrons bonds d) Two centre two-electron bonds
139. The product obtained on fusion of BaSO_4 and Na_2CO_3 is
 a) BaCO_3 b) BaO c) $\text{Ba}(\text{OH})_2$ d) BaHSO_4
140. NaOH is not used in
 a) Paper industry b) Soap industry c) Rayon industry d) Plastic industry
141. The first ionization potential of Na is 5.1 eV. The value of electron gain enthalpy of Na^+ will be
 a) -2.55 eV b) -5.1 eV c) -10.2 eV d) $+2.55$ eV
142. Select the correct statement(s)
 a) Li_2CO_3 decomposes into oxides while other alkali carbonates are thermally stable
 b) LiCl is predominantly covalent
 c) Li_3N is stable
 d) All of the above

143. Mixture of MgCl_2 and MgO is called
 a) Portland cement b) Sorel's cement c) Double salt d) None of these
144. Be and Al show diagonal relationship hence, both have
 a) Same degree of electronegativity b) Amphoteric nature of oxides
 c) Approximately same charge/radius ratio d) All the properties above
145. Which of the following carbonate decompose most easily on heating?
 a) Rb_2CO_3 b) K_2CO_3 c) Na_2CO_3 d) MgCO_3
146. Going down to II A group, following properties increase except
 a) Solubility of hydroxides in H_2O b) Hydration energy
 c) Thermal stability of carbonates d) Ionic radius
147. Which of the following halide of calcium is insoluble in water?
 a) CaCl_2 b) CaI_2 c) CaF_2 d) CaBr_2
148. Be in BeCl_2 undergoes
 a) Linear hybridization b) Trigonal hybridization
 c) Tetrahedral hybridization d) No hybridisation
149. The right order of the solubility of sulphates of alkaline earth metals in water
 a) $\text{Be} > \text{Ca} > \text{Mg} > \text{Ba} > \text{Sr}$ b) $\text{Mg} > \text{Be} > \text{Ba} > \text{Ca} > \text{Sr}$
 c) $\text{Be} > \text{Mg} > \text{Ca} > \text{Sr} > \text{Ba}$ d) $\text{Mg} > \text{Ca} > \text{Ba} > \text{Be} > \text{Sr}$
150. A colourless solid (X) on heating evolved CO_2 and also gave a white residue, soluble in water. Residue also gave CO_2 when treated with dilute acid. (X) is
 a) Na_2CO_3 b) CaCO_3 c) $\text{Ca}(\text{HCO}_3)_2$ d) NaHCO_3
151. Bleaching action of CaOCl_2 is due to
 a) Nascent oxygen b) Chlorine c) HClO d) HCl
152. Ripening of fruits can be carried out in presence of
 a) Na_2SO_4 b) NaCl c) CaCl_2 d) CaC_2
153. Select the correct statement(s)
 a) Li_2CO_3 is only sparingly soluble in water and no LiHCO_3 has been isolated
 b) K_2CO_3 cannot be made by a method similar to the ammonia-soda process
 c) Li_2CO_3 and MgCO_3 both are thermally stable
 d) $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$ is a mineral called trona
154. The solubilities of carbonates decrease down the magnesium group due to a decrease in
 a) Lattice energies of solids b) Hydration energies of cations
 c) Interionic attractions d) Entropy of solution formation
155. Which is not the s-block element?
 a) $[\text{Ar}]4s^2 3d^{10} 4p^6 5s^1$ b) $1s^2 2s^2 2p^1$ c) $1s^2 2s^1 2p^1$ d) $[\text{Ar}]4s^1 4p^1$
156. Bleaching powder loses its power on keeping for a long time because
 a) It changes into calcium hypochlorate
 b) It changes into calcium chloride and calcium hydroxide
 c) It absorbs moisture
 d) It changes into calcium chloride and calcium
157. $\text{BaC}_2 + \text{N}_2 \xrightarrow{\Delta} (A)$
 $\text{CaC}_2 + \text{N}_2 \xrightarrow{\Delta} (B)$
 (A) and (B) are
 a) $\text{BaCN}_2, \text{CaCN}_2$ b) $\text{Ba}(\text{CN})_2, \text{Ca}(\text{CN})_2$ c) $\text{Ba}(\text{CN})_2, \text{CaCN}_2$ d) None is correct

Multiple Correct Answers Type

158. The reagent(s) used for softening the temporary hardness of water is (are)
 a) $\text{Ca}_3(\text{PO}_4)_2$ b) $\text{Ca}(\text{OH})_2$ c) Na_2CO_3 d) NaOCl

159. Select the correct statement(s)
- Alkali metals-ozonides are coloured and paramagnetic
 - Alkali metals-ozonides are colourless and diamagnetic
 - Sesquioxides of alkali metals are peroxides disuperoxides $(M^+)_4(O_2^{2-})(O_2^-)_2$
 - Sesquioxides are paramagnetic due to presence of superoxide ion O_2^-
160. Which are true statements about s-block elements?
- Metals are obtained by the electrolysis of fused chlorides
 - Oxides are basic except BeO
 - +1 valency by alkali metals and +2 valency by alkaline earth metals is shown
 - Carbonates are thermally stable
161. $LiAlH_4$ can reduce
- Carbonyl compounds into alcohols
 - Alkenes into alkanes
 - CHO group into -CH₃
 - Either into alcohols
162. Sesquioxides (M_2O_3) of alkali metals
- Have been prepared by careful thermal decomposition of MO_2
 - Are dark-coloured paramagnetic substances
 - Are colourless diamagnetic substances
 - Are coloured diamagnetic substances
163. Select the correct statement(s)
- Radius of hydrated Li^+ ion is smaller than that of hydrated Cs^+ ion
 - Ionic mobility of hydrated Li^+ ion is smaller than that of hydrated Cs^+ ion
 - Hydrated Cs^+ is more conducting than hydrated Na^+ ion
 - Ionic mobility of hydrated $Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$
164. Select the correct alternate(s)
- In $NaHCO_3$, the HCO_3^- ions are linked into infinite chain
 - In $KHCO_3$, a dimer is formed by H-bonding
 - In $NaHCO_3$, a dimer is formed by H-bonding
 - In $KHCO_3$, the HCO_3^- ions are linked into infinite chain
165. Recently sodium naphthenide ($C_{10}H_7Na$) has been used as reductant in complex formation. $C_{10}H_7Na$ is
- Paramagnetic
 - Deep-green in colour
 - Diamagnetic
 - colourless
166. Select the correct alternate(s)
- All alkali metals form solid bicarbonates
 - Except $LiHCO_3$, all alkali metals bicarbonates are solid
 - Li_3CO_3 decomposes into CO_2 and Li_2O
 - Na_2CO_3 decomposes into CO_2 and Na_2O
167. Select the correct statement(s)
- MO_2 contains the paramagnetic ion O_2^-
 - O_2^- is stable only in the presence of large cations as K, Rb and Cs
 - KO_2 is paramagnetic and has orange colour
 - K_2O has antifluorite structure
168. Which is/are true statement(s)?
- The heats of hydration of the dipositive alkaline earth metal ions decrease with an increase in their ionic size
 - Hydration of alkali metal ion is less than that of IIA
 - Alkaline earth metal ions, because of their much larger charge to size ratio exert a much stronger electrostatic attraction on the oxygen of water molecular surrounding them
 - None of the above statements is correct
169. Na^+ and Ag^+ differ in
- Na_2CO_3 is thermally stable while Ag_2CO_3 decomposes into Ag, CO_2 and O_2

- b) Ag^+ forms complexes, Na^+ does not
 - c) NaCl is water soluble, AgCl is insoluble
 - d) NaCl and AgCl both give colour in flame when ignited
170. Select the correct alternate(s)
- a) Solid LiNO_3 and NaNO_3 are deliquescent
 - b) KNO_3 is used in preference to NaNO_3 in gun powder
 - c) NaNO_3 is used in preference to NaNO_3 in gun powder
 - d) NH_4HCO_3 exists in solid state

Assertion - Reasoning Type

This section contains 0 questions numbered 171 to 170. Each question contains STATEMENT 1 (Assertion) and STATEMENT 2 (Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

- a) Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1
- b) Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1
- c) Statement 1 is True, Statement 2 is False
- d) Statement 1 is False, Statement 2 is True

171

Statement 1: s block elements are highly electropositive.

Statement 2: The valance electrons present in s orbital are loosely held.

172

Statement 1: Group 1 elements are known as the alkali elements.

Statement 2: s orbital can accommodate only two electrons.

173

Statement 1: Gypsum is added to cement to increase its rate of setting.

Statement 2: Gypsum is calcium sulphate hemihydrates.

174

Statement 1: Radium is most abundant s block elements.

Statement 2: s block elements are non radioactive in nature.

Matrix-Match Type

This section contains 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**.

175. Match Column I (compounds) with Column II (associated uses)

Column-I

Column- II

(A) KO_2

(B) NaHCO_3

(C) LiCl

(D) Cs

(1) Baking

(2) Photovoltaic cell

(3) Submarine

(4) Humidity control

CODES :

	A	B	C	D
a)	2	3	1	4
b)	4	2	3	1
c)	3	1	4	2
d)	1	4	2	3

176. Match the mineral names (in Column I) with the chemical formulae (in Column II)

Column-I

Column- II

(A) Magnesite

(B) Dolomite

(C) Kieserite

(D) Carnallite

(1) $\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$

(2) $\text{MgSO}_4 \cdot \text{H}_2\text{O}$

(3) MgCO_3

(4) $\text{MgCO}_3 \cdot \text{CaCO}_3$

CODES :

	A	B	C	D
a)	3	4	2	1
b)	2	1	3	4
c)	4	2	1	3
d)	1	3	4	2

177. Select the metals (in Column I) with the specific properties of the compounds (in Column II)

Column-I

Column- II

(A) Li

(B) Na

(C) K

(D) Be

(E) Mg

(1) Supper oxide

(2) Lewis acid – a chloride

(3) Most negative value of E_{redn}°

(4) Thermally stable carbonate

(5) No flame colouration of the chloride

CODES :

	A	B	C	D	E
a)	3	4	1	2	5
b)	2	3	4	5	5
c)	1	2	5	3	5
d)	5	1	3	4	5

178. Match the species in Column I with given property (ies) in Column II

	Column-I	Column- II
(A)	Li_3N	(1) Paramagnetic
(B)	LiCl	(2) Ether soluble
(C)	KO_2	(3) Humidity control
(D)	Rb_2O_3	(4) Coloured compounds

CODES :

	A	B	C	D
a)	2,3	4,5	2,1	1,5
b)	1,5	2	2,3	4,5
c)	1,2	1,5	4,5	2,3
d)	4,5	2,3	1,5	1,5

179. Match compounds (in Column I) with the specific properties of the compounds (in Column II)

	Column-I	Column- II
(A)	BeCO_3	(1) Temporary hardness
(B)	BaCl_2	(2) Permanent hardness
(C)	MgSO_4	(3) Decomposes readily
(D)	$\text{Ca}(\text{HCO}_3)_2$	(4)

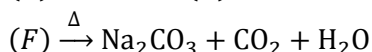
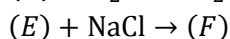
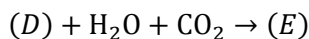
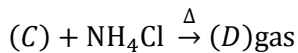
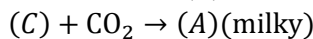
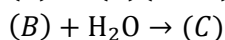
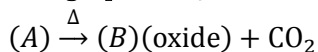
CODES :

	A	B	C	D
a)	2	3	1	4
b)	3	4	2	1
c)	1	2	4	3
d)	4	1	3	2

Linked Comprehension Type

This section contain(s) 14 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct.

Paragraph for Question Nos. 180 to -180



180. Name of the process is

- a) Solvay b) Ammonia-soda c) Both (a) & (b) correct d) None is correct

Paragraph for Question Nos. 181 to - 181

Read the following passage and answer the questions at the end of it

Dilute solutions of alkali metals in liquid NH_3 are blue. It is the ammoniated electron which is responsible for the blue colour of the solution, and the electrical conductivity is due to the ammoniated cation, $[\text{M}(\text{NH}_3)_x]^+$ as well as the ammoniated electron, $[e(\text{NH}_3)_y]^-$, values of x and y depend on the extent of solvation (by NH_3).

Dilute solutions are paramagnetic due to free electrons

181. What happens if alkali metal is allowed to react with concentrated ammonia solution?

- a) Paramagnetic character of solvated electrons is retained
 b) Solvated electrons associate to form electron-pairs and paramagnetic character decreases
 c) Reducing character is increased
 d) Reducing character is not affected

Paragraph for Question Nos. 182 to - 182

Questions given below are based on the following values of hydration energy and lattice energy

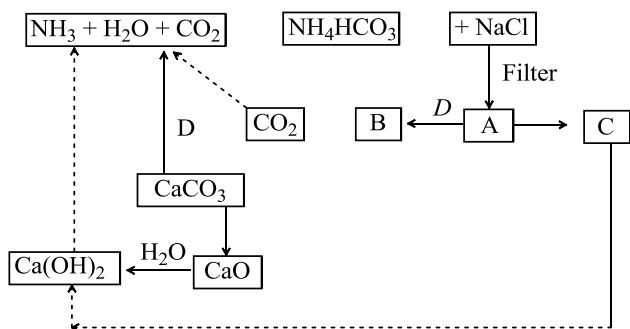
Hydration energy $\Delta H_{\text{hydr.}}$ (kJ mol ⁻¹)		Lattice energy ΔH_{U} (kJ mol ⁻¹)	
Li ⁺	- 499	LiCl	- 840
Na ⁺	- 390	NaCl	- 776
K ⁺	- 305	KCl	- 703
Cl ⁻	- 382		

182. Which salt has maximum heat of hydration?

- a) LiCl b) NaCl c) KCl d) LiCl and KCl equally

Paragraph for Question Nos. 183 to - 183

Answer the questions based on the following flow-sheet



183. This flow-sheet represents

- a) Solvay process of NaOH
 b) Solvay process of Na_2CO_3
 c) Dow process of Na_2CO_3
 d) None of the above is correct

Paragraph for Question Nos. 184 to - 184

Reduction potentials of group 1 (alkali metals) are given below:

Element	$E^\circ U$
$\text{Li}^+ + \text{e}^- \rightarrow \text{Li}$	-3.045
$\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$	-2.714
$\text{K}^+ + \text{e}^- \rightarrow \text{K}$	-2.925
$\text{Rb}^+ + \text{e}^- \rightarrow \text{Rb}$	-2.925
$\text{Cs}^+ + \text{e}^- \rightarrow \text{Cs}$	-2.923

Answer the following questions

184. Which is the best reducing agent?

- a) Li
 b) Na
 c) Rb
 d) Cs

Paragraph for Question Nos. 185 to - 185

“Calcium oxide, CaO, is used to remove SO_2 from power plant exhaust”

Based on the above statement, answer the following questions

185. In what form CaO removes SO_2 ?

- a) CaSO_3
 b) CaSO_4
 c) $\text{Ca}(\text{HSO}_3)_2$
 d) $\text{Ca}(\text{HSO}_4)_2$

Paragraph for Question Nos. 186 to - 186

Based on following analytical data, answer the questions

A mineral which can be represented by the formula $\text{Mg}_x\text{Ba}_y(\text{CO}_3)_z$, was analysed as described below

A sample of the mineral was dissolved in excess hydrochloric acid and the solution made up to 100 cm^3 with water. During the process 48 cm^3 of carbon dioxide, measured at 25°C and 1 atmosphere pressure, were evolved

A 25.0 cm^3 portion of the resulting solution required 25.0 cm^3 of EDTA solution of concentration 0.2 mol dm^{-3} to reach an end-point. A further 25.0 cm^3 portion gave a precipitate of barium sulphate of mass 0.058 g on treatment with excess dilute sulphuric acid. You may assume that group-2 metal ions form 1:1 complexes with EDTA

Molar volume of any gas at 25°C and 1 atmosphere pressure = 24 dm³)

186. Formula of the mineral is

- a) MgBa(CO₃)₄ b) MgBa(CO₃)₂ c) MgBa(CO₃)₃ d) Mg₂Ba(CO₃)₄

Paragraph for Question Nos. 187 to - 187

Questions given below are based on the following enthalpy values

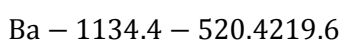
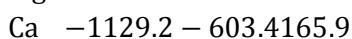
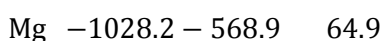
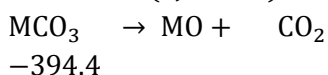
The standard enthalpy of formation ΔH_f° , of hypothetical CaCl(s) theoretically found to be -188 kJ mol^{-1} and that of CaCl₂(s) -795 kJ mol^{-1}

187. Which of the following compounds is more stable?

- a) CaCl(s) b) CaCl₂(s)
c) Both (a) & (b) are equally stable d) Nothing can be said

Paragraph for Question Nos. 188 to - 189

ΔG° values (kJ mol⁻¹) for the following cases can given



Answer the following question

188. Maximum value of ΔG° is for the reaction when M is

- a) Mg b) Ca c) Ba d) Equal for all cases

Integer Answer Type

189. Magnesium allyide is Mg₂C_x where x is.....

190. Potassium superoxide has..... unpaired electron(s)

191. Bleaching powder has two types of chlorine one with oxidation number -1 and other with oxidation number.....

192. Cl₂ disproportionates to NaCl and NaClO₃ on passing into hot NaOH solution. In this process each mole of Cl₂ consumes mole(s) of NaOH

193. When LiNO₃ is heated, change in oxidation number of N is.....

194. When NaNO₃ is heated, change in oxidation number of N is.....

195. One mole of Ca(HCO₃)₂ is neutralized by mole(s) of KOH

196. 96 g of Mg is burnt in air in a closed chamber. On analysis 25% of Mg is converted into oxide and remaining Mg into other possible product. Residue is dissolving in H₂O and neutralized by H₂SO₄. Number of moles of H₂SO₄ required is.....

197. Number of s-electrons in Na⁻ is.....

198. When one mole of Na₂CO₃ is heated, CO₂ obtained is mole

199. Number of neutrons in ⁹Be³⁺ is.....

200. Epsom salt contains..... water molecules (of hydration)

201. Magnesium is coordinated to N-atoms in chlorophyll. Number of rings in chlorophyll is.....

202. Number of elements in second period showing diagonal relationship is.....
203. Na_2CO_3 removes permanent hardness
 $\text{CaSO}_4 + \text{Na}_2\text{CO}_3 \rightarrow \text{Na}_2\text{SO}_4 + \text{CaCO}_3$
 10 L of hard water required 0.0848 g Na_2CO_3 . Thus, harden in ppm of CaCO_3 is.....
204. Number of HCO_3^- ions joined by H-bonding in KHCO_3 is.....
205. Bond order of oxide in sodium peroxide is.....
206. Hydrated sodium sulphite has 50% H_2O . Number of molecules of hydration is.....
207. Magnesium nitride is Mg_xN_y where $(x + y)$ is.....
208. Number of electrons in magnesium ion formed by three steps ionization of magnesium is.....
209. $E_{M^{2+}/M}^0$ values of some metals are
 Be : -1.85 V
 Mg : -2.37 V
 Ca : -2.87 V
 Sr : -2.89 V
 Cu : $+0.34 \text{ V}$
 Hg : 0.80 V
 Number of metals which can displace H_2 gas from acid is.....
210. Coordination number of complexes of beryllium is.....
211. In question (7), $x + y + z =$
212. One mole of lithium nitride is decomposed by H_2O and resultant solution is neutralized by HCl. Number of moles of HCl required is....
213. Magnesium is coordinated to N atoms in chlorophyll
214. Potassium sesquioxide has actually O atoms
215. $\text{Mg}_x\text{Ba}_y(\text{CO}_3)_z$ has 8.54% Mg, 48.75% Ba and remaining carbonate. 0.281 kg is decomposed by H_2SO_4 . CO_2 formed is mole(s)
216. When Cl_2 is passed into hot alkali solution, products formed have two types of chlorine. Difference in oxidation number of two chlorine atoms is.....
217. Number of water molecules in gypsum is.....
218. Unpaired electron(s) in superoxide ion....
219. KO_2 is CO_2 absorber and O_2 producer as shown
 $4\text{KO}_2 + \text{CO}_2 \rightarrow \text{K}_2\text{CO}_3 + x\text{O}_2$
 Values of x is.....
220. Number of radioactive elements in s-block is.....

10.THE S-BLOCK ELEMENTS

: ANSWER KEY :

1)	c	2)	b	3)	d	4)	d	125)	c	126)	b	127)	c	128)	d
5)	d	6)	c	7)	a	8)	c	129)	c	130)	a	131)	d	132)	b
9)	d	10)	b	11)	c	12)	b	133)	a	134)	d	135)	c	136)	d
13)	d	14)	a	15)	d	16)	c	137)	d	138)	a	139)	b	140)	d
17)	b	18)	c	19)	c	20)	a	141)	b	142)	d	143)	b	144)	d
21)	a	22)	a	23)	c	24)	c	145)	d	146)	b	147)	c	148)	a
25)	a	26)	c	27)	a	28)	c	149)	a	150)	d	151)	c	152)	d
29)	a	30)	d	31)	a	32)	b	153)	c	154)	a	155)	b	156)	d
33)	a	34)	c	35)	c	36)	d	157)	c	1)	b,c,d	2)	a,c,d	3)	
37)	a	38)	d	39)	c	40)	c		a,b,c	4)	a,d				
41)	a	42)	b	43)	d	44)	a	5)	a,b	6)	b,c,d	7)	a,b	8)	
45)	a	46)	c	47)	b	48)	d		a,b						
49)	c	50)	a	51)	c	52)	a	9)	b,c	10)	a,b,c,d	11)	a,b,c	12)	
53)	a	54)	c	55)	d	56)	a		a,b,c						
57)	a	58)	a	59)	a	60)	d	13)	a,b,d	1)	a	2)	b	3)	d
61)	c	62)	c	63)	d	64)	d		d	4)	d				
65)	d	66)	b	67)	c	68)	a	1)	c	2)	a	3)	a	4)	d
69)	b	70)	b	71)	b	72)	d	5)	b	1)	a	2)	b	3)	a
73)	a	74)	d	75)	c	76)	a		4)	b					
77)	c	78)	c	79)	c	80)	a	5)	a	6)	a	7)	b	8)	b
81)	b	82)	d	83)	d	84)	c	9)	c	1)	3	2)	1	3)	1
85)	a	86)	b	87)	b	88)	a		4)	2					
89)	b	90)	c	91)	b	92)	b	5)	1	6)	2	7)	2	8)	5
93)	d	94)	d	95)	a	96)	c	9)	6	10)	0	11)	5	12)	7
97)	c	98)	a	99)	d	100)	d	13)	8	14)	3	15)	8	16)	2
101)	b	102)	a	103)	a	104)	c	17)	1	18)	7	19)	5	20)	9
105)	b	106)	a	107)	c	108)	b	21)	4	22)	4	23)	4	24)	4
109)	d	110)	c	111)	b	112)	b	25)	4	26)	6	27)	2	28)	8
113)	b	114)	b	115)	a	116)	c	29)	2	30)	1	31)	3	32)	2
117)	a	118)	d	119)	b	120)	c								
121)	c	122)	c	123)	d	124)	a								

: HINTS AND SOLUTIONS :

- 5 **(d)**
 $\text{Ca(OH)}_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{CaCl}_2$
- 7 **(a)**
 Due to low (IE) and most negative E° values
- 8 **(c)**
 $2\text{Na}_2\text{O}_2 + 2\text{CO}_2 \rightarrow 2\text{Na}_2\text{CO}_3 + \text{O}_2$
- 9 **(d)**
 HCHO is used as preservatives of dead biological specimen
- 11 **(c)**
 $\text{BeO} + 2\text{NaOH} + \text{H}_2\text{O} \rightarrow \text{Na}_2[\text{Be(OH)}_4]$
 $\text{Be} + 2\text{NaOH} + 2\text{H}_2\text{O} \rightarrow \text{Na}_2[\text{Be(OH)}_4] + \text{H}_2$
- 12 **(b)**
 Chlorides are Lewis acids
- 14 **(a)**
 $\text{Al} + \text{NaOH} + \text{H}_2\text{O} \rightarrow \text{NaAlO}_2 + 1\frac{1}{2}\text{H}_2$
- 16 **(c)**
 $\text{Be}_2\text{C} + \text{H}_2\text{O} \rightarrow \text{Be(OH)}_2 + \text{CH}_4$
- 18 **(c)**
 Mg does not react with NaOH
- 20 **(a)**
 Na_2CO_3 is thermally stable
- 22 **(a)**
 $\text{CaCO}_3 + \text{H}_2\text{O} + \text{CO}_2 \rightarrow \text{Ca(HCO}_3)_2$
 soluble
- 24 **(c)**
 KO_2 is paramagnetic due to O_2^-
 K_2O_3 is actually K_4O_6
 $\text{K}_4(\text{O}_2^{2-})(\text{O}_2^-)_2$
 $\uparrow\uparrow$
 Peroxide superoxide
 Thu, it also paramagnetic
- 30 **(d)**
 BeCl_2 *sp*
 AlCl_3 *sp*²
- 33 **(a)**
 $\text{KI} + \text{I}_2 \rightleftharpoons \text{KI}_3$
- 38 **(d)**
 (a) $\text{Na}_2\text{CO}_3 \xrightarrow{\Delta}$ no CO_2
 (b) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
 $\begin{array}{l} \text{H}_2\text{O} \\ \downarrow \\ \text{Ca(OH)}_2 \\ \text{HCl} \end{array} \rightarrow \text{no gas}$
 (c) $\text{Ca(HCO}_3)_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O} + \text{CO}_2$
 Insoluble
- in H_2O
- (d) $2\text{NaHCO}_3 \xrightarrow{\text{HCl}} \text{Na}_2\text{CO}_3 + \text{H}_2\text{O} + \text{CO}_2$
 \downarrow
 $\text{CO}_2 \uparrow$
- Na_2CO_3 is water soluble
- 40 **(c)**
 $\text{Ca(OH)}_2 + \text{Cl}_2 \rightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$
- 42 **(b)**
 Smaller the size of cation, larger the hydration; size of
 $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+ < \text{Cs}^+$
 Thus, Cs^+ is least hydrated
 Thus, I is incorrect
 Li has closed packed structure. Thus, II is correct
 Only Li forms nitride. Thus, III is correct
 Thus, II and III are correct
- 44 **(a)**
 Smaller the size of cation, larger the hydration, hence, larger the stability of hydrated ion
- 47 **(b)**
 $2\text{Na}_2\text{O} \rightarrow \text{Na}_2\text{O}_2 + 2\text{Na}$
- 50 **(a)**
 It involved hydration hence exothermic
- 51 **(c)**
 (a) $\text{Li} + \text{N}_2 \rightarrow \text{Li}_3\text{N}$
 $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$
 O_2 and N_2 are removed
 (b) $\text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3$
 CO_2 is removed
- 52 **(a)**
 $\text{CaCO}_3 + \text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{Ca(HCO}_3)_2$
 $\text{Na}_2\text{CO}_3 \xrightarrow{\Delta} \text{x}$
 $\text{Li}_2\text{CO}_3 \xrightarrow{\Delta} \text{Li}_2\text{O} + \text{CO}_2$
 $\text{CaCl}_2/\text{CaSO}_4$ make permanent hardness
- 56 **(a)**
 Be

$\uparrow\downarrow$	$\uparrow\downarrow$
----------------------	----------------------

 $1s^2 2s^2$
 He

$\uparrow\downarrow$

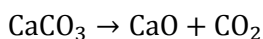
- Due to stable electronic configuration tendency to gain electron is minimum
- 61 **(c)**
 $\text{Na}_2\text{S}_2\text{O}_3$ (as fixer) dissolves unreacted AgBr as
 $2\text{Na}_2\text{S}_2\text{O}_3 + \text{AgBr} \rightarrow \text{Na}_3[\text{Ag(S}_2\text{O}_3)_2] + \text{NaBr}$

- 67 **(c)**
 $Mg^{2+} < Na^+$
 $Mg < Na$
- 68 **(a)**
 $\Delta G^\circ (\text{Mgsalt}) = -568.9 - 394.4 (-1028.2)$
 $= -963.3 + 1028.2 = 64.9 \text{ kJ}$
 $\Delta G^\circ (\text{Ca salt}) = -603.4 - 394.4 - (-1129.2)$
 $= -997.8 + 1129.2 = 131.4$
 $\Delta G^\circ = -520.4 - 394.4 - (-1134.4)$
 $= -914.8 + 1134.4 = 219.6$
 ΔG° of $MgCO_3$ is minimum, thus decomposition of $MgCO_3$ is most feasible
- 69 **(b)**
 $(CaCN_2 + C)$
- 71 **(b)**
 Sodium thiosulphate, $Na_2S_2O_3$ gets oxidised by chlorine water.
 $Na_2S_2O_3 + 4Cl_2 + 5H_2O \rightarrow 2NaHSO_4 + 8HCl$
- 72 **(d)**
 $NaCl$ – golden yellow
 $AgCl$ – no flame
- 73 **(a)**
 $Na_2O_2 + 2H^+Cl^- \rightarrow H_2O_2 + 2NaCl$
 $H_2O_2 + Cr_2O_7^{2-} + 2H^+ \rightarrow CrO_5$
 Deep violet soluble
 in ether
- 74 **(d)**
 $Na + O_2 \rightarrow Na_2O$
 $Li + O_2 \rightarrow Li_2O$
 $Li + Ni \rightarrow Li_3N$
- 77 **(c)**
 $Li_2CO_3 \rightarrow Li_2O + CO_2 \uparrow$
 $Na_2CO_3 \cdot 10H_2O \rightarrow Na_2CO_3 + 10H_2O \uparrow$
- 78 **(c)**
 Third IE (I_3) is very high, thus it represents alkali earth metal (Be)
- 81 **(b)**
 M_2O_3 actually exists as $M_4O_6[M_4(O_2^{2-})(O_2^-)_2]O_2$ is paramagnetic
- 82 **(d)**
 Gypsum is $CaSO_4 \cdot 2H_2O$
- 85 **(a)**
 $4KO_2 + 2H_2O + 4CO_2 \rightarrow 4KHCO_3 + 3O_2$
- 86 **(b)**
 $2NaNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2$
- 88 **(a)**
 $Al_4C_3 + H_2O \rightarrow CH_4$
- 89 **(b)**
 KO_2 is stable due to larger anion O_2^- which polarises K^+
- 95 **(a)**
 Smaller cation larger hydration thus smaller molar ionic conductance
Ionic size $Li^+ < Na^+ < K^+ < Rb^+$
Hydration $Li^+ > Na^+ > K^+ > Rb^+$
Size of hydration ion $Li^+ > Na^+ > K^+ > Rb^+$
Molar ionic conductance $Li^+ < Na^+ < K^+ < Rb^+$
- 97 **(c)**
 $NaHCO_3$ is acidic and decomposed by $NaOH$ forming Na_2CO_3
 $NaHCO_3 + NaOH \rightarrow Na_2CO_3 + H_2O$
 acid base
- 101 **(b)**
 Potassium antimonyl tartrate
- 102 **(a)**
 (a) Na^+ is alkalide ion
 $Na(1s^2 2s^2 2p^6 4s^1) \leftarrow$ Paramagnetic due to unpaired electrons
 $Na^-(1s^2 2s^2 2p^6 3s^2) \leftarrow$ Diamagnetic due to paired electrons
- 104 **(c)**
 $2NaF + BeF_2 \rightarrow Na_2[BeF_4] \rightleftharpoons 2Na^+ + [BeF_4]^{2-}$
 anion
- 105 **(b)**
 Alkali salts are colourless
 $NaCl$ colourless Na_2CrO_4 – yellow since CrO_4^{3-} is yellow
 KCl colourless K_2CrO_4 – yellow
 $KMnO_4$ – pink since MnO_4^- is pink
 K_2MnO_4 – green since MnO_4^{2-} is green
- 106 **(a)**
 KO_2 (O_2^- is paramagnetic due to one unpaired electron) NO_2 (is paramagnetic due to one unpaired electron on N)
- 107 **(c)**
 $(IE)_3$ is very high indicates +2 oxidation state. Thus, Be
- 108 **(b)**
 $2NaNO_3 \rightarrow 2NaNO_2 + O_2$
- 110 **(c)**
 Molar solubility is in mol L^{-1} (Reference Concise) inorganic Chemistry J.D. Lee)
 $LiCl = 19.6$
 $NaCl = 6.2$
 $KCl = 4.8$
 $RbCl = 7.5$
 $CsCl = 11.0$
- 111 **(b)**
 $NH_4NO_3 \rightarrow N_2O + 2H_2O$
- 112 **(b)**

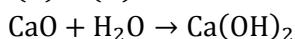
Li and Na do not form superoxide MO_2

115 (a)

Solution 46-49



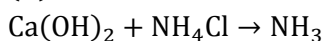
(A) (B)



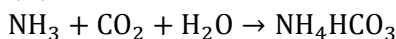
(C)



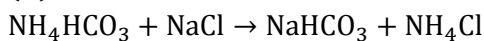
(A)



(D)

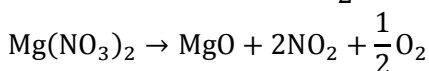
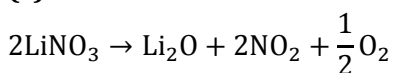


(E)



(F)

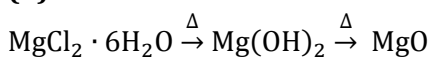
116 (c)



117 (a)

Smaller cation polarizes anion to a greater extent hence larger covalent nature and thus lattice energy

119 (b)



126 (b)

In molten state $NaCl(l) \rightleftharpoons Na^+ + Cl^-$

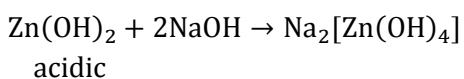
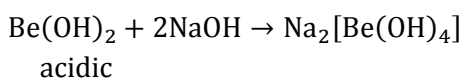
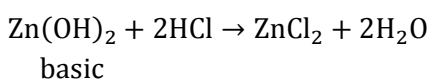
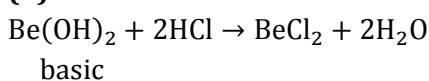
127 (c)

(a) $[Ar]3d^{10}4s^2$ – Last filling is in $3d$ thus it is d -block element

(b) $[Ar]3d^{10}4s^1$ – same as (a)

Thus, both are d -block element

128 (d)



130 (a)

IA (Alkali)	IB (Coinage)
(a) NaCl	CuCl + 1 valency thus true
(b) Na_2SO_4 soluble	$CuSO_4, Ag_2SO_4$ less soluble
(c) $Na_2O + H_2O \rightarrow 2NaOH$ Strong base	$Cu_2O + H_2O \rightarrow Cu(OH)_2$ Weak base
(d) also false	Thus, false

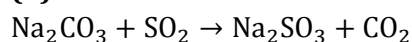
133 (a)

MgO basic oxide

ZnO amphoteric oxide

Thus, Mg and Zn do not resemble in this behaviour

136 (d)



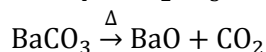
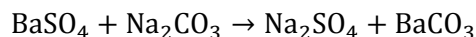
137 (d)

$LiNO_3$ on ignition imparts crimson red

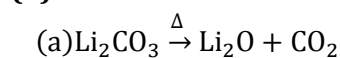
$BaCl_2 \rightarrow$ green

$(NH_4)_2Cr_2O_7 \rightarrow$ green (due to Cr_2O_3)

139 (b)



142 (d)



Thus, (a) is true

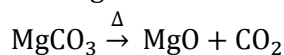
(b) LiCl soluble in ether thus covalent
Thus, (b) is true

(c) Li forms nitride
Thus, (c) is true

$Na_2CO_3 \xrightarrow{\Delta} x$
NaCl insoluble in ether but soluble in H_2O thus ionic Na does not form nitride

145 (d)

Alkali metal carbonate are not decomposed on heating



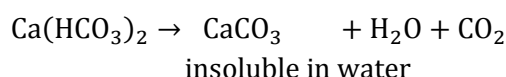
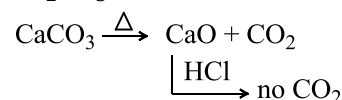
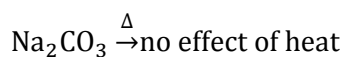
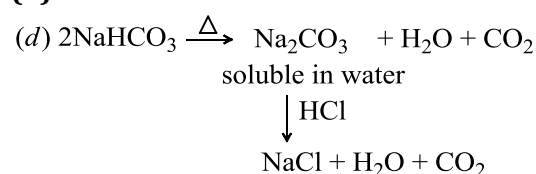
146 (b)

Larger the size, smaller the hydration energy

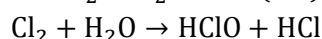
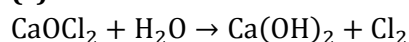
148 (a)

sp -linear

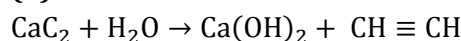
150 (d)



151 (c)



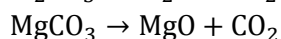
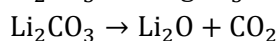
152 (d)



used to ripen fruits

153 (c)

Li_2CO_3 and MgCO_3 are decomposed by heating



155 **(b)**

(a) (*s*-block)

(b) (*p*-block)

(c) $1s^2 2s^2$ in ground state – (*s*-block) and

$1s^2 2s^1 2p^1$ in excited state

(d) $[\text{Ar}]4s^2$ – ground state

$[\text{Ar}]4s^1 4p^1$ – excited state

Thus, *s*-block

156 **(d)**



171 **(a)**

The loosely held *s*-electron in the outermost valence shell of these elements makes them, the most electropositive metals which readily give ion's M^+ or M^{2+} .

172 **(b)**

1. If Assertion is True, Reason is True, Reason is correct explanation of 1
2. If Assertion is True, Reason is True, Reason is not correct explanation of 1
3. If Assertion is True, Reason is False
4. If Assertion is False, Reason is True

173 **(d)**

Gypsum is added to cement to decrease its rate of

setting.

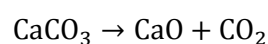
Gypsum is calcium sulphate dehydrate.

174 **(d)**

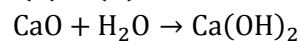
Radium is rarest of all *s*-block elements. Francium is radioactive. Its long lived isotope Fr^{223} has a half-life of only 21 min.

180 **(a)**

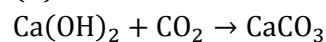
Solution 46-49



(A) (B)



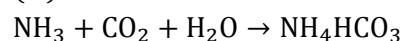
(C)



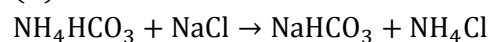
(A)



(D)



(E)



(F)