GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

CHEMISTRY

Single Correct Answer Type

1. van-Arker method of purification of metals involves converting the metal to a
   a) Volatile stable compound
   b) Non-volatile stable compound
   c) Volatile unstable compound
   d) None of the above
2. In the electrolysis of alumina, cryolite is added to:
   a) Lower the melting point of alumina and to increase the electrical conductivity
   b) Minimise the anode effect
   c) Remove impurities from alumina
   d) None of the above
3. The pyrolusite ore contains:
   a) Fe
   b) Al
   c) Mn
   d) Cu
4. Purest form of iron is
   a) Pig iron
   b) Wrought iron
   c) Cast iron
   d) Steel
5. Pig iron is manufactured by:
   a) An electric furnace
   b) A blast furnace
   c) An open hearth furnace
   d) None of these
6. During the process of electrolytic refining of copper, some metals present as impurity settle as 'anode mud'. These are
   a) Fe and Ni
   b) Ag and Au
   c) Pb and Zn
   d) Se and Ag
7. By which process Pb and Sn are extracted respectively?
   a) Carbon reduction—self reduction
   b) Self reduction—carbon reduction
   c) Electrolytic reduction—cyanide process
   d) Cyanide process—electrolytic reduction
8. CO on passing over heated nickel gives:
   a) $NiCO_3$
   b) $Ni(CO)_4$
   c) $CO_2 + H_2$
   d) $CO + H_2$
9. Cassiterite is concentrated by
   a) Liquation
   b) Floatation
   c) Electromagnetic separation
   d) Levigation
10. In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide with:
    a) Iron sulphide (FeS)
    b) Carbon monoxide (CO)
    c) Copper(I) sulphide (Cu_2S)
    d) Sulphur dioxide (SO_2)
11. Which of the following metal is thrown as anode mud during electrolytic refining of copper?
    a) Zn
    b) Fe
    c) Ag
    d) Ni
12. Which metal is a liquid at room temperature?
    a) Mercury
    b) Potassium
    c) Sodium
    d) Titanium
13. 'Lapis-Lazuli' is a blue coloured precious stone. It is mineral of the class
    a) Sodium alumino silicate
    b) Basic copper carbonate
    c) Zinc cobalt
    d) Prussian blue
14. Which of the following factors is of **no significance** for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?

a) Metal sulphides are thermodynamically more stable than CS_2
b) CO_2 is bthermodynamically more stable than CS_2
c) Metal sulphides are less stable than the corresponding oxides
d) $CO_2$is more volatile than CS_2

15. The inner lining of a blast furnace is made up of:
a) Graphite bricks b) Silica bricks c) Fire clay bricks d) Basic bricks
16. Which one is an ore of sodium?
a) Sylvine b) Siderite c) Spodumene d) Soda ash
17. Titanium containing mineral found in our country is
a) Bauxite b) Chalcopyrites c) Elmanite d) dolomite
18. Argentite is a mineral of
a) Gold b) Silver c) Copper d) Platinum
19. In blast furnace, iron oxide is reduced by
a) Silica b) Carbon c) Limestone d) CO
20. Heating of ores with flux to remove non-fusible mass is called:
a) Smelting b) Calcination c) Roasting d) Cupellation
21. Gold is extracted using:
a) Amalgamation process
b) Carbon reduction process
c) Oxidation process
d) Electrolytic process
22. Which of the following metals cannot be extracted by carbon reduction process?
a) Zn b) Al c) Hg d) Pb
23. The most malleable metal is:
a) Silver b) sodium c) Gold d) Platinum
24. Granulated zinc is obtained by:
a) Suddenly cooling molten zinc
b) Adding molten zinc to water
c) Heating zinc to 100-150°C
d) Dropping molten zinc drop by drop
25. Most of the plants contain:
a) Fe b) Zn c) Na d) K
26. Which of the following ores does not represent the ores of iron?
a) Cassiterite b) Limonite c) Haematite d) Magnetite
27. The metal obtained by self reduction process is:
a) Cu b) Hg c) Pb d) All of these
28. The cryolite is:
a) Al_2O_3 b) Na_3AlF_6 c) $KAlSi_3O_8$ d) $Al_3O_2OH_2O$
29. Blanc fixe is:
a) $BaSO_4$ b) $BaCl_2$ c) $BaCO_3$ d) None of these
30. Sulphide ores are generally concentrated by
a) Hand picking b) Forth floatation process
c) Gravity separation d) Magnetic separation
31. Which pair of elements can form alloy?
a) Zn and Pb b) Fe and Hg c) Fe and C d) C and Pt
32. Which ore can be best concentrated by froth floatation process?
a) Malachite b) Cassiterite c) Galena d) Magnetite
33. The mass of carbon anode consumed (giving only carbon dioxide) in the production of 270 kg of aluminium metal from bauxite by the hall process is
(Atomic mass of Al=27)

a) 180kg b) 270 kg c) 540 kg d) 90 kg

34. Carbon monoxide reduction process is used for the extraction of:
a) Cu b) Ag c) Na d) K
35. Load stone is one ore of
a) Iron b) Lead c) Silicon d) Tin
36. One of the following metals forms a volatile compound and this property is taken advantage for its extraction. This metals is
a) Cobalt b) Iron c) Tungsten d) Nickel
37. Carbon reduction is used for the extraction of:
a) Fe b) K c) Al d) None of these
38. The phenomenon in which white transparent crystal changes into white powder is known as:
a) Sublimation b) Allotropy c) Efflorescence d) deliquescence
39. Which is used for the extraction of cadmium from cadmium sulphide?
a) Roasting b) Reduction c) Oxidation d) Electrolysis
40. Formula of magnetite is
a) Fe_3O_4 b) Fe_2O_3 c) FeS_2 d) $FeCO_3$
41. When MnO_2 is fused with KOH, a coloured compound is formed, the compound and its colour is:
a) K_2MnO_4, purple green
b) $KMnO_4$, purple
c) Mn_2O_3, brown
d) Mn_3O_4, black
42. Which is not a basic flux?
a) $CaCO_3$ b) CaO c) SiO_2 d) MgO
43. An ore of tin containing $FeCrO_4$ is concentrated by:
a) Magnetic separation b) Froth floatation c) Electrostatic method d) Gravity separation
44. Orford process is used in extraction of:
a) Pt b) Co c) Fe d) Ni
45. The salt which is least likely to be found in minerals is:
a) Sulphate b) Acetate c) Chloride d) Sulphide
46. The second most common element on the earth is:
a) Silicon b) Hydrogen c) Nitrogen d) Oxygen
47. An ore of tin containing $FeCrO_4$ is concentrated by
a) Electrostatic method b) Gravity separation c) Magnetic separation d) Forth floatation
48. Alkaline earth metals are not found free in nature because of:
a) Their high b. p.
b) Their low b. p.
c) Thermal instability
d) Their great chemical activity
49. Alloy is an example of:
a) Gel b) Aerosol c) Solid sol d) Emulsion
50. Cinnabar is an ore of
a) Pb b) Hg c) Cu d) Zn
51. Which element occurs in free state in nature?
a) Fe b) Co c) Pt d) Ni
52. Aluminothermic process is used for the extraction of metals, whose oxides are:
a) Fusible
b) Not easily reduced by carbon
c) Not easily reduced by hydrogen
d) Strongly basic
53. Bauxite ore is concentrated by
a) Froth floatation b) Electromagnetic separation

c) Chemical separation d) Hydraulic separation

54. Which process is used for benefication of ores?
    a) Process of removal of impurities
    b) Process of heating ore at high temperature
    c) Extraction of metal from ore
    d) None of the above
55. Extraction for zinc from zinc blende is achived by
    a) Electrolytic reduction
    b) Roasting following by reduction with carbon
    c) Roasting followed by reduction with another metal
    d) Roasting followed by self-reduction
56. Auto-reduction process is used in the extraction of
    a) Cu and Hg b) Zn and Hg c) Cu and Al d) Fe and Pb
57. Thomas slag is
    a) $Ca_3(PO_4)_2.2H_2O$ b) $Ca_3(PO_4)_2.CaSiO_3$ c) $MgSiO_3$ d) $CaSiO_3$
58. Metals are good conductors of electricity because they contain
    a) Ionic bonds b) A network structure
    c) Very few valence electrons d) Free electrons
59. Liquation is used to purify:
    a) Hg b) Sn c) Bi d) All of these
60. The most abundant metal in the earth crust is:
    a) Na b) Ca c) Al d) Fe
61. Which of the elements listed below shows allotropic forms?
    a) Iodine b) Copper c) Sulphur d) Silver
62. Following method is not used for extraction of Al
    a) Van Arkel b) Serpeck c) Baeyer d) Hall-Heroult
63. Indian saltpetre is:
    a) KNO_2 b) KNO_3 c) NaCl d) Na_2CO_3
64. Poling process is used:
    a) For the removal of Cu_2O from Cu
    b) For the removal of Al_2O_3 from Al
    c) For the removal of Fe_2O_3 from Fe
    d) In all of the above
65. Sperrylite is:
    a) AgCl b) $PtAs_2$ c) Fe_2O_3 d) SnO_2
66. The substance added in water in the forth floatation process is
    a) Pine oil b) Coconut oil c) Soap powder d) None of these
67. The region in which metals are found in earth is called:
    a) Atomophil b) Lithophil c) Calcophil d) Sidrophil
68. In the manufacture of iron from haematite, lime stone is added to act as:
    a) Flux b) Slag c) A reducing agent d) An oxidising agent
69. On heating a mixture of Cu_2O and Cu_2S, we get:
    a) $Cu + SO_2$ b) $Cu + SO_3$ c) $CuO + CuS$ d) Cu_2SO_3
70. Cassiterite is an ore of
    a) Sb b) Mn c) Sn d) Ni
71. In the metallurgical extraction of zinc fromZnO, the reducing agent used is?
    a) Nitric oxide b) Sulphur dioxide c) Carbon monoxide d) Carbon dioxide
72. Zinc blende (an ore) is:
    a) ZnO b) $ZnCO_3$ c) ZnS d) Zn_2OCl_2
73. From gold amalgam, gold may be recovered by:
    a) Addition of Zn metal

b) Electrolytic refining
c) Distillation
d) Dissolving Hg in HNO_3

74. The lightest metal is:
a) Li b) Mg c) Ca d) Na

75. Calamine is
a) $CaCO_3$ b) $MgCO_3$
c) $ZnCO_3$ d) $CaCO_3 + CaO$

76. In the metallurgy of iron, when lime stone is added to the blast furnace, the calcium ions are removed as:
a) Slag b) Gangue c) Metallic Ca d) $CaCO_3$

77. Mond's process is used for the purification of
a) Ni b) Ti c) Zr d) Hg

78. Which contains both Ca and Mg?
a) Lime stone b) Dolomite c) Chalk d) Felspar

79. Calcination and roasting are:
a) Different names of the same operation
b) Used for the purification of metals
c) Usually carried out in reverberatory furnace
d) Employed for the concentration of the ore

80. Passivity of iron is due to the formation of thin film of....on its surface.
a) Oxide b) Carbonate c) Nitride d) Hydroxide

81. Which of the following statement is incorrect?
a) Silver glance mainly contains silver sulphide b) Zinc blende mainly contains zinc chloride
c) Gold is found in native state d) Copper pyrites also contains Fe_2S_3

82. Of the following, which cannot be obtained by electrolysis of the aqueous solution of their salts?
a) Cu b) Ag c) Mg and Al d) Cr

83. The sand stone in some iron ores is removed by:
a) Carbon filters b) Compressed air c) Lime stone d) Sulphuric acid

84. Copper pyrites is concentrated by
a) Gravity method b) Forth floatation process
c) Electromagnetic method d) All of these

85. The chief impurity present in red bauxite is
a) SiO_2 b) Fe_2O_3 c) K_2SO_4 d) NaF

86. Which does not contain aluminium?
a) Bauxite b) Emery c) Rutile d) Corundum

87. Naturally occurring substances from which a metal can be profitably (or economically) extracted are called
a) Ores b) Mineral c) Salts d) Gangue

88. Ferric oxide in blast furnace is reduced by:
a) C b) H_2 c) CO d) CO_2

89. Cupellation process is used in the metallurgy of:
a) Copper b) Silver c) Lead d) Iron

90. Which metal can be purified by distillation?
a) Cu b) Ag c) Fe d) Hg

91. Lepidolite is an ore of:
a) K b) Na c) Li d) All of these

92. Chalcogens are:
a) Hydrocarbons
b) Ore forming elements
c) Oxide forming elements
d) Those having ability to catenate

93. In the Hall's process for extraction of Al, the ore is fused with:
    a) $NaHCO_3$ b) Na_2CO_3 c) NaF d) Na_3AlF_6
94. Antimony occurs mainly in form of:
    a) Sulphide b) Stibnite c) Realgar d) Fluoropatite
95. An important ore of iron is
    a) Pyrites b) Malachite c) haematite d) Siderite
96. Barytes, an ore is:
    a) $BeSO_4$ b) $BeCl_2$ c) $BaSO_4$ d) $BaCl_2$
97. Thermite is a mixture of
    a) Fe powder and Al_2O_3 b) Al powder and Fe_2O_3
    c) Cu powder and Fe_2O_3 d) Zn powder and Cr_2O_3
98. When lime stone is heated, carbon dioxide is given off. This operation in metallurgy is known as:
    a) Smelting b) Ore-dressing c) Calcination d) Roasting
99. Heating mixture of Cu_2O and Cu_2S will give
    a) Cu_2SO_3 b) $CuO + CuS$ c) $Cu + SO_3$ d) $Cu + SO_2$
100. *A* and *B* are two allotropes of an element. One gram of *A* will differ from one gram of *B* in:
    a) Oxidation number
    b) Chemical composition
    c) Total number of atoms
    d) Atomic arrangement
101. Which represents calcination?
    a) $2Ag + 2HCl + [O] \longrightarrow 2AgCl + H_2O$
    b) $2Zn + O_2 \longrightarrow 2ZnO$
    c) $2ZnS + 3O_2 \longrightarrow 2ZnO + 2SO_2$
    d) $MgCO_3 \longrightarrow MgO + CO_2$
102. The matte is impure substance obtained during extraction of:
    a) Cu b) Fe c) Pb d) Al
103. The following equation represents a method of purification of nickel by,
    $Ni + 2CO \xrightarrow{320K} Ni(CO)_4 \xrightarrow{420K} Ni + 4CO$
    Impure Pure
    This method is:
    a) Cupellation b) Mond's process c) Van Arkel method d) Zone refining
104. Softening of lead means:
    a) Conversion of lead into PbO
    b) Conversion of lead into Pb_3O_4
    c) Removal of metallic impurities from lead
    d) Washing lead with HNO_3 followed by dilute alkali solution
105. Which is not a mineral of aluminium?
    a) Corundum b) Anhydrite c) Diaspore d) Bauxite
106. A common metal used as reductant for the extraction of metals from their oxides is:
    a) Cr b) Al c) Co d) Fe
107. Extraction of Ag from commercial lead is possible by:
    a) Parke's process b) Clarke's process c) Pattinson's process d) Electrolytic process
108. Which set of elements is called chalcogens?
    a) Cl, Br, I b) O, S, Se c) N, P, As d) C, Si, Ge
109. Apatite is an ore of
    a) Fluorine b) Chlorine c) Bromine d) iodine
110. Pentalandite is an ore of:
    a) Fe b) Co c) Cu d) Ni
111. Which element is present in pitch blende?

a) U b) Ce c) Ba d) Mg

112. In alumino-thermite process, aluminium is used as
a) Reducing agent b) Oxidizing agent c) Solder d) Flux

113. The existence of two or more crystalline forms of the same substance is called:
a) Polymorphism b) Isomerism c) Homologues d) Isomorphism

114. Forth floatation process for the concentration of the ores is an illustration of the practical application of
a) Adsorption b) Sedimentation c) Coagulation d) Absorption

115. In blast furnace, the cup and cone arrangement is used:
a) To escape the gases during charging
b) Not to allow the escape of the gases
c) To heat the charge with the gases
d) None of the above

116. Stainless steel has iron and
a) Cr b) Cu c) Co d) Zn

117. Blood haemoglobin contains:
a) Al b) Mg c) Cu d) Fe

118. Cyanide process is used in the extraction of
a) Au b) Cu c) Ag d) Both (a) and (c)

119. Alloy formation gives rise to:
a) Decrease in corrosion
b) Increase in hardness
c) Decrease in conductivity
d) All are correct

120. Which metal occurs in free state?
a) Ag b) Au c) Pt d) All of these

121. Platinum, palladium, indium, etc., are called noble metals because:
a) Alfred nobel discovered them
b) They are inert towards many common reagents
c) They are shining, lustrous and pleasing to look at
d) They are found in native state

122. Match the extraction process listed in column I with metals listed in column II.

Column I	Column II
A. Self reduction	(P) Lead
B. Carbon reduction	(Q) Silver
C. Complex formation and displacement by metal	(R) Copper
D. Decomposition of iodide	(S) Boron

a) A − P, R; B − R, Q; C − P; D − S, Q
b) A − P, R; B − P, R; C − Q; D − S
c) A − P, R; B − S; C − P; D − P, Q
d) A − P, Q; B − R, P; C − Q; D − S

123. Mercury is transported in mental containers made up of:
a) Fe b) Pb c) Zn d) Sn

124. Which is not a mineral?
a) Mica b) Peat c) Quartz d) Felspar

125. Slag coming out at the bottom of a blast furnace during extraction of iron from its ores, is used in making:
a) Roads b) Fertilizers c) Plastics d) Glass moulds

126. The process in which ore is heated in air below its melting point is known as:
a) Roasting b) Calcination c) Reduction d) Distillation

127. When pyrolusite is fused with KOH in presence of air, the fused mass becomes:
a) Pink b) Green c) Red d) Black

128. Which process is used for the purification of Al metal?
a) Hoop's process b) Baeyer's process c) Serpek's process d) Hall's process
129. Which is incorrect as the uses of lime stone in industries are concerned?
a) For making cement
b) In the extraction of Sn from its ore
c) In the extraction of Fe from its ore
d) In the manufacture of glass
130. The method of zone refining of metals is based on the principle of
a) Greater noble character of the solid metal than that of the impurity
b) Greater solubility of the impurity in the molten state then in the solid
c) Greater mobility of the pure metal than that of impurity
d) Higher malting point of the impurity that of the pure metal
131. Main ore of aluminium is:
a) Cryolite b) Kaolin c) Bauxite d) Felspar
132. Which of the following is a carbonate ore?
a) Pyrolusite b) Diaspore c) Cassiterite d) Malachite
133. Which of the following mineral does not contain Al?
a) Fluorspar b) Cryolite c) Mica d) Feldspar
134. An essential constituent of amalgam is:
a) Au b) Ag c) Al d) Hg
135. Mispickel is the ore of:
a) Sb b) Bi c) P d) As
136. Forth floatation method is successful in separating impurities from ores because
a) The pure ore is soluble in water containing additives like pine oil, cresylic acid etc
b) The pure ore is lighter than water containing additives like pine oil, cresylic acid, etc
c) The impurities are soluble in water containing additives like pine oil, cresylic acid, etc
d) The pure ore is not easily wetted by water as by pine oil, cresylic acid, etc
137. Which among the following has highest electrical conductivity?
a) Zn b) Fe c) Ag d) Cu
138. Which of the following statements regarding the metallurgy of magnesium using electrolytic method is not correct?
a) Electrolyte is magnesium chloride containing a little of NaCl and NaF
b) Air tight iron pot acts as a cathode
c) Electrolysis is done in the atmosphere of coal gas
d) Molten magnesium is heavier than the electrolyte
139. The process of heating the ore strongly in excess of air so that the volatile impurities are removed and the ore is changed to oxide is known as
a) Leaching b) Roasting c) Calcinations d) Froth floatation
140. During bessemerisation of copper, the reaction taking place in the bessemer convertor is:
a) $Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$
b) $Cu_2O + FeS \longrightarrow Cu_2S + FeO$
c) $FeO + SiO_2 \longrightarrow FeSiO_3$
d) None of the above
141. Which process is used for the extraction of metals from their sulphide ores?
a) Electrolysis b) Metal displacement c) Smelting d) Roasting
142. When copper pyrites is roasted in excess if air, a mixture of CuO + FeO is formed .FeO is present as impurities. This can be removed as slag during reduction of CuO. The flux added to from slag is
a) SiO_2 which is an acid flux b) Lime stone, which is a basic flux
c) SiO_2,which is basic flux d) CaO, which is basic flux
143. CaO act as … flux
a) Neutral b) Acidic c) Basic d) Both (a) and (b)

144. Electrolysis of fused carnallite gives:
a) Mg b) K c) K and CO_2 d) K, Mg and Cl_2
145. Wolframite ore is separated from tin stone ore by the process of
a) Calcination b) Electromagnetic c) Roasting d) Smelting
146. Iron ores are dressed by:
a) Froth floatation process
b) Magnetic separation
c) Hand picking
d) All of the above
147. The electrolytic reduction technique is used in the extraction of:
a) Highly electronegative elements
b) Highly electropositive elements
c) Metalloids
d) Transition metals
148. Iron is obtained on large scale from Fe_2O_3 by:
a) Reduction with CO b) Reduction with Al c) Calcination d) Passing H_2
149. The lining in blast furnace are made up of:
a) Graphite b) Silica c) Fireclay bricks d) $CaCO_3$
150. The cyanide process is used for obtaining
a) Cu b) Na c) Zn d) Ag
151. Refractory materials are used for the construction of furnaces because they:
a) Are light in weight
b) Can stand with high temperature
c) Are leak proof
d) Do not require to be replaced
152. The final step for the extraction of copper from copper pyrite in Bessemer converter involves the reaction
a) $Cu_2S + 2Cu_2O \rightarrow 6Cu + SO$ b) $4Cu_2O + FeS \rightarrow 8Cu + FeSO_4$
c) $2Cu_2O + FeS \rightarrow 4Cu + Fe + SO_2$ d) $Cu_2S + 2FeO \rightarrow 2Cu + 2FeCO + SO_2$
153. Beryl is an important ore of:
a) Boron b) Beryllium c) Lead d) Lithium
154. Smelting is done in:
a) Blast furnace b) Muffle furnace c) Open hearth furnace d) Electric furnace
155. Silver obtained by argentiferrous lead is purified by:
a) Distillation b) Froth floatation c) Cupellation d) Reacting with KCN
156. Among the following groups of oxides, the group containing oxides that cannot be reduced by carbon to give the respective metals is
a) Cu_2O, K_2O b) PbO, Fe_3O_4 c) Fe_2O_3, ZnO d) CaO, K_2O
157. Which metal can be found in native state?
a) Na b) Al c) Ca d) Fe
158. Which of the following pairs of metals is purified by van Arkel method?
a) Ni and Fe b) Ga and In c) Zr and Ti d) Ag and Au
159. Which of the following is the heaviest metal?
a) U b) Ra c) Pb d) Hg
160. Iron is made inactive or passive by:
a) H_3PO_4 b) Conc. HNO_3 c) Conc. H_2SO_4 d) Dil. HNO_3
161. Kiesserite is an ore of:
a) Cu b) Al c) Mg d) Fe
162. Smelting is the reduction of oxide to metal by:
a) C b) Al c) H d) Electric current
163. Which of the following is a metal?
a) P b) As c) Bi d) Sb

164. Sulphide ores of metals are usually concentrated by froth floatation process. Which one of the following sulphide ores offers an exception and is concentrated by leaching?
a) Galena b) Copper pyrite c) Sphalerite d) Argentite

165. Which consists of only one element?
a) Marble b) Sand c) Diamond d) Glass

166. Impurities physically associated with minerals are:
a) Slag b) Flux c) Alloy d) Matrix

167. One of the fertilizer is:
a) CaC_2 b) $CaCO_3$ c) $CaCN_2$ d) $CaSO_4$

168. In the commercial electrochemical process for aluminium extraction, electrolyte used is:
a) $Al(OH)_3$ in NaOH solution
b) An aqueous solution of $Al_2(SO_4)_3$
c) A molten mixture of Al_2O_3 and Na_3AlF_6
d) A molten mixture of Al_2O_3 and $Al(OH)_3$

169. Which element is found in human body?
a) Pb b) Fe c) Cd d) Al

170. Flux is used to remove
a) Acidic impurities b) Basic impurities
c) All impurities from ores d) From ores

171. Which statement is correct?
a) Slag are carefully choosen to combine with the slag present in the ore to produce easily fusible gangue to carry away the impurities
b) Gangues are carefully choosen to combine with the slag present in the ore to produce easily fusible flux to carry away the impurities
c) Gangues are carefully choosen to combine with flux present in the ore to produce easily fusible slag to carry away the impurities
d) Fluxes are carefully choosen to combine with the gangue present in the ore to produce easily fusible slag to carry away the impurities

172. Thermite process is used in reduction of
a) CrI_2O_3 b) Al_2O_3 c) pbo_2 d) CuO

173. Froth floatation process for the concentration of ores is a practical application of:
a) Adsorption b) Absorption c) Coagulation d) Sedimentation

174. The main constituent of steel in India are:
a) Ni and Mg b) V and Co c) Al and Zn d) Mn and Cr

175. Which is not employed for refining of metal?
a) Poling b) Leaching c) Electrolysis d) Liquation

176. In electrofining of copper, some gold is deposited as
a) Cathode b) Electrode c) Cathode mud d) Anode mud

177. Electric furnaces are lined with magnesia because:
a) It is not affected by acids
b) It liberates oxygen on heating
c) It melts at very high temperature
d) It has no effect of electricity

178. When the sample of Cu with Zn impurity is to be purified by electrolysis, the appropriate electrodes are:

	Cathode	Anode
a)	Pure Zn	Pure Cu
b)	Impure sample	Pure Cu
c)	Impure Zn	Impure sample
d)	Pure Cu	Impure sample

179. The process of concentrating silver ore is based on its solubility in:
a) HCl b) HNO_3 c) KCN d) NaOH

180. Correct statement is
    a) van-Arkel method is used for extraction of Zr
    b) Limestone is acidic flux
    c) Dolomite is an ore of Al
    d) Willemite is carbonate ore
181. Which one of the following ores is best concentrated by forth-floatation method?
    a) Magnetite
    b) Cassiterite
    c) Galena
    d) Malachite
182. Boron is found in form of:
    a) Borax
    b) Colemanite
    c) Both (a) and (b)
    d) None of these
183. Extraction of silver from its ore ore involving NaCN, air and an active metal is known as:
    a) Pattinson's method
    b) Amalgamation method
    c) Mc Arthur-Forest method
    d) Parke's method
184. Heating of ore in presence of air to remove impurity of sulphur is called:
    a) Calcination
    b) Roasting
    c) Smelting
    d) None of these
185. The ore concentrated by electromagnetic separation is:
    a) Wolframite
    b) Haematite
    c) Casseterite
    d) All of these
186. Which process represents the change,
    $Ti + 2I_2 \longrightarrow TiI_4 \longrightarrow Ti + 2I_2$?
    a) Cupellation
    b) Van Arkel
    c) Poling
    d) Zone refining
187. Liquid crystals are best used in:
    a) Colour TV
    b) Crystallization
    c) Extraction
    d) e/m determination
188. In the metallurgy of zinc, the zinc dust obtained from roasting and reduction of zinc sulphide contains some ZnO. It is removed by:
    a) Absorbance of ultraviolet light and reemission of white light
    b) Shock cooling by contact with a shower of molten lead
    c) X-ray method
    d) Smelting
189. High purity copper metal is obtained by:
    a) Carbon reduction
    b) Hydrogen reduction
    c) Electrolytic reduction
    d) Thermite process
190. In metallurgy, flux is a substance used to convert
    a) Soluble impurities to insoluble impurities
    b) Infusible impurities to fusible material
    c) Fusible impurities to infusible impurities
    d) Mineral into silicate
191. Gold is found usually near....mineral.
    a) Mica
    b) Felspar
    c) Quartz
    d) Galena
192. The smelting of iron in a blast furnace involves all the steps except:
    a) Reduction
    b) Fusion
    c) Decomposition
    d) Sublimation
193. The metal that is extracted from sea water is:
    a) Na
    b) Ca
    c) Mg
    d) Sn
194. Wulfenite (a yellow-red mineral) having waxy lustre occur in lead ores, is an important source of:
    a) Sulphur
    b) Molybdenum
    c) Helium
    d) Lead
195. The forth-floatation process is based upon
    a) The difference in the specific gravity of ore and gangue particles
    b) The magnetic properties of gangue and ore
    c) Preferential wetting of gangue perticles by oil
    d) The solubility of ore particles in suitable regent
196. Pig iron is converted into steel by decreasing the amount of carbon contained in it, in a:
    a) Blast furnace
    b) Pyrite burner
    c) Bessemer converter
    d) None of these
197. Plumbo-solvency refers to:
    a) Oxidation of lead to lead oxide
    b) Oxidation of lead to red lead
    c) Dissolution of lead in water containing air

d) Making lead wires by forcing heated metal through a die

198. Zinc is obtained on large scale by:
a) Electrolysis of $ZnCl_2$ b) Reduction of ZnO c) Precipitation with Ag d) All are correct

199. Which of the following substances can be used for drying gases?
a) CaO b) $NaHCO_3$ c) $CaCO_3$ d) Na_2CO_3

200. Refractory materials are generally used in furnaces because
a) They can withstand high temperature b) They are chemically inert
c) They do not require replacement d) They possess great structural strength

201. Presence of small impurity usually makes a metal quite hard because the impurities:
a) Change the lattice structure of metals
b) Reduce the number of slide planes
c) Reduce the number of mobile electrons
d) Reduce the crystal symmetry

202. Willemite is
a) Zn_2SiO_4 b) H_2ptCl_6 c) ZnO d) $ZnOFe_2O_3$

203. The least stable oxide at room temperature is:
a) ZnO b) CuO c) Sb_2O_3 d) Ag_2O

204. The process of removal of gangue particles from ores is known as:
a) Concentration b) Refining c) Smelting d) None of these

205. The process of calcination and roasting are carried out in:
a) Blast furnace
b) Muffle furnace
c) Reverberatory furnace
d) Open hearth furnace

206. Which is not essential for rusting?
a) Oxygen b) Water c) Carbon dioxide d) Iron

207. Which of the following does not contains silicon?
a) Kaoline b) Agate c) Ruby d) Quartz

208. The salt which is least likely to be found in minerals is:
a) Chloride b) Sulphate c) Sulphide d) Nitrate

209. Heating of pyrite ores in air to remove Sulphur is known as:
a) Calcination b) Fluxing c) Smelting d) Roasting

210. Leaching is a process of:
a) Reduction b) Concentration c) Refining d) Oxidation

211. Colemanite is
a) $Ca[B_3O_4(OH)_2].2H_2O$ b) $Ca_2B_6O_{11}.5H_2O$
c) $Ca(OH)_2$ d) $Na_2B_4O_7.2H_2O$

212. The ore that is concentrated by forth floatation process is
a) Zincite b) Cinnabar c) Bauxite d) malachite

213. Which one of the following ores is a chloride?
a) Bauxite b) Horn silver c) Zincite d) Felspar

214. An example of an oxide is
a) Zinc blende b) Bauxite c) Feldspar d) Malachite

215. The chemical composition of carnallite is:
a) $KCl \cdot MgCl_2 \cdot 6H_2O$ b) $MgSO_4 \cdot 7H_2O$ c) $MgCO_3 \cdot 7H_2O$ d) $MgCO_3$

216. Which is not a silver ore?
a) Argentite b) Siderite c) Horn silver d) Ruby silver

217. Blast furnace is used in the metallurgy of:
a) Al b) Fe c) Gold d) Ag

218. Corundum is
a) Cu_2Cl_2 b) $CaCl_2$ c) SrO_2 d) Al_2O_3

219. An alloy is:
    a) Intermetallic compound
    b) A solid substance containing two or more elements
    c) A solid which contains one non-metal
    d) A solid which contains more than one non-metal
220. Which of the following is not ore?
    a) Zinc blende b) Malachite c) Bauxite d) Pig iron
221. Cryolite is
    a) Sodium borofluride b) Magnesium silicate
    c) Aluminium d) Sodium aluminium fluoride
222. In the thermite process the reducing agent is:
    a) C b) Al c) Na d) Mg
223. Which is not an ore of lead?
    a) Galena b) Cassiterite c) Anglesite d) Cerussite
224. Which is not an ore of nickel?
    a) Nickel glance b) Garnerite c) Haematite d) Pentlandite
225. The ore magnesite is:
    a) $MgCO_3 \cdot CaCO_3$ b) $MgCl_2 \cdot KCl \cdot 6H_2O$ c) $MgSO_4 \cdot 7H_2O$ d) $MgCO_3$
226. In blast furnace, the highest temperature is in
    a) Fusion zone b) Reduction zone c) Combustion zone d) Slag zone
227. Which one of the following is correct?
    a) All minerals are ores b) All ores cannot be a mineral
    c) A mineral cannot be an ore d) All ores are minerals
228. Furnaces are lined with calcium oxide because:
    a) It gives off oxygen on heating
    b) It gives light on heating
    c) It is refractory and basic
    d) It is not affected by acids
229. Lepidolite, a lithium ore, also contains:
    a) Ru b) $MgSO_4$ c) Na d) Cs
230. Gold when dissolved in aqua-regia gives:
    a) Auric chloride b) Aurous chloride c) Chloroauric acid d) Tempering
231. Specific gravity of slag is:
    a) Always higher than molten metal
    b) Always less than molten metal
    c) Same as that of molten metal
    d) None of the above
232. The correct statement is:
    a) Dolomite is the ore of zinc
    b) Galena is the ore of mercury
    c) Pyrolusite is the ore of iron
    d) Cassiterite is the ore of tin
233. Which is known as blister copper?
    a) Pure copper b) 98% copper c) Ore of copper d) Alloy of copper
234. Which of the following ore is not concentrated by forth floatation process?
    a) Pyrolusite b) Pentlandite c) Zinc blende d) Copper pyrites
235. The metal extracted by leaching with cyanide is:
    a) Mg b) Ag c) Cu d) Na
236. Dollucite is an ore of:
    a) Li b) Rb c) K d) Cs
237. Which is statement is incorrect?

a) Galena is an ore of Pb
b) Electrostatic separation is used for lead sulphide
c) Ore is heated strongly, above its melting point in roasting
d) Silica acts as acidic flux

238. Anglesite is an ore of:
a) Cd b) Ni c) Sb d) Pb

239. Froth floatation process is based on:
a) Wetting properties of ore particles
b) Specific gravity of ore particles
c) Magnetic properties or ore particles
d) Electrical properties of ore particles

240. In froth floatation process many chemicals (frother, collector, activator and depressant) are used. Which is called a frother?
a) $CuSO_4$ b) NaCN + alkali c) Pine oil d) Potassium xanthate

241. Which metal is used as a reducing agent in smelting?
a) C b) Al c) Zn d) None of these

242. Calamine is an ore of:
a) Hg b) Zn c) Cd d) Ca

243. The furnace which provides the highest temperature is:
a) Blast furnace
b) Reverberatory furnace
c) Electrical furnace
d) Muffle furnace

244. After partial roasting, the sulphide of copper is reduced by:
a) Cyanide process
b) Electrolysis
c) Reduction with carbon
d) Self reduction

245. Roasting is used in the extraction of:
a) Galena b) Iron pyrite c) Copper glance d) All of these

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

247. Metals occur in the native form because of their:
a) High electronegativity
b) High reactivity
c) Low reactivity
d) Low density

248. Purpose of smelting of an ore is
a) To oxidize it b) To remove vaporisation impurities
c) To reduce it d) To obtain an alloy

249. Oxidation method is used for refining of:
a) Pb b) Cu c) Hg d) All of these

250. From which form of iron, other forms of iron can be produced?
a) Cast iron b) Wrought iron c) Pig iron d) Steel

251. Aluminium is extracted by the electrolysis of:
a) Bauxite
b) Alumina
c) Molten cryolite
d) Alumina mixed with cryolite

252. The most abundant element in the earth crust is:
a) O b) Si c) H d) C

253. Among the following statements, the incorrect one is
a) Calamine and siderite are carbonates
b) Malachite and azurite are ores of copper
c) Argentite and cuprite are oxides
d) Zinc blende and pyrites are sulphides

254. Roasting is generally carried out in case of:
a) Oxide ores
b) Sulphide ores
c) Silicate ores
d) Carbonate ores

255. Chile saltpetre is the ore of:
a) Mg
b) K
c) Na
d) Ca

256. Nickel is purified by thermal decomposition of its:
a) Hydride
b) Chloride
c) Azide
d) Carbonyl

257. Which element occurs freely in nature?
a) Iodine
b) Sulphur
c) Phosphorus
d) Magnesium

258. To dissolve argentite ore which of the following is used?
a) $Na[Ag(CN)_2$
b) NaCN
c) NaCl
d) HCl

259. The metal used in storage batteries is:
a) Cu
b) Sn
c) Pb
d) Ni

260. The process of Zinc –plating on iron sheet is known as
a) Annealing
b) Roasting
c) Galvanization
d) smelting

261. Bronze is a mixture of
a) Pb+ Sn
b) Cu+ Sn
c) Cu+ Zn
d) Pb+ Zn

262. Electrolytic reduction of alumina to aluminium by Hall-Heroult process is carried out
a) In the presence of NaCl
b) In the presence of fluorite
c) In the presence of cryolite which forms a melt with lower melting point
d) In the presence of cryolite which forms a melt with high melting point

263. Bauxite ore is made up of $Al_2O_3 + SiO_2 + Tio_2 + Fe_2O_3$ This ore is treated with conc NaOH solution at 500 K and 35 bar pressure for few hours and filtered when hot. In the filtrate, the species present are
a) $NaAl(OH)_4$ only
b) $Na_2Ti(OH)_6$ only
c) $NaAl(OH)_4$ snd Na_2SiO_3both
d) Na_2SiO_3 only

264. In India thorium deposits are found mainly in the forms of:
a) Lignite
b) Rutile
c) Monazite
d) None

265. The luster of a metal is due to
a) Its high polishing
b) Its high density
c) Its chemical inertness
d) Presence of free electrons

266. Which is the salt of an organic acid?
a) Rochelle salt
b) Microcosmic salt
c) Mohr's salt
d) Glauber's salt

267. An element A dissolves both in acid and alkali. It is an example of:
a) Allotropic nature of A
b) Dimorphic nature of A
c) Amorphous nature of A
d) Amphoteric nature of A

268. Which of the following statements about the advantages of roasting of sulphide ore before reduction is not true?
a) ΔG_f° of the sulphide is greater than CS_2 and H_2S
b) ΔG_f° is negative for roasting of sulphide ore to oxide
c) Roasting of the sulphide to oxide is thermodynamically feasible
d) Carbon and hydrogen are suitable reducing agents for metal sulphides

269. Which radioactive element is more abundant in India?
a) Thorium
b) Uranium
c) Radium
d) Radon

270. Which ore contain both iron and copper?
a) Cuprite
b) Chalococite
c) Chalcopyrite
d) malachite

271. Galena is an ore of:
a) Zn b) Pb c) Sn d) Ca
272. The process of extraction of sodium on a commercial scale by the electrolysis of fused sodium chloride is called:
a) Down's process b) Solvay process c) Nelson process d) Castner process
273. Before introducing FeO in blast furnace, it is converted to Fe_2O_3 by roasting so that:
a) It may not be removed as slag with silica
b) It may not evaporate in the furnace
c) Presence of it may increase the m. p. of charge
d) None of the above
274. Which method of purification is represented by the following equation?
$Ti(s) + 2I_2(g) \xrightarrow{523K} TiI_4(g) \xrightarrow{1700K} Ti(s) + 2I_2(g)$
a) Cupellation b) Poling c) Van Arkel d) Zone refining
275. Diaspore is:
a) $Al_2O_3.H_2O$ b) $Al_2O_3.2H_2O$ c) Al_2O_3 d) $Al_2O_3.3H_2O$
276. Formula for agate is
a) Na_2SiO_3 b) $K_2O.SiO_2.Al_2O_2$ c) SiO_2 d) CaF_2
277. Spelter is:
a) Impure zinc b) Impure iron c) Pure zinc d) Impure Al
278. Chloride ore among the following is:
a) Malachite b) Magnesite c) Magnetite d) Rock salt
279. Magnetic separation is used for increasing concentration of the following
a) Calcite b) Horn silver c) Magnesite d) Haematite
280. Ore pitch blende is main source of
a) Ra b) Th c) Mg d) Ce
281. Which one of the following is a mineral of iron?
a) Pyrolusite b) Magnetite c) Malachite d) Cassiterite
282. Metal which can be extracted from all the three dolomite, magnesite and carnallite is
a) Na b) K c) Mg d) Ca
283. A metal which is refined by poling is
a) Silver b) Sodium c) Blister copper d) Zinc
284. The process of converting hydrated alumina into anhydrous alumina is called:
a) Roasting b) Smelting c) Dressing d) Calcination
285. Sulphide ore is:
a) Copper pyrites b) Malachite c) Carnallite d) Magnetite
286. Which metal is sometimes found in native state?
a) Al b) Cu c) Fe d) Mg
287. In metallurgical process, the flux used for removing acidic impurities is:
a) Silica b) Sodium chloride c) Lime stone d) Sodium carbonate
288. Which of the following is not an ore?
a) Malachite b) Calamine c) Satellite d) Cerussite
289. Thomas slag is:
a) Calcium silicate
b) Calcium phosphate
c) Tricalcium phosphate and calcium silicate
d) Calcium ammonium phosphate
290. Leaching process is used to get:
a) Ag b) Au c) Both (a) and (b) d) None of these
291. The mineral of copper is:
a) Azurite b) Malachite c) Copper pyrites d) All of these

292. In Goldschmidt aluminothermic process, thermite mixture contains:
a) 3 parts Fe_2O_3 and 2 parts Al
b) 3 parts Al_2O_3 and 4 parts Al
c) 1 part Fe_2O_3 and 3 parts Al
d) 3 parts Fe_2O_3 and 1 part Al

293. Two compounds having the same crystal structures and analogous formulae, are called:
a) Isomorphous b) Isotopes c) Isomers d) Isobars

294. When a metal is to be extracted from its ore, if the gangue associated with the ore is silica, then
a) A basic flux is needed b) An acidic flux is needed
c) Both basic and acidic flux are needed d) Neither of them is needed

295. Blister copper is obtained by:
a) Bessemerisation b) Roasting c) Poling d) Refining

296. Which is not an ore of magnesium?
a) Carnallite b) Dolomite c) Gypsum d) Magnesite

297. Which of the following metal is sometimes found native in nature?
a) Mg b) Cu c) Al d) Fe

298. Match list I with List II and select the correct answer using the codes given below the lists

	List I (Types of ore)		List II (example)
1.	Oxide ore	A.	Feldspar
2.	Sulphide ore	B.	Barytes
3.	Sulphate ore	C.	Fluorspar
4.	Halide ore	D.	Galena
		E.	Corundum

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

299. To obtain chromium from chromic oxide (Cr_2O_3), the method used is:
a) Carbon reduction
b) Carbon monoxide reduction
c) Alumino thermic process
d) Electrolytic reduction

300. In order to refine blister copper, it is melted in a furnace and is stirred with green logs of wood. The purpose is
a) To expel the dissolved gases in blister copper
b) To bring the impurities to surface and oxidize them
c) To increase the carbon content of copper
d) To reduce the metallic oxide impurities with hydrocarbon gases liberated from the wood

301. Hydrometallurgy is useful in the extraction of:
a) Sn b) Al c) Hg d) Ag

302. Which is not an iron ore?
a) Haematite b) Limonite c) Cassiterite d) Magnetite

303. In the modern blast furnaces, the charge consists of a mixture of
a) Iron pyrites + bituminous coal b) Hydrated iron oxides +dolomite + coke
c) Calcined iron oxides + limestone + coke d) Calcined iron oxides + lime + anthracite coal

304. A substance which reacts with gangue to form fusible material is called
a) Flux b) Slag c) Catalyst d) Ore

305. Which process is not used in purification of bauxite?
a) Hall's method b) Baeyer's method c) Serpek's method d) Frankland's method

306. Gallium arsenide is purified by
a) van-Arkel method b) Zone-refining method
c) Electrolytic method d) Liquation

307. Which metal is not silver white?

a) Ni b) Cu c) Na d) Sn

308. In the reverberatory furnace:
   a) The flames do not come in contact with the charge
   b) The flames come in contact with the charge
   c) Only hot gases come in contact with the charge
   d) The flames are not there at all
309. Silicon is the main constituent of:
   a) Rocks b) Alloys c) Animals d) Plants
310. The grey cast iron contains:
   a) Iron carbide b) Silicon carbide c) Silicon dioxide d) Graphite
311. Carnallite is a mineral of
   a) Na b) Zn c) Cd d) Mg
312. In the extraction of lead from its ore galena, an important element recovered is:
   a) Au b) Ag c) Cr d) C
313. Chile salt petre is an ore of
   a) Magnesium b) Bromine c) Sodium d) Iodine
314. Native silver metal forms a water soluble complex with a dilute aqueous solution of NaCN in the presence of
   a) Nitrogen b) Oxygen c) Carbon dioxide d) argon
315. All ores are minerals, while all minerals are not ores because
   a) Minerals are complex compounds
   b) The minerals are obtained from mines
   c) The metal cannot be extracted economically from all the minerals
   d) All of the above are correct
316. The non-fusible impurities of ores are removed by adding:
   a) Flux b) Slag c) Gangue d) None of these
317. Tin is extracted from tin stone by heating it in a furnace with:
   a) $CaCO_3$ b) CaO c) Steam d) Coal
318. Wolframite ore contains:
   a) Zn b) W c) Hf d) Au
319. In Serpek's process, by product obtained in the purification of bauxite is:
   a) Al_2O_3 b) N_2 c) NH_3 d) None
320. Copper can be extracted from
   a) Dolomite b) Malachite c) Galena d) Kupfer nickel
321. Which element is purified by Zone refining?
   a) Ge b) Ge and Si c) Si d) None of these
322. An important characteristic property of metals is:
   a) Their hardness
   b) Their ability to conduct electricity
   c) To form oxides
   d) The stability of their compounds
323. Crystalline metal can be transformed into metallic glass by:
   a) Alloying
   b) Pressing into thin plates
   c) Slow cooling of molten metal
   d) Very rapid cooling of a spray of the molten metal
324. Metallurgy is the process of:
   a) Concentrating the ore b) Roasting the ore c) Extracting the metal from the ore d) Adding carbon to the ore in blast furnace
325. The substance not likely to contain $CaCO_3$ is:
   a) Sea shells b) Dolomite c) Marble statue d) Calcined gypsum

326. In the formation of Al_2O_3 large amount of heat is evolved. This property is used in:
a) Deoxidation b) Confectionary c) Indoor photography d) Thermite welding
327. CO is used in the metallurgy of:
a) Cu b) Ni c) Cr d) Pt
328. The electrolytic method of reduction is employed for the preparation of metals that
a) Are strongly electropositive b) Are weakly electropositive
c) Are moderately electropositive d) From oxides
329. Which substance can be used for drying gases?
a) $CaCO_3$ b) Na_2CO_3 c) $CaHCO_3$ d) CaO
330. The slag obtained during the extraction of copper from copper pyrites is composed of
a) Cu_2S b) SiO_2 c) $CuSiO_3$ d) $FeSiO_3$
331. Matte contains mainly
a) Cu_2S and FeS b) Cu_2S c) CuS and Fe_2S_3 d) Fe
332. Which statement is correct?
a) All minerals are ores
b) A mineral cannot be an ore
c) An ore cannot be a mineral
d) All ores are minerals
333. The phenomenon of removing layers of basic oxides from metals before electroplating is called:
a) Galvanising b) Anodising c) Pickling d) Poling
334. Radium is obtained from:
a) Pitch blende b) Haematite c) Monazite d) None of these
335. Main function of roasting is
a) Oxidation b) Reduction
c) Slag formation d) To remove volatile substance
336. Zinc metal is refined by:
a) Crystallisation b) Sublimation c) Heating d) Distillation
337. Rutile is an ore of:
a) Ti b) Zr c) Mn d) V
338. The incorrect statement is:
a) Calamine and siderite are carbonates
b) Argentite and and cuprites are oxides
c) Zinc blende and iron pyrites are sulphides
d) Malachite and azurite are ores of Cu
339. Electrometallurgical process (electrolysis of fused salt) is employed to extract:
a) Iron b) Lead c) Sodium d) Silver
340. Which of the following is correct?
a) Tin stone is magnetic in nature b) Wolframite is non-magnetic in nature
c) Wolframeite is $FeWO_4$ d) Cassiterite and rutile are sulphides ore
341. Which substance is used as basic refractory material in furnace?
a) Al_2O_3 b) SiO_2 c) CaO d) Fe_2O_3
342. Cinnabar is:
a) CuS b) Ag_2S c) ZnS d) HgS
343. Metal occur in the native from because of their
a) High electronegativity b) High reactivity
c) Low reactivity d) Low density
344. The method of concentrating the ore which makes use of the difference in density between ore and impurities is called
a) Leaching b) Liquation c) Levigation d) Magnetic separation
345. The reaction $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$ in the metallurgical process of zinc is called
a) Roasting b) Smelting c) Cupellation d) Calcinations

346. In electro-refining of metal the impure metal is made the anode and a strip of pure metal, the cathode, during the electrolysis of an aqueous solution of a complex metal salt. This method cannot be used for refining of:
a) Silver b) Copper c) Aluminium d) Sodium

347. Which metal is extracted by electrolytic reduction method?
a) Cu b) Al c) Ag d) Fe

348. The cheap and high melting point compound used in furnace lining is:
a) PbO b) CaO c) HgO d) ZnO

349. In the metallurgy of iron, when $CaCO_3$ is added to blast furnace, calcium ion appears as
a) Slag b) Gangue c) CaO d) Metallic Ca

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

351. Which of the following processes involves the roasting process?
a) $ZnCO_3 \longrightarrow ZnO + CO_2$
b) $Fe_2O_3 + 3C \longrightarrow 2Fe + 3CO$
c) $2PbS + 3O_2 \longrightarrow 2PbO + 2SO_2$
d) $Al_2O_3.2H_2O \longrightarrow Al_2O_3 + 2H_2O$

352. Which of the following ore is used for industrial extraction of aluminium in India?
a) Corundum b) Cryolite c) Bauxite d) Kaolin

353. Pb and Sn are extracted from their chief ore by
a) Electrolysis and self reduction b) Self reduction and electrolysis
c) Carbon reduction and self reduction d) Self reduction and carbon reduction

354. Heating of carbonate ores to remove carbon is called as:
a) Roasting b) Calcination c) Smelting d) Fluxing

355. Coating of zinc on iron objects is commonly known as:
a) Electroplating b) Surface coating c) Galvanising d) Sheardising

356. The temperature of the slag zone in the metallurgy of iron using blast furnace is
a) $1200 - 1500°C$ b) $1500 - 1600°C$ c) $400 - 700°C$ d) $800 - 1000°C$

357. Sapphire is a mineral of:
a) Zn b) Cu c) Hg d) Al

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

CHEMISTRY

: ANSWER KEY :

1)	a	2)	a	3)	c	4)	b	173)	a	174)	d	175)	b	176)	d
5)	b	6)	b	7)	b	8)	b	177)	c	178)	d	179)	c	180)	a
9)	c	10)	c	11)	c	12)	a	181)	c	182)	c	183)	c	184)	b
13)	a	14)	c	15)	c	16)	d	185)	d	186)	b	187)	a	188)	b
17)	c	18)	b	19)	d	20)	a	189)	c	190)	b	191)	c	192)	c
21)	a	22)	b	23)	c	24)	b	193)	c	194)	b	195)	d	196)	c
25)	d	26)	a	27)	d	28)	b	197)	c	198)	b	199)	a	200)	a
29)	a	30)	b	31)	c	32)	c	201)	b	202)	a	203)	d	204)	a
33)	d	34)	a	35)	a	36)	d	205)	c	206)	c	207)	c	208)	d
37)	a	38)	c	39)	b	40)	a	209)	d	210)	b	211)	b	212)	b
41)	a	42)	c	43)	a	44)	d	213)	b	214)	b	215)	a	216)	b
45)	b	46)	a	47)	c	48)	d	217)	b	218)	c	219)	b	220)	d
49)	c	50)	b	51)	c	52)	b	221)	d	222)	b	223)	b	224)	c
53)	c	54)	a	55)	b	56)	a	225)	d	226)	c	227)	d	228)	c
57)	b	58)	d	59)	d	60)	c	229)	c	230)	c	231)	b	232)	d
61)	c	62)	a	63)	b	64)	a	233)	b	234)	a	235)	b	236)	d
65)	b	66)	a	67)	b	68)	a	237)	c	238)	d	239)	a	240)	c
69)	a	70)	c	71)	c	72)	c	241)	a	242)	b	243)	c	244)	d
73)	c	74)	a	75)	c	76)	a	245)	d	246)	c	247)	c	248)	c
77)	a	78)	b	79)	c	80)	a	249)	d	250)	c	251)	d	252)	a
81)	b	82)	c	83)	c	84)	b	253)	c	254)	b	255)	c	256)	d
85)	b	86)	c	87)	a	88)	c	257)	b	258)	b	259)	c	260)	c
89)	b	90)	d	91)	d	92)	b	261)	b	262)	c	263)	a	264)	c
93)	b	94)	b	95)	c	96)	c	265)	d	266)	a	267)	d	268)	d
97)	b	98)	c	99)	d	100)	d	269)	a	270)	c	271)	b	272)	a
101)	d	102)	a	103)	b	104)	c	273)	a	274)	c	275)	a	276)	c
105)	b	106)	b	107)	a	108)	b	277)	a	278)	d	279)	d	280)	a
109)	a	110)	d	111)	a	112)	a	281)	b	282)	c	283)	c	284)	d
113)	a	114)	a	115)	c	116)	a	285)	a	286)	c	287)	c	288)	c
117)	d	118)	d	119)	d	120)	d	289)	c	290)	c	291)	d	292)	d
121)	b	122)	b	123)	a	124)	b	293)	a	294)	a	295)	a	296)	c
125)	a	126)	a	127)	a	128)	a	297)	b	298)	d	299)	c	300)	d
129)	b	130)	b	131)	c	132)	d	301)	d	302)	c	303)	c	304)	a
133)	a	134)	d	135)	d	136)	d	305)	d	306)	b	307)	b	308)	c
137)	c	138)	d	139)	b	140)	a	309)	a	310)	d	311)	d	312)	b
141)	d	142)	a	143)	c	144)	d	313)	c	314)	b	315)	c	316)	a
145)	b	146)	b	147)	b	148)	a	317)	d	318)	b	319)	c	320)	b
149)	c	150)	d	151)	b	152)	a	321)	b	322)	b	323)	d	324)	c
153)	b	154)	a	155)	c	156)	d	325)	d	326)	d	327)	b	328)	a
157)	d	158)	c	159)	a	160)	b	329)	d	330)	d	331)	a	332)	d
161)	c	162)	a	163)	c	164)	d	333)	c	334)	a	335)	d	336)	d
165)	c	166)	d	167)	c	168)	c	337)	a	338)	b	339)	c	340)	c
169)	b	170)	d	171)	d	172)	a	341)	c	342)	d	343)	c	344)	c

345)	**a**	**346)**	**d**	**347)**	**b**	**348)**	**b**
349)	**a**	**350)**	**d**	**351)**	**c**	**352)**	**c**
353)	**d**	**354)**	**b**	**355)**	**c**	**356)**	**d**
357)	**d**						

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

CHEMISTRY

: HINTS AND SOLUTIONS :

1 **(a)**

$$Ti + 2I_2 \xrightarrow{500\ K} \underset{\text{volatile stable compound}}{TiI_4} + 2I_2 \xrightarrow{1700\ K} \underset{\text{pure metal}}{Ti}$$

2 **(a)**

Cryolite has these two functions during electrolysis of alumina.

3 **(c)**

Pyrolusite is an ore of Mn containing MnO_2.

4 **(b)**

Wrought or malleable iron is the purest form of iron

5 **(b)**

___do___

6 **(b)**

During electrolysis, noble metals (inert metals) like Ag, Au and Pt are not affected band separate as anode mud from the impure anode

7 **(b)**

$PbS + 2PbO \longrightarrow 3Pb + SO_2$ (Self reduction)

$SnO + C \longrightarrow Sn + CO$ (Carbon reduction)

8 **(b)**

At about 330 K nickel is attacked by carbon monoxide with the formation of a volatile nickel carbonyl $Ni(CO)_4$.

10 **(c)**

It involves auto-reduction.

$$2Cu_2O + Cu_2S \longrightarrow 6Cu + SO_2$$

11 **(c)**

In electrolytic refining of Cu, impurities of Fe, Ni, and Zn pass into solution and others like Au and Ag fall down, as anode mud.

12 **(a)**

Mercury is the only metal which is liquid at room temperature.

13 **(a)**

Lapis lazuli is the sodium alumino silicate present in earth rocks as blue stone

14 **(c)**

$2MS + C \rightarrow 2M + CS_2$ $\quad \Delta G_1$ =positive

$2MO + C \rightarrow 2M + CO_2$ $\quad \Delta G_2$ =negative

The value of ΔG for the9 formation of $CO_2$is negative, *ie*, it is thermodynamically more than CS_2.Also metal sulphides are thermodynamically more stable than CS_2.Metal sulphides are more stable than the corresponding oxides, so they are roasted to convert into less stable oxides

15 **(c)**

It is a fact.

16 **(d)**

Soda ash (Na_2CO_3) is an ore of sodium

17 **(c)**

Titanium is quite abundant in nature and mainly occurs as elmanite, FeO. TiO_2

20 **(a)**

It is a fact.

21 **(a)**

It is a fact.

22 **(b)**

Al is highly electropositive. It can be obtained only by electrolytic reduction

23 **(c)**

Malleable nature (*i.e*., can be pressed out into sheets) is maximum in gold.

24 **(b)**

It is a fact.

25 **(d)**

It is a fact.

26 **(a)**

Cassiterite is an ore of tin

27 **(d)**

$2PbS + 3O_2 \rightarrow 2PbO + 2SO_2$

$PbS + 2PbO \rightarrow 3Pb + SO_2$

28 **(b)**

Cryolite is an ore of Al containing Na_3AlF_6.

29 **(a)**

Blanc fixe is $BaSO_4$.

30 **(b)**

Forth floatation method is based on the fact that the surface of sulphide ores is preferentially wetted by oil while that of gangue is wetted by water

31 **(c)**

Fe-C form alloy.

32 **(c)**

Galena is PbS; Sulphide ores are concentrated by froth floatation process.

33 **(d)**

In Hall and Heroult process,

$$2Al_2O_3 \rightarrow 4Al + 3O_2$$

$$4C + 3O_2 \rightarrow 2CO_2 + 2CO \uparrow$$

$$2Al_2O_3 + 4C \rightarrow 4Al + 2CO_2 + 2CO$$

Only for removal of CO_2, following equation is possible

$$2Al_2O_3 + 3C \rightarrow 4Al + 3CO_2$$

$$3 \times 12 = 36 \qquad 4 \times 27 = 108$$

$\because$For 108 g of Al, required amount of C $= 36$g

$\therefore$ For 270 g of required amount of $C = \frac{36}{108} \times 270 = 90$g

34 **(a)**

$CuO + CO \xrightarrow{\Delta} Cu + CO_2 \uparrow$

35 **(a)**

Load stone (magnetite, Fe_3O_4) is an ore of iron

36 **(d)**

Mond's process for refining of Ni is an example of vapour phase refining

37 **(a)**

Carbon reduction process is used for extraction of less electropositive metals like Pb, Fe, Zn, Sb, Cu, etc., from their ores.

38 **(c)**

The phenomenon of efflorescence involves spontaneous loss of water molecules from a crystal.

39 **(b)**

Cd is found as traces in most Zn ores, and is extracted from these.

$$Zn_{(solid)} + Cd^{2+}_{(solution)} \rightarrow Zn^{2+}_{(solution)} + Cd_{(solid)}; E^c = 0.36\ V$$

41 **(a)**

$$2MnO_2 + 4KOH + O_2 \longrightarrow \underset{\text{Purple green}}{2K_2MnO_4} + 2H_2O$$

42 **(c)**

SiO_2 is an acidic flux.

43 **(a)**

$FeCrO_4$ is magnetic impurity.

44 **(d)**

Extraction of Ni involves Electrolytic Process, Oxford Process, Mond's Process and German Process.4

45 **(b)**

Acetate of all metals are soluble in water.

46 **(a)**

____do___

47 **(c)**

Electromagnetic separation is used when either the ore or the impurities associated with it, are magnetic in nature

48 **(d)**

Alkaline earth metals are very reactive and are found in combined state only in nature.

49 **(c)**

Dispersion of solid in solid is called solid sol.

51 **(c)**

Pt is noble metal, other noble metals are Au, Ag.

52 **(b)**

Alumino-thermic process is commonly used for those metals which have very high m.pt. and are to be extracted from their oxides and their reduction with carbon is not satisfactory.

53 **(c)**

Bauxite ore is concentrated by chemical separation or leaching. In this, powdered ore is treated with a suitable reagent which can dissolve the ore but not the impurities

54 **(a)**

Dressing or benefication of ore involves removal of impurities from ore.

55 **(b)**

Zinc blende is roasted and then treated with coke for the reduction

$$3ZnS + 3O_0 \xrightarrow{\Delta} 2ZnO + 2SO_2 \uparrow$$

$$ZnO + C \xrightarrow{\Delta} Zn + CO \uparrow$$

56 **(a)**

$$2HgS + 3O_2 \rightarrow 2HgO + 3SO_2$$

$$2HgO \xrightarrow{\Delta} 2Hg + O_2$$

$$2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$$

$$2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$$

57 **(b)**

Mixture of calcium phosphate and calcium silicate is known as Thomas slag

58 **(d)**

Metals are good conductor of electricity because they contain free electrons

59 **(d)**

Purification of Hg, Sn and Bi involves liquation.

60 **(c)**

The abundance of elements in earth crust follow the order O > Si > Al > Fe .

61 **(c)**

Sulphur exists in various allotropic forms such as rhombic, monoclinic, plastic forms.

62 **(a)**

Van-Arkel method is not used for extraction of Al.

it is used in the purification of Ti

63 **(b)**
Indian saltpetre is a nitrate ore of K containing KNO_3 .

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

65 **(b)**
It is an ore of Pt.

66 **(a)**
Pine oil is foaming agent. An another substance called collector such as potassium ethyl xanthate or amyl xanthate is also added

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

68 **(a)**
Lime stone is used as basic flux to fuse acidic impurities of Silica.
$CaCO_3 + SiO_2 \longrightarrow CaSiO_3 + CO_2 \uparrow$
Flux Gangue Slag

69 **(a)**
Auto reduction occurs
$Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$

70 **(c)**
Cassiterite is an ore of tin

71 **(c)**
$ZnO + CO \rightarrow CO_2 + Zn$

72 **(c)**
Zinc blende is an ore of Zn containing ZnS.

73 **(c)**
Hg having low b.pt. is easily distilled off.

74 **(a)**
Density increases with increasing atomic number.

75 **(c)**
Calamine is the carbonate ore zinc ($ZnCO_3$)

76 **(a)**
$CaCO_3 + SiO_2 \longrightarrow CaSiO_3$
Slag

77 **(a)**
Mond's process is used for the purification of Ni
$Ni + 4CO \xrightarrow{Heat} [Ni(CO)_4] \xrightarrow{Decompose} Ni + 4CO$

78 **(b)**
Dolomite is an ore containing, $CaCO_3 \cdot MgCO_3$.

79 **(c)**
___do___

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

81 **(b)**
Zinc blende is ZnS not $ZnCl_2$

82 **(c)**
Mg and Al cannot be obtained by the electrolysis of aqueous solution of their salts because instead of metal, H_2 gas is liberated at cathode

83 **(c)**
Lime stone acts as basic flux for sandstone (SiO_2).

85 **(b)**
The main impurity in red bauxite is ferrite (Fe_2O_3) and the main impurity in white bauxite is silica (SiO_2)

86 **(c)**
Rutile is TiO_2 .

88 **(c)**
$FeO + CO \xrightarrow{1000°C} Fe + CO_2$

89 **(b)**
Silver is recovered from the alloy (lead-silver alloy) by cupellation.

90 **(d)**
Hg has low b. pt. and is purified by distillation.

91 **(d)**
Lepidolite is $(Li, Na, K)_2$; $Al_2(SiO_3)_3$, $(F, OH)_2$.

92 **(b)**
VIA group member or oxygen family is known as chalcogens.

93 **(b)**
$Al_2O_3 + Na_2CO_3 \longrightarrow 2NaAlO_2 + CO_2$

94 **(b)**
Stibnite is an ore of Sb containing Sb_2S_3.

96 **(c)**
Baryte is an ore of Barium having formula $BaSO_4$.

97 **(b)**
Thermite is a mixture of Al and F_2O_3 in 1:3 ratio

98 **(c)**
It is definiton of calcination.

99 **(d)**
Following reaction takes place during bessemerisation
$2Cu_2O + Cu_2S \rightarrow 6Cu + SO_2$

101 **(d)**
Calcination involves decomposition of ore to remove volatile impurities.

102 **(a)**
$FeO + SiO_2 \longrightarrow FeSiO_3$ (Fusible slag)
$Cu_2O + FeS \longrightarrow Cu_2S + FeO$
Slag is removed from the slag hole while a molten mass containing mostly cuprous sulphide with a little ferrous sulphide called matte.

103 **(b)**
Mond's process is used for the purification of Ni.

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

105 **(b)**

Bauxite ($Al_2O_3.2H_2O$)
Corundum (Al_2O_3)
Diaspore ($Al_2O_3.H_2O$)

106 **(b)**
Extraction of less electropositive metals say Cr, Mn, Cu, Ca, Ni, etc., can be done by heating their oxides with strong reducing agents, e.g., $CO, CO + H + Na, Al, Mg$, etc.

107 **(a)**
Lead extracted from argentiferrous galena contains small quantities of silver. Recovery of silver from argentiferrous lead is an economical proposition and is carried out by Parke's process.

108 **(b)**
Oxygen family is known as chalcogens.

109 **(a)**
Apatite is $CaF_2.3Ca_3(pO_4)_2$
$\therefore$ It is ore of fluorine with calcium

110 **(d)**
A bronze sulphide mineral $(Fe, Ni)_9S_8$, a chief ore c

111 **(a)**
Pitch blende is an ore of uranium containing U_3O_8.

112 **(a)**
In alumino-thermic process, aluminium is used as reducing agent

113 **(a)**
___do___

114 **(a)**
The adsorption phenomenon is involved in the forth floatation process

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

116 **(a)**
Stainless steel is an alloy of iron with chromium and nicl Its composition is 82% Fe and 18% (Cr+Ni). It res corrosion and used for making automobile parts and utensils

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

118 **(d)**
Cyanide process is used in the extraction of both silver and gold because these form complex salts with CN^- ion due to presence of lone pair of electron on nitrogen atom

119 **(d)**
All are characteristic features of alloy.

120 **(d)**
All are noble metals.

121 **(b)**
Metals which are inert towards many common reagents are called noble metals.

122 **(b)**
Follow text.

123 **(a)**
Fe does not form amalgam with Hg.

124 **(b)**
Peat is an early stage in the formation of coal from vegetable matter.

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

126 **(a)**
It is definition of roasting.

127 **(a)**
Due to the formation of K_2MnO_4.

128 **(a)**
Other methods are used for extraction of Al from its ores.

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

130 **(b)**
The method of zone refining of metals is based on the principle of greater solubility of the impurity in the molten state than in the solid. Elements which are used as semiconductors like Si, Ge, Ga etc are refined by this method

131 **(c)**
Bauxite is $Al_2O_3 \cdot 2H_2O$.

132 **(d)**
Pyrolusite $- MnO_2$
Malachite $- CuCO_3.Cu(OH)_2$
Diaspore $-Al_2O_3.H_2O$
Cassiterite $-SnO_2$

133 **(a)**
Fluorspar (CaF_2),
Cryolite (na_3AlF_6)
Feldspar ($KAlSi_3O_3$),
Mica ($K_2O.3Al_2O_3.6SiO_2.2H_2O$)

134 **(d)**
Alloys of metals with Hg are called amalgams.

135 **(d)**
A natural sulphide of iron and arsenic, FeAsS .

136 **(d)**
In froth floatation method, the pure ore is not easily wetted by water but wetted by pine oil, so it is successfully separated from impurities

137 **(c)**
Metallic character increases down the group.

138 **(d)**
Molten magnesium is lighter than ore.

140 **(a)**
This is auto reduction of copper sulphide.

141 **(d)**
Sulphide ores on roasting forms oxide and give SO_2.

142 **(a)**
The compounds which combine with impurities preseore (at high temperature) and remove them as a fls substance (slag) are known as flux. When basic impurities are present, an acidic flux is used and $vice - versa$

$FeO + SiO_2 \rightarrow FeSiO_3$

Basic impurity acidic flux slag

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

145 **(b)**
Wolframite ore [$FeWO_4$] is present in tin stone as impurities and it has same mass per unit volume as that of tin stone. So, it is separated by electromagnetic separator because wolframite is magnetic in nature, hence it gets attached by magnet while tin stone does not

146 **(b)**
Fe ores are magnetic in nature.

147 **(b)**
Because reduction of highly electropositive elements, (*e*.g., alkali metals, alkaline earth metals and Al) cannot be made by other metals.

148 **(a)**
In blast furnace, at the top is the zone of reduction. Here Fe_2O_3 is reduced to spongy iron by CO rising up.

$$Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$$

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

150 **(d)**
Cyanide process is used for obtaining silver. This process is also called as Mac Arthur and Forest process

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

152 **(a)**
In Bessemer converter, copper sulphide is partially oxidised to cuprous oxide which further reacts with remaining copper sulphide to form copper and sulphur dioxide.

$Cu_2S + 2Cu_2O \rightarrow 6Cu + SO_2$

153 **(b)**
Beryl is $3BeO \cdot Al_2O_3 \cdot 6SiO_2$.

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

155 **(c)**
Lead present as impurity in the silver obtained by argentiferous lead is purified by cupellation.

156 **(d)**
CaO, K_2O cannot reduced by carbon reduction method

158 **(c)**
The method is used for purification of Zr and Ti in which these metals on heating with I_2 forms vapours of metal iodide which on decomposition gives pure metals.

159 **(a)**
Mass number of uranium is highest, i.e., U^{238}.

160 **(b)**
Iron is made inactive or passive by oxidizing agents like conc. Nitric acid, chromic acid, acidified $KMnO_4$, etc., the cause of this is the formation of a thin film of oxide on the surface of the metal.

161 **(c)**
Kiesserite is an ore of Mg containing, $MgSO_4 \cdot H_2O$.

162 **(a)**
In smelting carbon is used for the reduction of oxide to metal.

163 **(c)**
Metallic character increases down the gp.

164 **(d)**
Ag, Au are obtained by complex formation.

165 **(c)**
Diamond consists of carbon atoms only.

166 **(d)**
Impurities are known as matrix or gangue.

167 **(c)**
$CaCN_2$ is used as a fertilizer.

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

169 **(b)**
It is found in human body as haemoglobin.

170 **(d)**
Flux is used to fuse non-fusible impurities (both acidic and basic) present in the ore

171 **(d)**
Flux is a substance with combine with gangue that present in the roasted or calcined ore to form fusible product, called slag

172 **(a)**
Oxides of less electropositive metals such as Cr_2O_3,Mn etc are reduced by using Al. This process is called them process

$Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr + Head$

173 **(a)**

Gangue particles are wetted up by water and adsorbed.

174 **(d)**
Composition of various alloy of steels are as-Nickel steel -3.5% Ni, Chrome steel-1.5-2% Cr, Chrome-vanadium -0.15% V, I % Cr, Manganese steel-1.2-15% Mn, Tungsten steel 14-20% W, 3-8% Cr, Invar 36% Ni, Stainless steel 11.5% Cr.

175 **(b)**
Leaching is used to make insoluble ore in soluble form.

176 **(d)**
In electroefining of copper, some gold is deposited as anode mud

177 **(c)**
Thus, furnace material can withstand high temperature.

178 **(d)**
Anode : $Cu \longrightarrow Cu^{2+} + 2e$
(Impure sample)
Cathode : $Cu^{2+} + 2e \longrightarrow Cu$
(Pure Cu)

179 **(c)**
Ag_2S forms soluble complex with KCN.

180 **(a)**
Van-Arkel method is used to purify metals such asZr, Ti, V, Th, etc, limestone is basic flux. Dolomite ($CaCO_3$) is an ore of Ca. Willemite (Zn_2SiO_4) is a silicate ore

181 **(c)**
Forth-floatation is used to concentrated sulphide ores [Galena pbS)]

182 **(c)**
Borax and Colemanite both are the ores of Boron containing $Na_2B_4O_7 \cdot 10H_2O$ and $Ca_2B_6O_{11} \cdot 5H_2O$ respectively.

183 **(c)**
Follow Mc Arthur-Forest process for Ag .

184 **(b)**
S is oxidised to SO_2 (g).

185 **(d)**
All are magnetic ores.

186 **(b)**
A method for purification of titanium metal.

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

188 **(b)**
Follow extraction of Zn.

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

190 **(b)**
Flux is mixed with concentrated ore which is not soluble in molten metal

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

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

193 **(c)**
Magnesium chloride is present in sea water.

194 **(b)**
Wulfenite is a molybdate containing Pb, Mo, O_4 .

195 **(d)**
The fourth –floatation process is based upon the preferential wetting of ore particle by oil

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

197 **(c)**
Lead dissolves in water containing dissolved air, due to the formation of lead hydroxide. This solvent action of water on lead is called plumbo solvency.

198 **(b)**
$ZnO \xrightarrow{\text{Reduction}} Zn$

200 **(a)**
Refractory materials are the substances which can withstand very high temperature without melting or becoming salt

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

202 **(a)**
Willemite, a rare zinc silicate mineral, isZn_2SiO_4. It has trigonal symmetry and is strongly fluorescent green

203 **(d)**
Ag_2O is decomposed on simple heating.

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

205 **(c)**
___do___

206 **(c)**
Although presence of CO_2 enhances rusting due to formation of more H_3^+O ions.

207 **(c)**
Ruby in mineral of aluminium, ie, Al_2O_3. It does not contain silicon

208 **(d)**
Because all nitrates are water soluble.

209 **(d)**
Roasting is a process in which ore is heated in air to remove Sulphur impurities.

210 **(b)**
Leaching is a chemical method for the concentration of an ore.

212 **(b)**
Cinnabar (HgS) is a sulphide ore, hence it is concentrated by forth floatation process

214 **(b)**
Bauxite ($Al_2O_3.2H_2O$) is an oxide ore of aluminium

215 **(a)**
Carnallite is an ore of magnesium containing $KCl \cdot MgCl_2 \cdot 6H_2O$.

216 **(b)**
Siderite is $FeCO_3$.

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

218 **(c)**
Corundum (Al_2O_3) is the combined state of aluminium

219 **(b)**
____do____

220 **(d)**
Pig iron is the most impure from of iron and contains highest proportion of carbon (2.5-4%)
Malachite → $Cu(OH)_2.CuCO_3$ (Cu ore)
Zinc blende → ZnS (Zn ore)
Bauxite → $Al_2O_3.2H_2O$ (Al ore)

222 **(b)**
Al acts as strong reducing agent and converts many metal oxides (excepts I and II gp) to metals.

223 **(b)**
Cassiterite is an ore of tin.

224 **(c)**
Haematite is an ore of Fe.

225 **(d)**
It is an ore of Mg containing $MgCO_3$.

226 **(c)**
Combustion zone 1800 K
Fusion zone 1600 K
Slag zone 1300 K
Reduction zone 800 K

227 **(d)**
All minerals are not suitable for the extraction for the extraction of metals commercially. Thus, all ores are minerals, but all minerals are not ores

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

229 **(c)**
Lepidolite is $(Li, K, Na)_2\ Al_2(SiO_3)_3 \cdot (F \cdot OH)_2$.

230 **(c)**
$Au + 3HNO_3 + 4HCl \longrightarrow HAuCl_4 + 3NO_2 + 3H_2O$

231 **(b)**
The slag float over molten mass.

232 **(d)**
Cassiterite is a principal ore of tin containing SnO_2.

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

234 **(a)**
Pyrolusite (MnO_2) is not a sulphide ore, so it is not concentrated by forth floatation process

235 **(b)**
Follow text.

236 **(d)**
Dollucite is caesium aluminium silicate containing about 30% of caesium.

237 **(c)**
Roasting is the process in which the ore is heated strongly below its melting point is presence of air

238 **(d)**
Anglesite is $PbSO_4$.

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

240 **(c)**
Pine oil reduces the surface tension of water and the solution forms froths.

241 **(a)**
In smelting, powerful reducing agents like
C, H_2, CO etc are used

242 **(b)**
Calamine is an ore of Zn containing $ZnCO_3$.

243 **(c)**
On striking the electric are between the electrodes, high temperature is produced due to which the charge melts.

244 **(d)**
$2CuO + CuS \longrightarrow 3Cu + SO_2 \uparrow$

245 **(d)**
Roasting is mainly used in the extraction of sulphide ores. Galena—PbS, Iron pyrite-FeS, Copper glance-Cu_2S .

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

248 **(c)**
Smelting is a process of reducing metal oxide to metal by means of coke or CO
$Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$
$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

249 **(d)**
Pb, Cu, and Hg all are refined by Oxidation method.

250 **(c)**

Cast iron, wrought iron and steel may be produced from pig iron.

251 **(d)**
Follow text.

252 **(a)**
The abundance ratio : $O > Si > Al > Fe$.

253 **(c)**
Cuprite (Cu_2O) is oxide but argentite (Ag_2S) is not oxide

254 **(b)**
To convert ores into oxides and remove Sulphur as volatile SO_2.

255 **(c)**
Chile saltpetre is $NaNO_3$.

256 **(d)**
$Ni(CO)_4 \xrightarrow{\Delta} Ni + 4CO$

257 **(b)**
Sulphur occurs in native state while iodine, phosphorus and magnesium are found in combined state.

258 **(b)**
Argentite is an ore of Ag having composition Ag_2S.It dissolves in NaCN due to formation of soluble complex
$Ag_2S + 4NaCN \rightarrow 2Na[Ag(CN)_2] + NaCl$
∴NaCN is used to dissolve argentite

259 **(c)**
It is one use of lead.

260 **(c)**
The process of zinc –plating on iron-sheet is known is known as galvanisation

261 **(b)**
Bronze is mixture of Cu and Sn

262 **(c)**
In the extraction of Al, Al_2O_3 is melted with cryolite[$Na_3(AlF_6)$]. Cryolite improves the electrical conductivity of the alumina and lowers the m.p. of the mixture to about 950°C

263 **(a)**
In bauxite ore, only Al_2O_3 reacts with conc NaNO and fo sodium meta aluminate. This, further dissolves in water
$Al_2O_3 + 2H_2O + 2NaOH \xrightarrow[35\ bar]{500\ K} 2NaAlO_2 + 3H_2O$
$NaAlO_2 + 2H_2O \rightarrow 2NaAl(OH))4$

264 **(c)**
A mineral containing phosphates oscerium, thorium and other rare earths, with some occluded helium.

265 **(d)**
Luster of metals is due to the presence of mobile electrons

266 **(a)**
Rochelle salt is potassium, sodium tartarate.

267 **(d)**
Amphoteric compounds are soluble in both alkali and acid.

268 **(d)**
$\Delta\, \overset{\circ}{G_f}$ for sulphides $>$ $\Delta \overset{\circ}{G_f}$ of CS_2 and H_2S and thus, C and H_2 cannot reduce metal sulphide.

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

270 **(c)**
Among cuprite [Cu_2O], chalcocite [Cu_2S], chalcopyrite [$CuFeS_2$] and malachite [$Cu(OH)_2.CuCO_3$]; only chalcopyrite is an ore which contains both Fe and Cu

271 **(b)**
Galena is an ore of Pb containing SnO_2.

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

273 **(a)**
FeO can form slag with SiO_2,
$SiO_2 + FeO \rightarrow FeSiO_3$.

274 **(c)**
This is Van-Arkel method for purification of Ti.

275 **(a)**
Diaspore is an ore of aluminium containing $Al_2O_3 \cdot H_2O$.

276 **(c)**
Quartz is found in many varieties which have different colour due to impurities, *eg*, amelthyst (purple), opel (white) carnelian and agate
∴Agate is SiO_2

277 **(a)**
In the metallurgy of zinc, reduction of roasted ore (ZnO) gives impure zinc (in fire-clay retort) called spelter.

278 **(d)**
Rock salt is NaCl.

280 **(a)**
Ore pitch blende is main source of radium

281 **(b)**
Magnetite is Fe_3O_4.

282 **(c)**
Dolomite $MgCO_3.CaCO_3$
Magnesite $MgCO_3$
Carnallite $KCl.MgCl_2.6H_2O$

283 **(c)**
Poling is used for purification of metal which contain their own oxide as impurity, *eg*, Cu_2O in

Cu; SnO_2 in Sn

284 **(d)**

$$Al_2O_3 \cdot 2H_2O \xrightarrow[-2H_2O]{\Delta} Al_2O_3,$$

The process is known as calcination, *i.e.*, to heat a mineral below its m.pt. in absence of air in order to remove moisture, organic impurities and volatile impurities.

285 **(a)**

Copper pyrite is $CuFeS_2$.

286 **(c)**

Small quantity of iron occur in native state while Al, Cu and Mg are found in combined state.

287 **(c)**

$SiO_2 + CaCO_3 \rightarrow CaSiO_3 + CO_2$

Impurity (acidic) Flux (basic) Slag

289 **(c)**

Thomas slag is tricalcium phosphate and calcium silicate.

290 **(c)**

Leaching process involves the treatment of the ore with a suitable reagent so as to make it soluble while impurities remain insoluble. It is used to get Ag and Au both.

291 **(d)**

All are the mineral of copper.

Azurite-$Cu(OH)_2 \cdot 2CuCO_3$, Malachite-$Cu(OH)_2 \cdot CuCO_3$,

Copper pyrites-$CuFeS_2$.

292 **(d)**

It is a fact.

293 **(a)**

___do___

294 **(a)**

$SiO_2 + CaO \rightarrow CaSiO_3$

acidic impurity basic flux slag

295 **(a)**

In Bessemerisation, the molten mass is run into sand moulds and allowed to solidify, when it gives out dissolved SO_2 leaving blister type appearance on copper which is popularly known as blister copper.

296 **(c)**

Gypsum is $CaSO_4 \cdot 2H_2O$.

297 **(b)**

Copper is found in native as well as in combined state

298 **(d)**

List I (Types of ore)	List II (Example)
Oxide ore	Corundum (Al_2O_3
Sulphide ore	Galena (pbS)
Sulphate ore	Barytes ($BaSO_4$)
Halide ore	Fluorsper (CaF_2)
	Feldspar

299 **(c)**

$Cr_2O_3 + 2Al \longrightarrow Al_2O_3 + 2Cr$; $\Delta H = -ve.$

300 **(d)**

$2Cu_2S + 3O_2 \rightarrow 2Cu_2O + 2SO_2$

$3Cu_2O + CH_4 \rightarrow 6Cu + 2H_2O + CO$

(from green logs of wood)

301 **(d)**

Extraction of silver and gold is done by hydrometallurgical process or complex salt formation method.

302 **(c)**

Cassiterite is SnO_2.

306 **(b)**

Gallium arsenide is purified by zone refining method

307 **(b)**

Copper metal is reddish brown in colour.

308 **(c)**

___do___

309 **(a)**

All the rocks contains silicates.

310 **(d)**

It is a fact.

312 **(b)**

Lead extracted from galena contains little Ag. Recovery of Ag from argentiferous lead is made by Parke's process.

313 **(c)**

Chile salt petre ($NaNO_3$) is the nitrate ore of sodium

314 **(b)**

A water soluble complex of silver with a dilute aqueous solution of NaCN is sodium argentocyanide, in the cyanide process, the native from is crushed and treated with 0.1-0.2% solution of NaCN and aerated

$4Ag + 8NaCN + 2H_2O + O_2 \rightarrow 4Na[Ag(CN)_2] + 4NaOH$

Argentocyanide is soluble metal is recovered from the complex by reduction with zinc

315 **(c)**

Metals can not be extracted from all the minerals that is why all minerals are not ores

316 **(a)**

Flux is used to fuse non-fusible impurities present in ore.

317 **(d)**
$SnO_2 + 2C \longrightarrow Sn + 2CO$

318 **(b)**
Wolframite is $FeWO_4$.

319 **(c)**
$SiO_2 + 2C \longrightarrow Si + 2CO \uparrow$
$Al_2O_3 + 3C + N_2 \longrightarrow 2AlN + 3CO$
$AlN + 3H_2O \longrightarrow Al(OH)_3 + NH_3$

321 **(b)**
Ge and Si both the elements are purified by Zone refining.

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

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

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

325 **(d)**
Gypsum is $CaSO_4 \cdot 2H_2O$.

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

327 **(b)**
For purification of Ni in Mond's process.

328 **(a)**
In electrolytic reduction, the oxides of highly electropositive metals are reduced at very high temperature

329 **(d)**
CaO is hygroscopic agent.

330 **(d)**
The slag obtained during the extraction of copper from copper pyrites is of $FeSiO_3$. It is carried out in smelting.
$FeO + SiO_2 \rightarrow FeSiO_3$
(slag)

331 **(a)**
Matte is a mixture of Cu_2S containing little FeS

332 **(d)**
An ore is a mineral or aggregate of mineral from which a valuable constituent, especially a metal, can be profitably mined or extracted. All ores are minerals but all minerals are not ore.

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

334 **(a)**
Pitch blende contains traces of radium.

335 **(d)**
Roasting is mainly employed to remove volatile substances
$S_8 + 8O_2 \rightarrow 8SO_2 \uparrow$
$P_4 + 5O_2 \rightarrow P_4O_{10} \uparrow$
$4As + 3O_2 \rightarrow 2As_2O_3 \uparrow$

336 **(d)**
Zn, Cd, Hg have low b.pt.

337 **(a)**
Rutile is TiO_2.

338 **(b)**
Argentite is Ag_2S.

339 **(c)**
Alkali metals, alkaline earth metals and Al are extracted by electrolytic reduction.

340 **(c)**
Wolframite is ferrous tungstate ($FeWO_4$) which is magnetic in nature

341 **(c)**
CaO is a basic flux.

342 **(d)**
Cinnabar is an ore of Hg(HgS).

343 **(c)**
Less reactive metals are found in native state (free state)

344 **(c)**
Levigation (gravity separation) in based on the difference in the specific gravities of the gangue particles and the ore particles.

346 **(d)**
Sodium has high reactivity towards water.

347 **(b)**
Metals like, Na, K, Mg, Ca, Al etc are reduced by electrolytic reduction

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

349 **(a)**
In the metallurgy of iron, when $CaCO_3$ is added to balst furnace, it removes impurities from ore and forms slag.
$CaCO_3 \rightarrow CaO + CO_2$ (1070-1170 K)
$CaO + SiO_2 \rightarrow CaSiO_3$ (1470 K)
$3CaO + P_2O_5 \rightarrow Ca_3(PO_4)_2$

350 **(d)**
Mg alloys are lighter.

351 **(c)**
It is definition of roasting.

352 **(c)**
Aluminium is mainly isolated from bauxite ($Al_2O_3.2H_2O$) ore which is generally contaminated with ferric oxide and silica

353 **(d)**
PbO and $PbSO_4$ get reduced by PbS itself which is already present in mixture, because the reduction takes place by mixture itself, hence is known as self reduction

$2PbO + PbS \xrightarrow{\Delta} 3Pb + SO_2 \uparrow$

$PbSO_4 + PbS \xrightarrow{\Delta} 2Pb + 2SO_2 \uparrow$

354 **(b)**

Calcination is a process in which the ore is heated strongly in the absence of air.

(i) It removes the volatile impurities like CO_2, SO_2, organic matter, moisture from the ore.

(ii)It removes water from the hydrated ore.

(iii)It removes carbon as CO_2 from a carbonate ore.

$$CaCO_3 \xrightarrow{\Delta} CaO + CO_2$$

Lime stone

355 **(c)**

It is a fact.

356 **(d)**

The temperature of the slag zone in the metallurgy of iron using blast furnace is 800-1000°C

357 **(d)**

A natural crystalline form of blue, transparent corundum (Al_2O_3). The colour being due to traces of cobalt and other metals.

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

CHEMISTRY

Assertion - Reasoning Type

This section contain(s) 0 questions numbered 1 to 0. 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

1

Statement 1: In the Hoop's process of purification of aluminium, the fused materials remains in three different layers. These layers remain intact even in electrolytic reduction

Statement 2: All the layers have different densities

2

Statement 1: Gold occurs in native state

Statement 2: Gold dissolves in aqua-regia

3

Statement 1: Alkaline earth metals are not easy to produce by chemical reduction

Statement 2: Their aqueous solutions can not be used for displacing one metal by another

4

Statement 1: The reduction of a metal oxide is easier if the metal formed is in liquid state at the temperature of reduction

Statement 2: The value of entropy change of the reduction process is more on positive side when the metal formed is in liquid state

5

Statement 1: Forth-floatation process is used to Concentrate sulphide ores

Statement 2: There is no difference in the wettability of different minerals

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

CHEMISTRY

: ANSWER KEY :

1)	**a**	**2)**	**b**	**3)**	**b**	**4)**	**a**	
5)	**b**							

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

CHEMISTRY

: HINTS AND SOLUTIONS :

1 **(a)**
Upper most layer of pure molten aluminium, middle layer of molten fluorides of Na^+, Ba^{2+} and Al^{3+} and lower layer of molten impure aluminium have different densities

2 **(b)**
Being less reactive, gold occurs in native state. All metals including gold dissolve in aqua-regia

3 **(b)**
Alkaline earth metals are strong reducing agents so they cann't be produced by reduction method. Aqueous solution of alkaline earth metals cann't be used for displacing one metal by another

5 **(b)**
Forth-flotation process is used to concentrate sulphide ores. This process is based upon the wettability of differen minerals

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

CHEMISTRY

Matrix-Match Type

This section contain(s) 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**.

1. Match List I with List II and select the correct answer using the codes given below the list

Column-I	**Column- II**
(A) Ti	(p) Bauxite
(B) Si	(q) Cerussite
(C) Al	(r) van-Arkel method
(D) Pb	(s) Zone refining

CODES :

	A	**B**	**C**	**D**
a)	b	a	c	d
b)	b	c	a	b
c)	c	a	b	d
d)	c	d	a	b

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

CHEMISTRY

: ANSWER KEY :

1) **d**

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

CHEMISTRY

: HINTS AND SOLUTIONS :

1 **(d)**

Ti- van-Arkel method

Si- Zone refining method

Al– Bauxite (Al_2O_3)

Pb– Cerussite ($PbCO_3$)