Time : 1 Mins **P BLOCK ELEMENTS 1** **Marks : 461**

1. The metal ion, that plays an important role in muscle contraction is:
   a) K^+ b) Na^+ c) Mg^{2+} d) Ca^{2+}
2. Which of the following does not show the anomalous behaviour of lithium?
   a) Lithium reacts with nitrogen to form a nitride
   b) Lithium carbonate decomposes on heating c) Lithium nitrate gives NO_2 on heating
   d) Lithium is the strongest reducing agent
3. Which of the following statements is correct?
   a) Sodium carbonate decomposes on heating
   b) Sodium bicarbonate is more soluble in water than potassium bicarbonate
   c) Sodium when heated with excess of O_2, gives peroxide.
   d) Lithium halides are highly ionic in nature
4. Which of the following is not true about alkali metals?
   a) Alkali metals do not occur free in nature b) Alkali metals are good oxidising agents
   c) Alkali metal salts impart colour to the flame d) Alkali metal salts are generally ionic
5. When chlorine is passed over by slaked lime at room temperature, the main reaction product is:
   a) $Ca(ClO_2)_2$ b) $CaCl_2$ c) $CaOCl_2$ d) $Ca(OCl)_2$
6. Amphoteric hydroxides react with both alkalies and acids. Which of the following Group 2 metal hydroxides is soluble in sodium hydroxide?
   a) $Be(OH)_2$ b) $Mg(OH)_2$ c) $Ca(OH)_2$ d) $Ba(OH)_2$
7. Which of the following materials conducts electricity?
   a) Crystalline potassium chloride b) Fused sulphates c) Molten sodium chloride
   d) Diamond
8. K_2CO_3 cannot be prepared by Solvay's process because:
   a) $KHCO_3$ is less soluble than $NaHCO_3$
   b) $KHCO_3$ is too soluble to be precipitated by KCl and NH_4HCO_3
   c) K_2CO_3 is more soluble to be precipitated by KCl d) K_2CO_3 is less soluble than Na_2CO_3
9. The alkali metals form salt-like hydrides by the direct synthesis at elevated temperatures. The thermal stability of these hydrides decrease in which of the following orders?
   a) $CsH > RbH > KH > NaH > LiH$ b) $KH > NaH > LiH > CsH > RbH$
   c) $NaH > LiH > KH > RbH > CsH$ d) $LiH > NaH > KH > RbH > CsH$
10. Which of the following compounds are not arranged in correct order as indicated?
    a) $SrCl_2 < CaCl_2 < MgCl_2 < BeCl_2$ (increasing order of hydrolysis)
    b) $SrCl_2 < CaCl_2 < MgCl_2 < BeCl_2$ (increasing lattice energy)

c) $CaSO_4 < MgSO_4 < BeSO_4$ (increasing stability)

d) $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2$ (increasing solubility)

11. BeO is insoluble but BaO is soluble as

a)

lattice energy of BeO is higher than BaO due to small size of Be^{2+} ion and its covalent nature

b) hydration energy of BeO is lower than BaO due to small size Be^{2+} ion

c) BeO is amphoteric in nature while BaO is basic

d) BeO forms hydrated salts while BaO forms anhydrous salts

12. In which of the following, the hydration energy is higher than the lattice energy?

a) $BaSO_4$ b) $MgSO_4$ c) $RaSO_4$ d) $SrSO_4$

13. A white solid X on heating gives a white solid Y and an acidic gas Z. Gas Z is also given out when X reacts with an acid. The compound Y is also formed if caustic soda is left open in the atmosphere. X, Y and Z are:

a)

X	Y	Z
$NaHCO_3$	Na_2CO_3	CO_2

b)

X	Y	Z
Na_2CO_3	NaOH	CO_2

c)

X	Y	Z
Na_2CO_3	$NaHCO_3$	CO_2

d)

X	Y	Z
NaOH	$NaHCO_3$	CO_2

14. Which of the following statements is not true about alkali metals?

a) All alkali metals form oxo salts such as carbonates, sulphates and nitrates

b) The basic character of oxides increases down the group

c)

Carbonates and sulphates of lithium are stable and their stability decreases down the group

d) Solubility of carbonates and sulphates increases down the group

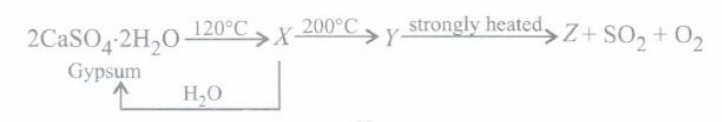
15. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Na_2CO_3	(i)	Caustic soda
(B)	NaOH	(ii)	Glauber's salt
(C)	$Na_2CO_3.10H_2O$	(iii)	Soda ash
(D)	$Na_2SO_4.10H_2O$	(iv)	Washing soda

a) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii) b) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii)

c) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (iv), (D) ⟶ (i) d) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (iv), (D) ⟶ (ii)

16. Identify X, Y and Z



a)

X	Y	Z
Plaster of Paris($CaSO_4.1/2H_2O$)	Burnt plaster($CaSO_4$)	Quick lime(CaO)

b)

X	Y	Z
Calcium sulphate($CaSO_4$)	Plaster of Paris($CaSO_4.1/2H_2O$)	Quick lime(CaO)

c)

X	Y	Z
Quick lime(CaO)	Plaster of Paris($CaSO_4.1/2H_2O$)	Lime water($Ca(OH)_2$

d)

X	Y	Z
Plaster of Paris($CaSO_4.1/2H_2O$)	Burnt plaster($CaSO_4$)	Slaked lime($Ca(OH)_2$)

17. In which of the following processes, fused sodium hydroxide is electrolysed at a $330^\circ C$ temperature for extraction of sodium?
    a) Castner's process b) Down's process c) Cyanide process d) Both 'b' and 'c'
18. Which of the following is not the point of difference between Be and other alkaline earth metals?
    a) It has a tendency to form covalent bonds
    b) It dissolves in alkalies with evolution of hydrogen
    c) Its oxides and hydroxides are amphoteric d) Its carbide gives acetylene on hydrolysis
19. A certain compound X imparts a golden yellow flame. When zinc powder is heated with concentrated solution of X, H_2 gas is evolved. X combines with CO_2 to give a salt Y. Y is a hydrated salt which on reaction with HCl or excess of CO_2 gives another salt Z which is an important part of baking powder. Identify X, Y and Z.

a)

X	Y	Z
HCl	NaOH	$NaHCO_3$

b)

X	Y	Z
KOH	K_2CO_3	$KHCO_3$

c)

X	Y	Z
NaCl	Na_2CO_3	NaOH

d)

X	Y	Z
NaOH	Na_2CO_3	$NaHCO_3$

20. A metal M reacts with nitrogen to give nitride which on reaction with water produces ammonia gas. Metal M can be
    a) Na b) K c) Li d) Rb
21. When $BeCl_2$ is hydrolysed, white fumes of gas are given out. The intensity of fumes intensifies when a rod dipped in moist ammonia is brought near the mouth of the test tube. The gas which comes out during hydrolysis is
    a) Cl_2 b) HCl c) NH_4OH d) NH_4Cl
22. Enzymes that utilize AIP in phosphate transfer require an alkaline earth metal (M) as the cofactor, M is:
    a) Mg b) Ca c) Sr d) Be
23. A certain compound (X) when treated with copper sulphate solution yields a brown precipitate. On adding hypo solution, the precipitate turns white. The compound is:
    a) K_2CO_3 b) KI c) KBr d) K_3PO_4
24. 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
25. Which of the following is not true about s-block elements?
    a) They have large atomic sizes b) They have lower ionisation enthalpies
    c) They have variable oxidation state d) They form basic oxides

26. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:

List-I (substances)	List-II (Composition)
(a) Plaster of Paris	(i) $CaSO_4.\ 2H_2O$
(b) Epsomite	(ii) $CaSO_4.\ 1/2\ H_2O$
(c) Kieserite	(iii) $MgSO_4 \cdot 7H_2O$
(d) Gypsum	(iv) $MgSO_4 \cdot H_2O$

a)

	(a)	(b)	(c)	(d)
(a)	(iv)	(iii)	(ii)	(i)

b)

	(a)	(b)	(c)	(d)
(b)	(iii)	(iv)	(i)	(ii)

c)

	(a)	(b)	(c)	(d)
(c)	(ii)	(iii)	(iv)	(i)

d)

	(a)	(b)	(c)	(d)
(d)	(iv)	(ii)	(iii)	(i)

27. Alkali metals react with water vigorously to form hydroxides and dihydrogen. Which of the following alkali metals reacts with water least vigorously?
a) Li b) Na c) K d) Cs

28. Crystalline sodium chloride is a bad conductor of electricity while molten NaCl and its aqueous solution conduct electricity. This is because
a) crystalline sodium chloride contains molecules only
b) the ions present in it are not free to move in solid state
c) sodium chloride is a covalent crystal d) solid substances do not conduct electricity

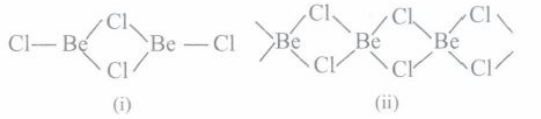
29. The reducing power of a metal depends on various factors. Suggest the factor which makes Li, the strongest reducing agent in aqueous solution
a) Sublimation enthalpy b) Ionisation enthalpy c) Hydration enthalpy
d) Electron-gain enthalpy

30. Assertion: Superoxides of alkali metals are paramagnetic.
Reason: Superoxides contain O_2 ion which has one unpaired electron.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

31. Which of the following statements is not correct regarding preparation of NaOH?
a) NaOH is prepared by electrolysis of sodium chloride in Castner-Kellner cel
b) Sodium metal discharged at cathode combines with mercury to form sodium amalgam
c) Chlorine is evolved at anode d) Amalgam is heated to separate Na and Hg

32. Which of the following statements is false?
a) Ca^{2+} ions are not important in maintaining the regular beating of the heart.
b) Mg^{2+} ions are important in the green parts of the plants.
c) Mg^{2+}ions form a complex with ATP. d) Ca^{2+} ions are important in blood clotting.

33. The following two figures represent



a) (i) $BeCl_2$ is a dimer in vapour phase; (ii) $BeCl_2$ is chain structure in solid state
b) (i) $BeCl_2$ is in solid state; (ii) $BeCl_2$ is in vapour phase
c) (i) $BeCl_2$ is monomer in solid state; (ii) $BeCl_2$ is linear polymer in vapour phase
d) (i) $BeCl_2$ is linear monomer; (ii) $BeCl_2$ is three dimensional dimer

34. The normal oxide contains _____ ion, peroxide contains _____ ion and superoxide contains _____ ion.
a) O^{2-}, O_2^{2-}, O_2^- b) O^{2-}, O_2^-, O_2^{2-} c) O^-, O_2^-, O_3^- d) O^-, O^{2-}, O_2^{2-}

35. The pair of amphoteric oxides is:
a) BeO, ZnO b) Al_2O_3, Li_2O c) BeO, BO_3 d) BeO, MgO

36. Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\ 2s^2\ 2p^3$, the simplest formula for this compound is:
a) Mg_2X b) MgX_2 c) Mg_2X_3 d) Mg_3X_2

37. Which of the following elements is extracted commercially by the electrolysis of an aqueous solution or its compound?
a) Cl b) Br c) Al d) Na

38. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Quick lime	(i)	Setting fractured bones
(B)	Plaster of Paris	(ii)	A constituent of chewing gum
(C)	Slaked lime	(iii)	Manufacture of bleaching powder
(D)	Limestone	(iv)	Manufacture of dyestuffs

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

39. Assertion: $CaCO_3$ is prepared by passing carbon dioxide gas through slaked lime.
Reason: Passing excess of CO_2 through slaked lime leads to the formation of quick lime.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

40. Superoxides of alkali metals act as oxidising agents while normal oxides are basic in nature. The oxide which is paramagnetic in nature due to presence of unpaired electron is:
a) Na_2O_2 b) KO_2 c) Na_2O d) K_2O_2

41. Assertion: Be is readily attacked by acids.
Reason: Be shows diagonal relationship to Na.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

42. By adding gypsum to cement
a) setting time of cement becomes less b) setting time of cement increases
c) colour of cement becomes light d) shining surface is obtained

43. All the following substances react with water, The pair that gives the same gaseous product is:
a) K and CO_2 b) Na and Na_2O_2 c) Ca and CaH_2 d) Ba and BaO_2

44. Which among the following is kinetically inert towards water?
a) Na b) Be c) Ca d) K

45. Which of the following metals is required as cofactor by all enzymes utilising ATP in phosphate transfer?
a) K b) Ca c) Na d) Mg

46. In context with beryllium, which one of the following statements is correct?
    a) It is rendered passive by nitric acid. b) It forms Be_2C. c) Its salts rarely hydrolyze.
    d) Its hydride is electron-deficient and polymeric.
47. Which one of the following atoms will have the smallest size?
    a) Mg b) Na c) Be d) Li
48. The formula for calcium chloride is
    a) $Ca(ClO_4)_2$ b) $Ca(ClO_3)_2$ c) $CaClO_2$ d) $Ca(ClO_2)_2$
49. Ca^{2+} is isoelectronic with
    a) Na b) Mg^{2+} c) Ba^{2+} d) Ar
50. An oxide of alkaline earth metals [X] reacts with C and Cl_2 to give a compound Y. Y is found in polymeric chain structure and is electron deficient molecule. The compound Y is:
    $BeO + C + Cl_2 \rightarrow Y + CO$
    a) BeO b) $BeCl_2$ c) $Be(OH)_2$ d) $BeCO_3$
51. When sodium is dissolved in liquid ammonia, a solution of deep blue colour is obtained. The colour of the solution is due to
    a) ammoniated electron b) sodium ion c) sodium amide d) ammoniated sodium ion.
52. Two metals X and Y belong to the second group of periodic table. X forms insoluble oxide but soluble sulphate. Y forms a soluble oxide but insoluble sulphate. Hydroxide of metal X is soluble in NaOH while that of metal Y is insoluble in NaOH. What are metals X and Y?
    a) X=Be, Y=Ba b) X=Mg, Y=Ca c) X=Ca, Y=Sr d) X=Ba, Y=Mg
53. The ease of adsoration of the hydrated alkali metal ions on an ion-exchange resins follows the:
    a) $Li^+ < K^+ < Na^+ < Rb^+$ b) $Rb^+ < K^+ < Na^+ < Li^+$
    c) $K^+ < Na^+ < Rb^+ < Li^+$ d) $Na^+ < Li^+ < K^+ < Rb^+$
54. The function of "Sodium pump" is a biological process operating in each and every cell of all animals. Which of the following biologically important ions is also a constituent of this pump:
    a) Mg^{2+} b) K^+ c) Fe^{2+} d) Ca^{2+}
55. The properties of Li are similar to those of Mg. This is because:
    a) both have nearly the same size. b) both has their charge to size ratio nearly the same.
    c) both have similar electronic configurations d) both are found together in nature
56. The difference in number of water molecules in gypsum and plaster of paris is
    a) 5/2 b) 2 c) 1/2 d) 3/2
57. A compound of sodium does not give CO_2 when heated but it gives CO_2 when treated with dilute acids. A crystalline compound is found to have 37.1% Na and 14.52% H_2O. Hence, compound is
    a) $NaHCO_3.10H_2O$ b) $NaHCO_3.5H_2O$ c) $Na_2CO_3.10H_2O$ d) $Na_2CO_3.H_2O$
58. Which of the following has the largest size?
    a) Na b) Na^+ c) Na^- d) Can't be Predicied
59. Ionic mobility of which of the following alkali metal ions is lowest when aqueous solution of their salts are put under an electric filed?
    a) Na b) K c) Rb d) Li
60. Beryllium shows diagonal relationship with aluminium. Which of the following similarity is incorrect?

a) Be_2C like Al_4C_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

61. Which of the carbonates given below is unstable in air and is kept in CO_2 atmosphere to avoid decomposition?
a) $BeCO_3$ b) $MgCO_3$ c) $CaCO_3$ d) $BaCO_3$

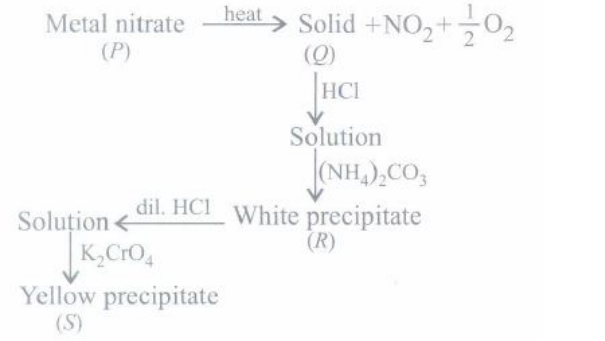
62. The stability of K_2O, K_2O_2 and KO_2 is in order $K_2O < K_2O_2 < KO_2$. This increasing stability as the size of metal ion increases is due to stabilisation of:
a) larger cation by smaller anions through lattice energy effects
b) larger cation by larger anions through lattice energy effects
c) smaller cations by smaller anions through melting point
d) smaller cations by larger anions through melting point

63. First ionisation energy of alkali metals is very low but second ionisation energy is very high because?
a) alkali metals acquire noble gas configuration after losing one electron
b) a large amount of energy is required to remove electron from a cation
c) alkali metals can form only univalent ions
d) first group elements can lose only one electron

64. When a substance (A) reacts with water it produces a combustible gas (B) and a solution of substance (C) in water. When another substance (D) reacts with this solution of (C), it also produces the same gas (B) on warming but (D) can also produce gas (B) on reaction with dilute sulphuric acid at room temperature. (A) imparts a deep golden yellow colour to a smokeless flame of Bunsen burner. Then, A, B, C and D, respectively are:
a) Na, H_2, NaOH, Zn b) K, H_2, KOH, Al c) Ca, H_2, $Ca(OH)_2$, Sn
d) CaC_2, C_2H_2, $Ca(OH)_2$, Fe

65. The E^0 for Cl^-/Cl_2 is 1.36, for I^-/I^2 is +0.53, for Ag^+/Ag is +0.79, Na^+ is -2.71 and for Li^+/Li is -3.04 V Arrange the following species in decreasing order of reducing strength. I^-, Ag, Cl^-Li, Na
a) Li > Cl > Ag > I^- > Na b) Li > Na > I^- > Ag > Cl^- c) Cl^- > Ag > I^- > Na > Li
d) Na > Li > Ag > Cl^- > I^-

66. What are (P), (Q), (R) and (S)?



a)

P	Q	R	S
$Be(NO_3)_2$	BeO	$BeCO_3$	$BeCrO_4$

b)

P	Q	R	S
$NaNO_3$	Na_2O	Na_2CO_3	Na_2CrO_4

c)

P	Q	R	S
$Ba(NO_3)_2$	BaO	$BaCO_3$	$BaCrO_4$

d)

P	Q	R	S
KNO_3	K_2O	K_2CO_3	K_2CrO_4

67. The solubility of metal halides depends on their nature, lattice enthalpy and hydration enthalpy of the individual ions. Amongst fluorides of alkali metals, the lowest solubility of LiF in water is due to
    a) ionic nature of lithium fluoride b) high lattice enthalpy
    c) high hydration enthalpy for lithium ion d) low ionisation enthalpy of lithium atom
68. The suspension of slaked lime in water is known as:
    a) Lime water b) Quick lime c) Milk of lime d) Aqueous solution of slaked lime.
69. Metals form basic hydroxides. Which of the following metal hydroxide is the least basic?
    a) $Mg(OH)_2$ b) $Ca(OH)_2$ c) $Sr(OH)_2$ d) $Ba(OH)_2$
70. The sequence of ionic mobility in aqueous solution is:
    a) $K^+ > Na^+ > Rb^+ > Cs^+$ b) $Cs^+ > Rb^+ > K^+ > Na^+$ c) $Rb^+ > K^+ > Cs^+ > Na^+$
    d) $Na^+ > K^+ > Rb^+ > Cs^+$
71. The metal ion, that plays an important role in muscle contraction, is
    a) Be^{2+} b) Mg^{2+} c) Ca^{2+} d) Ba^{2+}
72. Solubility of the alkaline earth's metal sulphates in water decreases in the sequence:
    a) $\mathrm{Ca > Sr > Ba > Mg}$ b) $\mathrm{Sr > Ca > Mg > Ba}$ c) $\mathrm{Ba > Mg > Sr > Ca}$
    d) $\mathrm{Mg > Ca > Sr > Ba}$
73. The compound A on heating gives a colorless gas and a rescue that is dissolve in water obtain B. Excess of CO_2 is bubbled through aqueous solution of B. C is formed which is recovered in the solid form. Solid C on gentle heating gives back A. The compound 'X' is?
    a) $\mathrm{CaSI_4 2H_2O}$ b) $\mathrm{CaCO_3}$ c) $\mathrm{Na_2CO_3}$ d) $\mathrm{K_2CO_3}$
74. Which of the following is arranged according to increasing basic strength?
    a) CaO < MgO < SrO < BaO < BeO b) BaO < SrO < CaO < MgO < BeO
    c) BeO < MgO < CaO < BaO < SrO d) BeO < MgO < CaO < SrO < BaO
75. Baking soda is
    a) $NaHCO_3$ b) $NaHCO_3.6H_2O$ c) Na_2CO_3 d) $Na_2CO_3.10H_2O$
76. Metal carbonates decompose on heating to give metal oxide and carbon dioxide. Which of the metal carbonates is most stable thermally?
    a) $MgCO_3$ b) $CaCO_3$ c) $SrCO_3$ d) $BaCO_3$
77. Which of the following elements does not form hydride by direct heating with dihydrogen?
    a) Be b) Mg c) Sr d) Ba
78. When washing soda is heated :
    a) CO is released b) CO + CO_2 is released c) CO_2 is released
    d) water vapour is released
79. A metal X reacts with water to produce a highly combustible gas Y, and a solution Z. Another metal P reacts with Z to give the same gas Y.
    X, Y, Z and P respectively are
    a) Zn, H_2, $Zn(OH)_2$, Al b) Na, H_2, NaOH, Zn c) K, H_2, KOH, Al d) Li, H_2, LiOH, K
80. An element X burns in nitrogen to give a compound Y which on reaction with water gives a compound Z and a gas with a pungent smell. Z can be used during construction and white washing. When excess of CO_2 is bubbled through Z, a compound P is formed which on heating decomposes to give a colourless, odourless gas. Identify X, Y, Z and P.

a)

X	Y	Z	P
Ca	Ca_3N_2	$Ca(OH)_2$	$Ca(HCO_3)_2$

b)

X	Y	Z	P
Mg	MgO	$Mg(OH)_2$	$MgCO_3$

c)

X	Y	Z	P
Ca	Ca_3N_2	$Ca(OH)_2$	$CaCO_3$

d)

X	Y	Z	P
Ca	CaO	$Ca(OH)_2$	$Ca(HCO_3)_2$

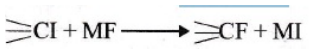
81. The formula of soda ash is
    a) $Na_2CO_3.10H_2O$ b) $Na_2CO_3.2H_2O$ c) $Na_2CO_3.H_2O$ d) Na_2CO_3
82. Property of the alkaline earth metals that increases with their atomic number is:
    a) Solubility of their hydroxides b) Solubility of their sulphates in water.
    c) Ionization energy d) Electronegativity
83. Which of the following statements is incorrect?
    a) Pure sodium metal dissolves in liquid ammonia to give blue solution.
    b) NaOH reacts with glass to give sodium silicate
    c) Aluminum reacts with excess NaOH to give $\mathrm{Al(OH)_3}$.
    d) $\mathrm{NaHCO_3}$ on heating gives $\mathrm{Na_2CO_3}$.
84. 20.0 gm of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 gm magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample? (At. wt. of Mg = 24)
    a) 96 b) 60 c) 84 d) 75
85. The compound (A) on heating gives a colourless gas and a residue that is dissolved in water to obtain (B). Excess of CO_2 is bubbled through aqueous solution of (B), (C) is formed which is recovered in the solid form. Solid (C) on gentle heating gives back (A). The compound is:
    a) $CaCO_3$ b) Na_2CO_3 c) K_2CO_3 d) $CaSO_4 \cdot 2H_2O$
86. Assertion: The fluorides of alkaline earth metals are relatively less soluble than chlorides.
    Reason: Fluorides have high lattice energies.
    a) If both assertion and reason are true and reason is the correct explanation of assertion
    b) If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false
87. Which of the following oxides is most acidic in nature?
    a) BaO b) BeO c) MgO d) CaO
88. The violet flame shown by potassium in Bunsen flame is due to jumping of the electron from:
    a) 1s to 4p b) 1s to 5p c) 4p to 4s d) 5p to 4s
89. The decreasing order of the second ionization potential of Mg, Ca and Ba is
    a) Mg > Ca > Ba b) Ca > Ba > Mg c) Ba > Mg > Ca d) Mg > Ba > Ca
90. Alkali metals are not found in free state due to their highly reactive nature. This is due to
    a) their large size and low ionisation enthalpy
    b) their large size and high ionisation enthalpy
    c) their low ionisation enthalpy and high electron gain enthalpy
    d) their tendency to impart colour to the flame
91. When plaster of Paris comes in contact with water it sets into a hard mass. The composition of the hard mass is

a) $CaSO_4 \cdot H_2O$ b) $CaSO_4.Ca(OH)_2$ c) $CaSO_4.2H_2O$ d) $CaSO_4.2Ca(OH)_2$

92. Which of the following oxides is not expected to react with sodium hydroxide?
a) CaO b) SiO_2 c) BeO d) B_2O_3

93. The alkali metals dissolve in ammonia to give a deep blue solution which is conducting in nature.
$M+(x+y)NH_3 \longrightarrow [M(NH_3)_x]^{2+} + 2[e(NH_3)_y]^-$
Which of the following is not true about the solutions of alkali metals in liquid ammonia
a) The blue colour is due to ammoniated electron b) The solution is paramagnetic
c) The blue colour changes to brown on standing
d) In concentrated solution blue colour changes to bronze and becomes diamagnetic

94. Which of the following is not a use of baking soda?
a) In medicines as antacid b) As a component of baking powder
c) In removing permanent hardness of water d) In fire extinguishers

95. In the replacement reaction:

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

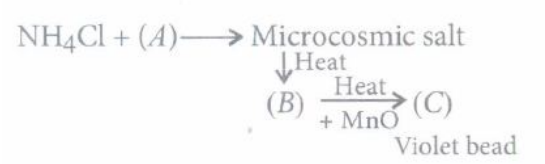
96. In the synthesis of sodium carbonate, the recovery of ammonia is done by treating NH_4Cl with $Ca(OH)_2$. The by-product obtained in this process is
a) $CaCl_2$ b) NaCl c) NaOH d) $NaHCO_3$

97. A solution of a compound X in dilute HCl on treatment with a solution of $BaCl_2$ gives a white precipitate of a compound Y which is insoluble in conc. HNO_3 and conc. HCl. Compound X imparts golden yellow colour to the flame.
$$\underset{(imparts\ golden\ yellow\ colour)}{X(Solution\ in\ dilute\ HCl)} + BaCl_2 \longrightarrow \underset{White\ ppt}{Y} \xrightarrow[Conc.HCl]{Conc.HNO_3+} Insoluble$$
What are compounds X and Y?
a) X is $MgCl_2$ and Y is $BaSO_4$ b) X is $CaCl_2$ and Y is $BaSO_4$
c) X is Na_2SO_4 and Y is $BaSO_4$ d) X is $MgSO_4$ and Y is $BaSO_4$

98. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Plaster of paris
a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

99. The raw materials in solvay process are:
a) NaCl, NH_3, $CaCO_3$ b) NaOH, CO_2 c) NaCl, $CaCO_3$, NH_3 d) NH_3, H_2O, NaCl

100. Which of the following is not a similarity of beryllium with aluminium?
a) It becomes passive when treated with cone HNO_3
b) It forms polymeric covalent hydrides c) Carbonate of Be is extremely stable
d) Salts of Be do not impart colour to the flame

101. 

(A), (B) and (C) respectively are

a) Na_3PO_4, $NaPO_3$, $(Mn)_3(PO_4)_2$ b) Na_2HPO_4, Na_3PO_4, $Mn_3(PO_4)_2$

c) Na_2HPO_4, $NaPO_3$, $Mn(PO_3)_2$ d) Na_2HPO_4, $NaPO_3$, $NaMnPO_4$

102. Sulphates of Be and Mg are readily soluble in water but sulphates of Ca, Sr and Ba are insoluble. This is due to the fact

a) the greater hydration enthalpies of Be^{2+} and Mg^{2+} overcome the lattice enthalpy

b) high lattice enthalpy of Be^{2+} and Mg^{2+} makes them soluble in water

c) solubility decreases from $BeSO_4$ to $BaSO_4$ due to increase in ionic size

d) $BeSO_4$ and $MgSO_4$ are ionic in nature while other sulphates are covalent

103. Assertion: Elements of group 1 are called 'alkali metals'.

Reason: All the alkali metals react with water.

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

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

c) If assertion is true but reason is false d) If both assertion and reason are false

104. What is the biological importance of Na+ and K^+ ions in cell fluids like blood plasma?

a) They participate in transmission of nerve signals

b) They regulate the number of red and white blood corpuscles in the cell

c) They can be present in any amount in the blood since they are absorbed by the cells

d) They regulate the viscosity and colour of the blood

105. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Li	(i)	Role in biological systems
(B)	K	(ii)	Golden yellow flame
(C)	Na	(iii)	Photoelectric cell
(D)	Cs	(iv)	Carbonate decomposes on heating

a) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (iii), (D) ⟶ (ii) b) (A) ⟶ (i), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (iv)

c) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i), (D) ⟶ (iv) d) (A) ⟶ (iv), (B) ⟶ (i), (C) ⟶ (ii), (D) ⟶ (iii)

106. Arrange the following elements in the order of the increasing electropositive character.

Li, Na, K, Rb, Cs

a) Li > Na > K > Rb > Cs b) Li < Na < K < Rb < Cs c) Li > Na < K < Rb < Cs

d) Na > Li > K < Rb < Cs

107. Assertion Lithium resembles magnesium diagonally placed in next group.

Reason: The size of Li^+ and Mg^{2+} are different and their electropositive character is same.

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

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

c) If assertion is true but reason is false d) If both assertion and reason are false

108. In all oxides, peroxides and superoxides, the oxidation state of alkali metals is:

a) +1 and -1 b) +1 and +2 c) +1 only d) +1, -1 and +2

109. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Gypsum
a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

110. A metal salt solution forms a yellow precipitate with potassium chromate in acetic acid, a white precipitate with dilute sulphuric acid but does not give precipitate with sodium chloride or iodide. The white precipitate obtained when sodium carbonate is added to the metal salt solution will consist of:
a) lead carbonate b) basic lead carbonate c) barium carbonate d) strontium carbonate

111. Which is the characteristic flame colouration of Li?
a) Yellow b) Violet c) Blue d) Crimson red

112. The product obtained as a result of a reaction of nitrogen with CaC_2 is:
a) $CaCN_3$ b) Ca_2CN c) $Ca(CN)_2$ d) CaCN

113. All alkali halides are soluble in water except LiF The low solubility of LiF in water is due to its (i) the low solubility of CsI is due to (ii). LiF is soluble in (ii) solvents.
a)

(i)	(ii)	(iii)
low lattice enthalpy	large hydration enthalpy	polar solvents

b)

(i)	(ii)	(iii)
high lattice enthalpy	smaller hydration enthalpy	non - polar solvents

c)

(i)	(ii)	(iii)
high hydration enthalpy	high lattice enthalpy	non - polar solvents

d)

(i)	(ii)	(iii)
smaller hydration enthalpy	high lattice enthalpy	polar solvents

114. When alkaline earth metals dissolve in ammonia, they form coloured solution like alkali metals. Which of the following observations regarding the reaction are correct?
(i) Dilute solutions are bright blue in colour due to solvated electrons.
(ii) These solutions decompose to form amides and hydrogen.
(iii) From this solution the ammoniates $[M(NH_3)_6]^{2+}$ can be recovered by evaporation.
a) Only (i) and (ii) b) Only (i), (ii) and (iii) c) Only (ii) and (iii) d) Only (i)

115. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Na^+	(i)	Chlorophyll
(B)	K^+	(ii)	Bones and teeth
(C)	Ca^{2+}	(iii)	Regulating flow of water across cell membrane
(D)	Mg^{2+}	(iv)	Activation of enzyme within cell fluids

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

116. Fill up the blanks with appropriate choices. Lithium and magnesium react slowly with water. Their hydroxides are _____ soluble in water. Carbonates of Li and Mg _____ easily on heating. Both LiCl and $MgCl_2$ are _____ in ethanol and are _____ They crystallise from their aqueous solutions as _____

a) more, do not decompose, soluble, hygroscopic, hydrates

b) less, decompose, soluble, deliquescent, hydrates

c) freely,sublime, insoluble,deliquescent,anhydrous

d) freely, decompose, soluble, hygroscopic, crystals

117. In Solvay ammonia process, sodium bicarbonate is precipitated due to

a) presence of NH_3 b) reaction with CO_2 c) reaction with brine solution

d) reaction with NaOH

118. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Na	(i)	Crimson red
(B)	K	(ii)	Yellow
(C)	Sr	(iii)	Apple green
(D)	Ba	(iv)	Violet

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii), (D) ⟶ (iv) b) (A) ⟶ (ii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (iii)

c) (A) ⟶ (iv), (B) ⟶ (iii), (C) ⟶ (ii), (D) ⟶ (i) d) (A) ⟶ (iii), (B) ⟶ (iv), (C) ⟶ (i), (D) ⟶ (ii)

119. Which nitrate will decompose to give NO_2 on heating?

a) $NaNO_3$ b) KNO_3 c) $RbNO_3$ d) $LiNO_3$

120. Assertion: Lithium salts are mostly hydrated.
Reason: The hydration enthalpies of alkali metal ions decrease with increase in ionic size.

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

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

c) If assertion is true but reason is false d) If both assertion and reason are false

121. Assertion: Lithium fluoride is most covalent in nature.
Reason: Small anion can be easily distorted.

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

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

c) If assertion is true but reason is false d) If both assertion and reason are false

122. The alkali metals are low melting. Which of the following alkali metals is expected to melt if the room temperature rises to 30°C?

a) Na b) K c) Rb d) Cs

123. The first ionisation enthalpies of the alkaline earth metals are higher than that of alkali metals but second ionisation enthalpies are smaller, why?

a)
In alkali metals, second ionisation enthalpy involves removal of electron from noble gas electronic configuration while in alkaline earth metals, second electron is removed from ns^1 configuration.

b) Alkaline earth metals have very high melting point as compared to alkali metals

c) Electrons in s-orbital are more closely packed in alkaline earth metals than alkali metals

d) Due to smaller size alkaline earth metals do not form divalent ions very easily

124. An example of a double salt is:
a) Bleaching powder b) $K_4[Fe(CN)_6]$ c) Hypo d) Potash alum

125. Which of the following will have lowest value of K_{sp} at room temperature?
a) $Be(OH)_2$ b) $Mg(OH)_2$ c) $Ca(OH)_2$ d) $Ba(OH)_2$

126. Slaked lime reacts with chlorine to give:
a) $CaCl_2$ b) CaO c) $Ca(OCl)_2$ d) $CaCO_3$

127. The increasing order of basic character of oxides MgO, SrO, K_2O, and Cs_2O is:
a) $MgO < SrO < K_2O < Cs_2O$ b) $SrO < MgO < Cs_2O < K_2O$ c) $Cs_2O < K_2O < SrO < MgO$
d) $K_2O < Cs_2O < SrO < MgO$

128. Nuclear attraction is often the deciding control factor for the association of neutral molecules to a given metal ion. Which one of the following represents the correct order of stability of the ions?
$[Be(H_2O)_4]^{2+}$, $[Mg(H_2O)_4]^{2+}$, $[Ca(H_2O)_4]^{2+}$ and $[Sr(H_2O)_4]^{2+}$
a) $[Be(H_2O)_4]^{2+} > [Sr(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Ca(H_2O)_4]^{2+}$
b) $[Ca(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Be(H_2O)_4]^{2+} > [Sr(H_2O)_4]^{2+}$
c) $[Sr(H_2O)_4]^{2+} > [Ca(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Be(H_2O)_4]^{2+}$
d) $[Be(H_2O)_4]^{2+} > [Mg(H_2O)_4]^{2+} > [Ca(H_2O)_4]^{2+} > [Sr(H_2O)_4]^{2+}$

129. Calcium chloride is used as a dehydrating agent because:
a) it has a strong affinity for water b) it has water of crystalline attached to it
c) it loses water when exposed to air d) it has a high melting point.

130. Assertion: Beryllium and magnesium do not impart characteristic colour in flame.
Reason: Both Beryllium and magnesium have high I.E.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

131. A solid compound 'X' on heating gives CO_2, gas and residue. The residue mixed with water forms 'Y'. residue. On passing an excess of CO_2, through 'Y' in water, a clear solution 'Z', is obtained. On boiling 'Z', compound 'X' reformed. The compound 'X' is?
a) $Ca(HCO_3)_2$ b) $CaCO_3$ c) Na_2CO_3 d) K_2CO_3

132. Compared with the alkaline earth metals, the alkali metals exhibit
a) smaller ionic radii b) higher boiling points c) greater hardness
d) lower lonisation energies

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

134. Which of the following statements is true about $Ca(OH)_2$?
a) It is used in the preparation of bleaching powder b) It is a light blue solid
c) It does not possess disinfectant property d) It is used in the manufacture of cement

135. Gypsum is added to portland cement to:
a) fasten the process of setting b) slow down the process of setting
c) improve the colour of the cement d) increase the melting point of cement

136. Which of the following compounds has the lowest rnelting point?
a) $CaCl_2$ b) $CaBr_2$ c) CaI_2 d) CaF_2

137. Which of the following statement is false?
a) Strontium decomposes water readily than beryllium
b) $BaCO_3$ melts at a higher temperature than $CaCO_3$
c) Barium hydroxide is more soluble in water than $Mg(OH)_2$
d) Beryllium hydroxide is more basic than bariun hydroxide

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

139. Assertion: The melting and boiling points of the alkali metals are low.
Reason: Alkali metals have weak metallic bonding.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

140. Which of the following reactions is not a part of Solvay's process for preparation of sodium carbonate?
a) $2NH_3 + H_2O + CO_2 \longrightarrow (NH_4)_2CO_3$) b) $(NH_4)_2CO_3 + H_2O + CO_2 \longrightarrow 2NH_4HCO_3$
c) $2NH_4HCO_3 \longrightarrow (NH_4)_2CO_3 + H_2O + CO_2$ d) $NH_4HCO_3 + NaCl \longrightarrow NH_4Cl + NaHCO_3$

141. Which of the following is known as fusion mixture?
a) Mixture of $Na_2CO_3 + NaHCO_3$ b) $Na_2CO_3 \cdot 10H_2O$ c) Mixture of $K_2CO_3 + Na_2CO_3$
d) $NaHCO_3$

142. Which one is the correct statement with reference to the solubility of $MgSO_4$ in water?
a) SO_4^{2-} ions mainly contribute towards hydratior energy
b) Sizes of Mg^{2+} and SO_4^{2-} are similar
c) Hydration energy of $MgSO_4$ is higher in comparison to its lattice energy
d) Ionic potential (charge/radius ratio) of Mg^{2+}

143. Which of the following increasing orders is not correct as per the property indicated against it?
a) CsCl < RbCl < KCl < NaCl < LiCl (Lattice energy)
b) LiOH < NaOH < KOH (Solubility in water)
c) $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$ (Size of hydrated ion)
d) NaI < NaBr < NaCl < NaF (Lattice energy)

144. Which of the following alkali metals when burnt in air forms a mixture of oxide as well as nitride?
a) K b) Na c) Li d) Cs

145. Be and Al exhibit diagonal relationship. Which of the following statements about them is/are not true?
(i) Both react with HCl to liberate H_2.
(ii) They are made passive by HNO_3.
(iii) Their carbides give acetylene on treatment with water.
(iv) Their oxides are amphoteric
a) (iii) and (iv) b) (i) and (iii) c) (i) only d) (iii) only

146. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Epsomite

a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

147. Which one of the following has minimum value of size of cation/anion ratio?
a) NaCl b) KCl c) $MgCl_2$ d) CaF_2

148. Alkali metals cannot be extracted by reduction of their oxides and other compounds because:
a) alkali metals are strong reducing agents b) alkali metals have low ionisation enthalpy
c) alkali metals have high lattice enthalpy d) alkali metals are strongly basic in nature

149. Sodium is made by the electrolysis of a molten mixture about 40% NaCl and 60% $CaCl_2$ because:
a) Ca^{2+} can reduce NaCl to Na b) Ca^{2+} can displace Na from NaCl
c) $CaCl_3$ helps in conduction of electricity
d) This mixture has a lower melting point than NaCl

150. Which one of the following has minimum value of size of cation/anion ratio?
a) NaCl b) KCL c) $MgCl_2$ d) CaF_2

151. Which of the following atoms will have the smallest size?
a) Mg b) Na c) Be d) Li

152. Lithium is the strongest reducing agent though it has highest ionisation energy in its group. Which of the following factors is responsible for making Li the strongest reducing agent?
a) Large heat of atomisation b) Smaller size c) Large sublimation energy
d) Large amount of hydration enthalpy

153. Assertion: For biological functions in human body, barium is not required.
Reason: Barium is a divalent ion.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

154. Which one of the following properties of alkali metals increases in magnitude as the atomic number rises?
a) Ionic radius b) Melting point c) Electronegativity d) First ionization energy

155. When sodium is dropped in small amount of water it catches fire. Which one of the following burns in the process?
a) Na b) H_2O c) H_2 d) NaOH

156. The decreasing order of ionization enthalpy in alkali metals is:
a) Na> Li > K > Rb b) Rb < Na < K < Li c) Li > Na > K> Rb d) K < Li < Na < Rb

157. On reaction with dihydrogen the alkali metals
a) form hydrides which are ionic solids with high melting points
b) form hydrides which are molecular solids with low melting points
c) form hydrides which are ionic solids with low melting points
d) form hydrides which are non-stoichiometric

158. Match column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Li	(i)	M_2O_2
(B)	Na	(ii)	MO_2
(C)	Rb	(iii)	M_2O

a) (A) ⟶ (i), (B) ⟶ (ii), (C) ⟶ (iii) b) (A) ⟶ (iii), (B) ⟶ (ii), (C) ⟶ (i)
c) (A) ⟶ (iii), (B) ⟶ (i), (C) ⟶ (ii) d) (A) ⟶ (ii), (B) ⟶ (iii), (C) ⟶ (i)

159. Some of the Group 2 metal halides are covalent and soluble in organic solvents. Among the following metal halides, the one which is soluble in ethanol is
a) $BeCl_2$ b) $MgCl_2$ c) $CaCl_2$ d) $SrCl_2$

160. A substance which gives brick red flame and breaks down on heating to give oxygen and a brown gas is
a) magnesium nitrate b) calcium nitrate c) barium nitrate d) strontium nitrate

161. A chemical 'A' is used for the preparation of washing soda to recover ammonia. When CO2 is bubbled through an aqueous solution of 'A', the solution turns milky. It is used in white washing due to disinfectant nature. What is the chemical formula of 'A'?
a) $Ca(HCO_3)_2$ b) CaO c) $Ca(OH)_2$ d) $CaCO_3$

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

163. Assertion: The carbonate of lithium decomposes easily on heating to form lithium oxide and CO_2.
Reason: Lithium being very small in size polarises large carbonate ion leading to the formation of more stable Li_2O and CO_2.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

164. Complete the following equations:
(i) $Na_2O_2 + 2H_2O \longrightarrow \underline{(W)} + H_2O_2$
(ii) $2KO_2 + 2H_2O \longrightarrow \underline{(X)} + \underline{(Y)} + O_2$
(iii) $Na_2O + CO_2 \longrightarrow \underline{(Z)}$

a)

W	X	Y	Z
4Na	K_2O	H_2O	Na_2O_2

b)

W	X	Y	Z
4Na	K_2O	H_2O_2	Na_2CO_3

c)

W	X	Y	Z
4NaOH	2KOH	H_2O	Na_2O_2

d)

W	X	Y	Z
2NaOH	2KOH	H_2O_2	Na_2CO_3

165. Which of the following alkaline earth metal sulphates has hydration enthalpy higher than the lattice enthalpy?
a) $CaSO_4$ b) $BeSO_4$ c) $BaSO_4$ d) $SrSO_4$

166. The correct order of increasing thermal stability of K_2CO_3, $MgCO_3$, $CaCO_3$ and $BeCO_3$ is:
a) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$ b) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$
c) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$ d) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$

167. Bleaching powder is obtained by the action of chlorine gas and
a) dilute solution of $Ca(OH)_2$ b) concentrated solution of $Ca(OH)_2$ c) dry CaO
d) dry slaked lime

168. The solubility of alkali metal salts in water is due to the fact that the cations get hydrated by water molecules. The degree of hydration depends upon the size of the cation. If the trend of relative ionic radii is $Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$. What is the relative degree of hydration?
a) $CS^+_{(aq)} > Rb^+_{(aq)} > K^+_{(aq)} > Na^+_{(aq)} > Li^+_{(aq)}$ b) $Li^+_{(aq)} > Na^+_{(aq)} > K^+_{(aq)} > Rb^+_{(aq)} > Cs^+_{(aq)}$
c) $Na^+_{(aq)} > K^+_{(aq)} > Rb^+_{(aq)} > C^+_{(aq)} > Li^+_{(aq)}$ d) $Cs^+_{(aq)} > Na^+_{(aq)} > Li^+(aq) > K^+_{(aq)} > Rb^+_{(aq)}$

169. A white solid X reacts with dil. HCl to give colourless gas which is used in fire extinguishers. The solid X is
a) NaCl b) CH_3COONa c) Na_2CO_3 d) $NaHCO_3$

170. Assertion: $BeSO_4$ and $MgSO_4$ are insoluble in water.
Reason: Be^{2+} and Mg^{2+} have low hydration enthalpies.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

171. In the given chemical reactions,
$2P + H_2O + CO_2 \rightarrow Q \xrightarrow{H_2O+CO_2} 2R \xrightarrow{NaCl} S + NH_4Cl$ Identify S.
a) Na_2CO_3 b) NaOH c) $NaHCO_3$ d) NH_3

172. On heating which of the following releases CO_2 most easily?
a) Na_2CO_3 b) $MgCO_3$ c) $CaCO_3$ d) K_2CO_3

173. Which one of the following is present as an active ingredient in bleaching powder for bleaching action?
a) $CaOCl_2$ b) $Ca(OCl)_2$ c) CaO_2Cl d) $CaCl_2$

174. Bleaching powder reacts with a few drops of concentrated HCl to give:
a) Chlorine b) Hypochlorous acid c) Calcium oxide d) Oxygen

175. Which one of the following properties of alkali metals increases in magnitude as the atomic number rises?
a) Ionic radius b) Melting point c) Electronegativity d) First ionisation energy

176. The low solubility of LiF and that of CsI in water are respectively due to which of the properties of the alkali metal ions?
a) Higher hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+
b) Smaller hydration enthalpy of Li^+, higher lattice enthalpy of Cs^+
c) Smaller lattice enthalpy of Li^+, higher hydration enthalpy of Cs^+
d) Higher lattice enthalpy of Li^+, smaller hydration enthalpy of Cs^+

177. Match the column I with column II and mark the appropriate choice:

Column I		Column II	
(A)	Quick lime	(i)	CaH_2
(B)	Slaked lime	(ii)	$Ba(OH)_2$
(C)	Baryta water	(iii)	$Ca(OH)_2$
(D)	Hydrolith	(iv)	CaO

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

178. Dead burnt plaster is
a) $CaSO_4$ b) $CaSO_4.\frac{1}{2}H_2O$ c) $CaSO_4.H_2O$ d) $CaSO_4.2H_2O$

179. The element A burns in nitrogen to give an ionic compound B. The compound B reacts with water to give C and D. A solution of C becomes milky on bubbling carbon dioxide. What is the nature of compound (D)?
a) Acidic b) Basic c) Amphoteric d) Neutral

180. Which of the following statements is correct regarding alkaline earth metals?
a) Alkaline earth metals are weaker reducing agents than alkali metals
b) Alkaline earth metal salts are paramagnetic in nature
c) Alkaline earth metal salts are more soluble than corresponding alkali metal salts
d) Solubility of sulphates of alkaline earth metals increases from top to bottom in the group

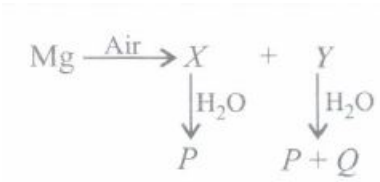
181. Which of the following statement is false?
a) Strontium decomposes water readily than beryllium.
b) $BaCO_3$ melts at a higher temperature than $CaCO_3$
c) Barium hydroxide is more soluble in water than $Mg(OH)_2$
d) Beryllium hydroxide is more basic than barium hydroxide.

182. One word answers are given for the following. Mark the example which is not correct
a) Alkali metal with lowest melting point - Cs
b) Alkaline earth metal with highest hydration enthalpy - Ba^{2+}
c) Alkaline earth metal which imparts brick red colour to the flame - Ca^{2+}
d) Oxide of alkaline earth metal which is amphoteric in nature - BeO

183. Which one of the following is present as an active ingredient in bleaching powder for bleaching action?
a) $Ca(OCl)_2$ b) CaO_2Cl c) $CaCl_2$ d) $CaOCl_2$

184. Equimolar solutions of the following were prepared in water separately. Which one of the solutions will record the highest pH?
a) $SrCl_2$ b) $BaCl_2$ c) $MgCl_2$ d) $CaCl_2$

185. What happens when magnesium is burnt in air and the products X and Yare treated with water?



a)

X	Y	P	Q
MgO	$Mg(OH)_2$	$Mg(OH)_2$	N_2

b)

X	Y	P	Q
MgO	Mg_3N_2	$Mg(OH)_2$	NH_3

c)

X	Y	P	Q
$Mg(OH)_2$	MgO	$Mg(OH)_2$	N_2

d)

X	Y	P	Q
MgO	$Mg(OH)_2$	N_2	$Mg(OH)_2$

186. The correct order of the mobility of the alkali metal ions in aqueous solution is:
a) $Li^+ > Na^+ > K^+ > Rb^+$ b) $Na^+ > K^+ > Rb^+ > u^+$ c) $K^+ > Rb^+ > Na^+ > Li^+$
d) $Rb^+ > K^+ > Na^+ > u^+$

187. Which is the correct sequence of solubility of carbonates of alkaline earth metals?
a) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$ b) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$
c) $CaCO_3 > BaCO_3 > SrCO_3 > MgCO_3$ d) $BaCO_3 > CaCO_3 > SrCO_3 > MgCO_3$

188. Lithium salts are mostly hydrated like $LiCl \cdot 2H_2O$ due to
a) maximum ionisation enthalpy b) maximum degree of hydration of Li^+
c) maximum hygroscopic nature d) maximum chemical reactivity

189. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce AIP and with Na, is responsible for the transmission of nerve signals.
a) Potassium b) Iron c) Copper d) Calcium

190. The average composition of portland cement is
a) CaO: 40 - 50%, SiO_2: 30 - 40% , Al_2O_3 Fe_2O_3 : 10 - 20%
b)
CaO: 50 - 60%, SiO_2 : 20 - 25%, Al_2O_3 : 5 - 10%, MgO : 2 - 3%, Fe_2O_3 : 1 - 2% and SO_3: 1-2%
c) SiO_2: 40 - 50%, CaO: 30 - 40%, Al_2O_3 : 10 - 20% d) CaO: 50%, SiO_2 : 50%

191. Match List-I with List-II for the compositions of substances and select the correct answer using the code given below the lists:
Kieserite
a) $CaSO_4.2H_2O$ b) $CasO_4.\frac{1}{2}H_2O$ c) $MaSO_4.7H_2O$ d) $MgSO_4.H_2O$

192. Assertion: Alkaline earth metal oxides are quite stable to heat.
Reason: Enthalpies of formation of alkaline earth metal oxides are quite high.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

193. When sodium reacts with excess of oxygen, the oxidation number of oxygen changes from:
a) 0 to -1 b) 0 to -2 c) -1 to -2 d) No change

194. Among CaH_2, BeH_2, BaH_2, the order of ionic character is:
a) $BeH_2 < BaH_2 < CaH_2$ b) $CaH_2 < BeH_2 < BaH_2$ c) $BeH_2 < CaH_2 < BaH_2$
d) $BaH_2 < BeH_2 < CaH_2$

195. Which of the following is not present in portland cement?
a) $Ca_3Al_2O_6$ b) Ca_3SiO_5 c) Ca_2SiO_4 d) $Ca_3(PO_4)_2$

196. The ionisation energy of alkali metals decreases from Li to Cs because
a) the atomic size increases from Li to Cs
b) the distance between nucleus and outermost orbital decreases from Li to Cs
c) electropositive character decreases down the group
d) melting point decreases from Li to Cs

197. Which of the following metal ions play an important role in muscle contraction?
a) K^+ b) Na^+ c) Mg^{2+} d) Ca^{2+}

198. Identify the correct statement.
a) Gypsum is obtained by heating plaster of Paris
b) Plaster of Paris can be obtained by hydration gypsum
c) Plaster of Paris is obtained by partial oxidation gypsum
d) Gypsum contains a lower percentage of calcium than plaster of Paris

199. In the case of alkali metals, the covalent character decreases in the order:

a) MF > MCl > MBr > MI b) MF > MCl > MI > MBr c) MI > MBr > MCl > MF
d) MCl > MI > MBr > MF

200. Washing soda has formula
a) $Na_2CO_3 \cdot 7H_2O$ b) $Na_2CO_3 \cdot 10H_2O$ c) $Na_2CO_3 \cdot 3H_2O$ d) Na_2CO_3

201. Which of the following is known as fusion mixture?
a) Mixture of $Na_2CO_3 + NaHCO_3$ b) $Na_2CO_3 \cdot 10H_2O$
c) Mixture of $K_2CO_3 + Na_2CO_3$ d) $NaHCO_3$

202. An aqueous solution of sodium carbonate absorbs NO and NO_2 to give:
a) CO_2 + $NaNO_3$ b) CO_2 + $NaNO_2$ c) $NaNO_2$ + CO d) $NaNO_3$ + CO

203. 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. What would be M?
a) Be b) Ba c) Ca d) Mg

204. Which of the bicarbonates does not exist in solid state?
a) $NaHCO_3$ b) $KHCO_3$ c) $Ca(HCO_3)_2$ d) $RbHCO_3$

205. In Castner-Kellner cell for production of sodium hydroxide
a) Brine is electrolysed with Pt electrodes b) Brine is electrolysed using graphite electrodes
c) Molten sodium chloride is electrolysed
d) Sodium amalgam is formed at mercury cathode

206. The correct order of increasing thermal stability of
$K_2CO_3, MgCO_3, CaCO_3$ and $BeCO_3$ is
a) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$
b) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$
c) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$
d) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$

207. Dehydration of hydrates of halides of calcium, barium and strontium i.e., $CaCl_2 \cdot 6H_2O$, $BaCl_2 \cdot 2H_2O$, $SrCl_2 \cdot 6H_2O$, can be achieved by heating. These become wet on keeping in air. Which of the following statements is correct about these halides?
a) Act as dehydrating agent b) Can absorb moisture from air
c) Tendency to form hydrate decreases from calcium to barium d) All of the above

208. Which of the following has lowest thermal stability?
a) Li_2CO_3 b) Na_2CO_3 c) K_2CO_3 d) Rb_2CO_3

209. What is the formula of hydrated $BeCl_2$?
a) $BeCl_2 \cdot H_2O$ b) $BeCl_2 \cdot 2H_2O$ c) $BeCl_2 \cdot 3H_2O$ d) $BeCl_2 \cdot 4H_2O$

210. The mobilities of the alkali metal ions in aqueous solution are $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$ because
a) greater is the degree of hydration, lesser is the mobility in aqueous medium
b) larger the size of cation, greater is the mobility in aqueous medium
c) larger the size of cation, lesser is the mobility of ions in aqueous medium
d) lesser the degree of hydration, lesser is the mobility of ions in aqueous medium

211. What happens when H_2 is passed over lithium at 1073 K?

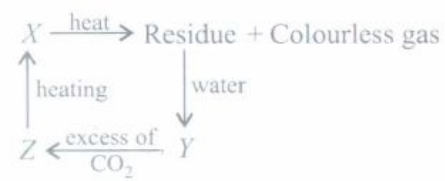
a) Covalent lithium hydride is formed b) Coloured complex is formed
c) Ionic lithium hydride is formed d) No reaction takes place

212. Which of the following statements is false?
a) Mg^{2+} ions form a complex with ATP b) Ca^{2+} ions are important in blood clotting
c) Ca^{2+} ions are not important in maintaining the regular beating of the heart
d) Mg^{2+} ions are important in the green parts of plants.

213. When kept open in air, the crystals of washing soda lose 9 molecules of water to form a monohydrate. $Na_2CO_3 .10H_2O \xrightarrow[to\ air]{exposed} Na_2CO_3.H_2O + 9H_2O$ This process is called
a) efflorescence b) deliquescence c) dehydration d) hydration

214. Identify W, X, Y, and Z respectively in the given reactions.
$CaCO_3 \xrightarrow{\triangle} W + X$
$W + H_2O \rightarrow Y$
$Y + Z \rightarrow NaOH + CaCO_3$
a) CaO, CO_2, $CaCO_3$, Na_2CO_3 b) CO_2, $Ca(OH)_2$, $Ca(HCO)_3$, $NaHCO_3$
c) CaO, CO_2, $Ca(OH)_2$, Na_2CO_3 d) CO_2, CaO, H_2CO_3, Na_2CO_3

215. Which of the following does not show diagonal relationship between beryllium and aluminium?
a) Both BeO and Al_2O_3 are amphoteric in nature
b) Both beryllium and aluminium form polymeric covalent hydrides
c) Both beryllium and aluminium form nitrides with nitrogen which evolve NH_3 with water
d) Both metal carbonates are highly stable

216. 

Identify X, Y and Z,

a)

X	Y	Z
$Ca(HCO_3)_2$	$CaCO_3$	$Ca(OH)_2$

b)

X	Y	Z
$CaCO_3$	$Ca(OH)_2$	$Ca(HCO_3)_2$

c)

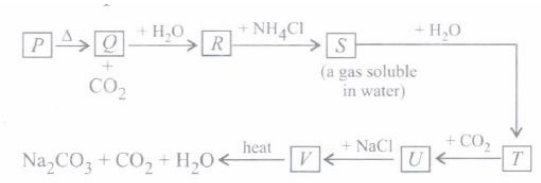
X	Y	Z
$CaCO_3$	CaO	$Ca(OH)_2$

d)

X	Y	Z
$CaCO_3$	CaO	$Ca(HCO_3)_2$

217. Assertion: Alkali metals are obtained by electrolysis of molten salt and not aqueous solution.
Reason: The discharge potential of H^+ ions is lower than alkali metal cation hence hydrogen is discharged at cathode instead of metal.
a) If both assertion and reason are true and reason is the correct explanation of assertion
b) If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false

218. Study the road map for preparation of washing soda and fill up the blanks.



a)

P	Q	R	S	T	U	V
$CaCO_3$	CaO	$Ca(OH)_2$	NH_3	NH_4OH	NH_4HCO_3	$NaHCO_3$

b)

P	Q	R	S	T	U	V
$CaCl_2$	CaO	$Ca(OH)_2$	HCl	HCl	$NaHCO_3$	HCl

c)

P	Q	R	S	T	U	V
$CaCl_2$	CaO	$CaCO_3$	NH_3	HCl	NH_4Cl	$NaHCO_3$

d)

P	Q	R	S	T	U	V
$CaCO_3$	CaO	$Ca(OH)_2$	HCl	Cl_2	$CaCl_2$	$NaHCO_3$