10 CHAPTER

METALLURGY

EXERCISE-1

GENERAL PRINCIPLES INVOLVED IN METALLURGY / CONCENTRATION / ORES AND THEIR CONCENTRATION

Q.1 Metallurgy is the process of

(A) Concentration of ore (B) Roasting of ore

(C) Extraction of metal from the ore (D) Adding carbon to the ore in blast furnace

Q.2 Which of the following metal is not found in free state

(A) Zn (B) Au (C) Ag (D) Hg

Q.3 All ores are minerals, while all minerals are not ores because

(A) The metal cannot be extracted economically from all the minerals

(B) Minerals are complex compounds

(C) The minerals are botained from mines

(D) All of these are correct

Q.4 Which one of the followng does not occur as sulphide ore

(A) Zn (B) Cr (C) Ag (D) Fe

Q.5 Electrometallurgical process is used to extract

(A) Fe (B) Pb (C) Na (D) Ag

Q.6 Which of the following metal is extracted by carbon reduction process

(A) Cu (B) Ca (C) Hg (D) Zn

Q.7 Which metal is extracted by electrolytic reduction method

(A) Cu (B) Ca (C) Fe (D) Ag

Q.8 Thermite process is used to extracted metals
(A) When their oxides can be reduced by carbon
(B) When their carbonates do not yield oxides by thermal decomposition
(C) When their sulphides cannot be converted into oxides by roasting
(D) When their oxides are highly stable

Q.9 'Lapis-Lazuli' is a blue coloured precious stone. It is mineral of the class
(A) Sodium-alumino silicate (B) Zinc cobaltate
(C) Basic copper carbonate (D) Prussian blue

Q.10 The lustre of a metal is due to
(A) its high density (B) polished surface
(C) its chemical inertness (D) presence of free electrons

Q.11 Which of the following processes is used in exctractve metaullurgy of magnesium?
(A) Fused salt electrolysis (B) Self reduction
(C) Aqueous solution electrolysis (D) Thermite reduction

Q.12 Which metal is commercially extracted by hydrometallurgical process involving complexation?
(A) Mg (B) Au (C) Cu (D) Zn

Q.13 Which of the following metal is obtained by Self-Reduction process?
(A) Copper (B) Iron (C) Silver (D) Magnesium

Q.14 Cyanide process is used for the concentration of
(A) Au (B) Ag (C) Al (D) Both A & B

Q.15 Froth floatation process for the concentration of ores is an illustration of physical phenomenon of
(A) Adsorption (B) Absorption (C) Coagulation (D) Sedimentation

Q.16 The method of concentration of the ore that makes use of difference in density between ore and impurities is called
(A) Levigation (B) Leaching
(C) Magnetic separation (D) Liquation

Q.17 During concentration of Tin stone separation of sulframates of Fe^{II} and Mn^{II} is based on the fact
(A) SnO_2 is paramagnetic (B) SnO_2 is diamagnetic
(C) $FeWO_4$ and $MnWO_4$ are paramagnetic (D) Both B and C

Q.18 Leaching of Ag_2S by NaCN solution is carried out in the presence of air it, because :
(A) $[Ag(CN)_2]^-$ complex is formed in a reversible reaction
(B) oxidation of formed Na_2S into Na_2SO_4 and sulphur
(C) both (A) and (B)
(D) none of the above

Q.19 In froth-floatation process, pine oil functions as
(A) activator (B) frother (C) collector (D) agitator

Q.20 Collector are the substance which combine with sulphide ore and make them water repellant, which of the following substance can act as collector
(A) sodium ethyl xanthate (B) sodium xenate
(C) sodium pyrophosphate (D) adsorption

Q.21 Preferential wetting of ore by oil and gangue by water takes place during
(A) Levigation (B) Froth floatation (C) Leaching (D) Bessemerisation

Q.22 Concentration of sulphide ores can be carried out by
(A) Liquation (B) Leaching
(C) Froth-floatation process (D) Both B & C

Q.23 Froth floatation process for concentration of ores is an illustration of the practical application of:
(A) Adsorption (B) Absorption (C) Coagulation (D) Sedimentation

Q.24 The most abundant element in the earth crust is
(A) Aluminium (B) Oxygen (C) Silicon (D) Iron

Q.25 Titanium containing ore found in the earth crust is
(A) Bauxite (B) Dolomite (C) Chalcopyrites (D) Ilmenite

Q.26 Silicon is main constituent of
(A) Alloys (B) Rocks (C) Seawater (D) Plants

Q.27 A mineral is called ore if
(A) Metal present in mineral is precious (B) Metal present in mineral is in low content
(C) Metal present in mineral is in rich content (D) Metal cannot be extracted from it

Q.28 Which of the following does not contain Mg

(A) Magnetite (B) Asbestos (C) Magnesite (D) Carnallite

Q.29 Composition of azurite mineral is

(A) $CuCO_3CuO$ (B) $Cu(HCO_3)_2.Cu(OH)_2$

(C) $2CuCO_3.Cu(OH)_2$ (D) $CuCO_3.2Cu(OH)_2$

Q.30 The salt which is least likely to be found in minerals is

(A) Halides (B) Carbonate (C) Sulphide (D) Nitrate

Q.31 Metal which can be extracted from all the three dolomite, magnesite and carnallite is

(A)Na (B) K (C) Mg (D) Ca

Q.32 Cinnabar is an ore of

(A) Hg (B) Cu (C) Pb (D) Zn

Q.33 An example of halide ore is

(A) Galena (B) Bauxite (C) Cinnabar (D) Cryolite

Q.34 Which of the following is not an ore

(A) Bauxite (B) Malachite (C) Zinc blende (D) Pig iron

Q.35 Which of the following ore is used for industrial extraction of aluminium

(A) Corundum (B) Kaolin (C) Cryolite (D) Bauxite

Q.36 Siderite is an ore of

(A) Cu (B) Al (C) Ag (D) Fe

Q.37 Corundum is

(A)$Al_2O_3.H_2O$ (B) Al_2O_3 (C) $Al_2O_3.2H_2O$ (D) $Al_2O_3.2SiO_2.2H_2O$

Q.38 Formula of magnetite is

(A) Fe_2O_3 (B) $Fe_2O_3.3H_2O$ (C)$FeCO_3$ (D) Fe_3O_4

Q.39 Which of the following ores does not represent the ore of iron

(A) Haematite (B) Magnetite (C) Cassiterite (D) Limonite

Q.40 Which of the following ore is called malachite

(A) $CuFeS_2$ (B) $CuCO_3.Cu(OH)_2$

(C) Cu_2S (D) $2CuCO_3.Cu(OH)_2$

Q.41 Calamine is

(A)$ZnSO_4$ (B) ZnO (C) ZnS (D) $ZnCO_3$

Q.42 Which of the following statement is incorrect·

(A) Silver glance mainly contains silver sulphide (B) Gold is found in native state

(C) Tin stone is oxide ore (D) Chalcocite: $CuFeS_2$

Q.43 Which ore contains both iron and copper?

(A) Cuprite (B) Chalcocite (C) Chalcopyrite (D) Malachite

Q.44 Commercially important ore of lead from which it is extracted is

(A) Anglesite (B) Cerussite (C) Galena (D) Siderite

Q.45 Cassiterite is an ore of

(A) Mn (B) Ni (C) Sb (D) Sn

Q.46 Among the following statements, the incorrect one is

(A) Calamine and siderite are carbonates (B) Argentite and cuprite are oxides

(C) Zinc blende and pyrites are sulphides (D) Hornsilver is halide ore

Q.47 Which of the following sulphide ore is concentrated by leaching

(A) Argentite (B) Galena (C) Copper pyrite (D) Sphalerite

Q.48 Froth floatation process is used for the concentration of

(A) Oxide ores (B) Sulphide ores (C) Halide ores (D) Sulphate ores

Q.49 Process used for the concentration of ore is

(A) Froth floatation (B) Roasting (C) Electrolysis (D) Bessemerization

Q.50 Magnetic separation is used for the concentration of

(A) Horn silver (B) Gypsom (C) Chromite (D) Magnesite

Q.51 Cassiterite is concentrated by

(A) Levigation (B) Electromagnetic separation

(C) Froth floatation (D) Liquation

Q.52 Bauxite ore is concentrated by

(A) Froth floatation (B) Cyanidation

(C) Chemical leaching (D) Calcination

Q.53 Zinc blende is concentrated by

(A) Froth floatation (B) Magnetic separation

(C) Leaching (D) Roasting

Q.54 Gravity separation process is primarily used for the concentration of

(A) Calamine (B) Haematite (C) Chalcopyrite (D) Bauxite

Q.55 Froth floatation process is used for concentration of

(A) Chalcopyrite (B) Bauxite (C) Haematite (D) Calamine

Q.56 Which one of the following beneficiation process is used for the ore, $Al_2O_3.2H_2O$

(A) Froth floatation (B) Leaching (C) Liquation (D) Magnetic separation

Q.57 Naturall occuring materials from which an element can be extracted economically are called

(A) Ores (B) Minerals (C) gangue (D) None ofthese

Q.58 Cassiterite is concentrated by

(A) Levigation (B) Electromagnetic separation

(C) Floatation (D) Liquefaction

Q.59 Wolframites are separated from tin stone ore by the process of

(A) Calcination (B) Electromagnetic process

(C) Roasting (D) Smelting

Q.60 Which of the following is not an ore?

(A) Azurite (B) Siderite (C) Clay (D) Cerussite

Q.61 Select the correct match:

	Column-I (Method of conc.)		Column-II (Ores)
X	Magnetic separation	(a)	Ag_2S
Y	froth floation	(b)	$FeCr_2O_4$
Z	Leaching	(c)	$Al_2O_3.2H_2O$

	X	**Y**	**Z**		**X**	**Y**	**Z**
(A)	(a)	(b)	(c)	(B)	(b)	(a)	(c)
(C)	(c)	(a)	(b)	(D)	(b)	(c)	(a)

Q.62 Incorrect statement is

(A) Casseterite, chromite and haematite can be concentrated by hydraulic washing method.

(B) In Hall's process Red Bauxite is purified by leaching,

(C) Sulphide ore is concentrated by froth floatation process.

(D) During roasting of sulphide ore both metal oxide and metal sulphate are formed.

Q.63 Which one of the following is not a method of concentration of ore?

(A) Gravity separation (B) Froth floatation process

(C) Electromagnetic separation (D) Bessemerization

Q.64 Leaching is commercially used in the concentration of:

(A) Haematite (B) Argentite (C) Galena (D) Cinnabar

Q.65 In the froth floatation process, NaCN is added as depressant when galena is associated with impurity of ZnS, because

(A) $Pb(CN)_2$ is precipitated while ZnS remains unaffected,

(B) ZnS forms soluble complex $Na_2[Zn(CN)_4]$ while PbS combines with frother.

(C) PbS forms soluble complex $Na_2[Pb(CN)_4]$ while ZnS combines with frother.

(D) NaCN regenerates ZnS from complex $[Zn(CN)_4]^{2-}$.

Q.66 Which mineral has been named incorrectly?

(A) bauxite : $Al_2O_3.2H_2O$ (B) Chalcocite : Cu_2S

(C) Cryolite : $3NaF.AlF_3$ (D) Feldspar : $Be_3Al_2Si_6O_{18}$

Q.67 Carnallite does not contain

(A) K (B) Ca (C) Mg (D) Cl

Q.68 Identify the metal M which is present in its ore as $MFeS_2$:

(A) copper (B) tin (C) lead (D) zinc

Q.69 The main ore of copper is:
(A) chalcocite (B) Chalcopyrite (C) Azurite (D) Cerussite

Q.70 Three most abundunt elements in the earth crust in their decreasing order of percentage.
(A) O, Si, Al (B) Si, O, Al (C) Al, O, Si (D) O, Fe, Si

Q.71 An ore containing the impurity of $FeCr_2O_4$ is concentrated by
(A) magnetic-separation (B) gravity separation
(C) froth-floatation method (D) electrostatic method

Q.72 Formula of dolomite is :
(A) $CaMg(CO_3)_2$ (B) $MgCO_3$ (C) $CacO_3.MgCO_3$ (D) (A) & (C) both

Q.73 Incorrect statement is :
(A) calamine and siderite are carbonates (B) argentite and cuprite are oxide
(C) zinc blende and pyrites are sulphides (D) malachite and azurite are ores of copper

Q.74 The impurities present in a mineral are called:
(A) gangue (B) f1ux (C) pulverization (D) nuggets

Q.75 Correct statement is:
(A) Magnetite is an ore of magnesium (B) Pyrolusite is mixed oxide of Mn
(C) Siderite is carbonate ore of iron (D) FeS_2 is rolled gold

Q.76 Elements found in native state are
(A) Mg & Al (B) Cu & Fe (C) Zn & Pb (D) Pt & Au

Q.77 The reason, for floating of ore particles in concentration by froth floatation process is that:
(A) they are light (B) they are insoluble
(C) they are charged (D) they are adsorbed over air bubbles

Q.78 The formula of carnallite is :
. (A) $LiAl(Si_2O_5)_2$ (B) $KCl.MgCl_2.6H_2O$
(C) $K_2OAl_2O_3.6SiO_2$ (D) $KCl.MgCl_2.2H_2O$

Q.79 Which of the following is not an ore of iron?
(A) Haematite (B) Limonite (C) Siderite (D) Malachite

Q.80 "Fool's gold" is
(A) iron pyrites (B) horn silver (C) copper pyrites (D) bronze

REDUCTION / EXTRACTION OF METALS

Q.81 Extraction of zinc from zinc blende is achieved by

(A) Electrolytic reduction

(B) Roasting followed by reduction with carbon

(C) Roasting following reduction with another metal

(D) Roasting followed by self-reduction

Q.82 Roasting is generally done in case of the following.

(A) Sulphate ores (B) Silicate ores (C) Sulphide ores (D) Carbonate ores

Q.83 Electric furnaces are lined with magnesia because

(A) it is not affected by acids (B) it gives oxygen on heating

(C) it melts at very high temperature (D) it has no effect of electricity

Q.84 Purpose of smelting of an ore is

(A) To oxidise it (B) To reduce it

(C) To remove vaporisable impurities (D) To obtain an alloy

Q.85 The role of calcination in metaullurgical operation is

(A) To remove moisture (B) To decompose carbonates

(C) To decompose organic matter (D) To achieve all the above

Q.86 The metallurgical process in which metal is obtained in fused state from its ore is called

(A) Smelting (B) Roasting (C) Calcination (D) Froth floatation

Q.87 Which of the following processes involves smelting

(A) $ZnCO_3 \rightarrow ZnO + CO_2$ (B) $Fe_2O_2 + 3\ CO \rightarrow 2Fe + 3CO_2$

(C) $2PbS + 3O_2 \rightarrow 2\ PbO + 2SO_2$ (D) $Al_2O_3 \cdot 2H_2O \rightarrow Al_2O_3 + 2H_2O$

Q.88 Which of the following ore is subjected to roasting during metallurgical operations for getting the metal oxide

(A) Argentite (B) Zinc blende (C) Malachite (D) Limonite

Q.89 Flux is added to remove

(A) Acidic impurities (B) Basic impurities

(C) All impurities of ores (D) Both (A) and (B)

Q.90 Which element is used as a reducing agent in smelting

(A) C (B) Al (C) Zn (D) None of these

Q.91 According to Ellingham diagram, the oxidation reaction of carbon to carbon monoxide may be used to reduce which one of the following oxides at the lowest temperature

(A) Al_2O_3 (B) Cu_2O (C) MgO (D) ZnO

Q.92 In blast furnace, maximum temperature is in

(A) Zone of fusion (B) Zone of combustion

(C) Zone of slag formation (D) Zone of reduction

Q.93 During smelting, an additional substance is added which combines with impurities to form a fusible product. It is known as

(A) slag (B) mud (C) gangue (D) flux

Q.94 Which one of the following reaction is an example of calcination process?

(A) $2Ag + 2HCl + [O] \rightarrow 2AgCl + H_2O$

(B) $2Zn + O_2 \rightarrow 2\ ZnO$

(C) $2\ ZnS + 3O_2 \rightarrow 2\ ZnO + 2SO_2$

(D) $2\ PbCO_3 \cdot Pb(OH)_2 \xrightarrow{\Delta} 3PbO + CO_2\uparrow + H_2O$

Q.95 Which of the following metal is obtained by electrolytic reduction process ?

(A) Fe (B) Cu (C) Ag (D) Mg

Q.96 Heating of ore in the absence of air below its melting point is called

(A) Leaching (B) Roasting (C) Smelting (D) Calcination

Q.97 Which of the following flux is used to remove acidic impurities in metallurgical process?

(A) Silica (B) Lime stone (C) Borax (D) Sodium

Q.98 The process of converting hydrated alumina into anhydrous alumina is called

(A) Roasting (B) Smelting (C) Dressing (D) Calcination

Q.99 Which of the following statements about the advantage of roasting of sulphide ore before smelting is not true?

(A) $\Delta_f G^o$ of the sulphide is more negative than that of CS_2

(B) $\Delta_f G^o$ is negative for roasting of sulphide ore to oxide

(C) $\Delta_f G$ of carbon reduction of metal oxide to free metal is more negative at higher temperature

(D) Carbon and hydrogen are suitable reducing agents for metal sulphides

Q.100 The value of $\Delta_f G^o$ for Cr_2O_3 is – 540 kJ mol^{-1} and that of Al_2O_3 is – 827 kJ mol^{-1}. Is the reduction of Cr_2O_3 by Al is feasible reaction

(A) The data is incomplete (B) The reaction is feasible

(C) The reaction is not feasible (D) The reaction may or may not be feasible

Q.101 Heating pyrites in air for oxidation of sulphur is called

(A) Slagging (B) Smelting (C) Roasting (D) None of these

Q.102 Which of the following condition is incorrect for metal oxide formation from metal and oxygen at given temp.

(A) ΔH = – ve (B) ΔS = – ve (C) ΔS = + ve (D) None of these

Q.103 Calcination is not carried out for

(A) Calalmine (B) Malachite (C) Chalcopyrite (D) Dolomite

Q.104 Consider the following statements :

Roasting is carried out to :

(i) convert sulphide ore to metal oxide and metal sulphate

(ii) remove water of hydration

(iii) organic matter is decomposed into volatile substance

(iv) remove arsenic and sulphuric impurities as their oxides

Of these statements :

(A) (i), (ii) and (iii) are correct (B) Only (i) and (iv) are correct

(C) (i), (ii) and (iv) are correct (D) All are correct

Q.105 Identify the metal M whose extraction is based on the following reactions :

$MS + 2O_2 \longrightarrow MSO_4$; $2\,MS + 3O_2 \longrightarrow 2MO + 2SO_2$

$MS + 2\,MO \longrightarrow 3M + SO_2$; $MS + MSO_4 \longrightarrow 2M + 2SO_2$

(A) Magnesium (B) Aluminium (C) Lead (D) Tin

Q.106 Which of the following metal is not extracted commercially by carbon reduction process?

(A) Zn (B) Fe (C) Hg (D) Sn

Q.107 Which of the following reaction does not represent to calcination.

(A) $Al(OH)_3 \xrightarrow{\Delta} Al_2O_3$ (B) $ZnS + O_2 \xrightarrow{\Delta} ZnSO_4$

(C) $CuCO_3.Cu(OH)_2 \rightarrow CuO + CO_2 + H_2O$ (D) $MgCl_2.6H_2O \xrightarrow[\text{Dry HCl}]{\Delta} MgCl_2$

Q.108 An ore after levigation is found to have acidic impurities . Which of the following can be used as flux during smelting operation?

(A) $Na_2B_4O_7$ (B) $CaCO_3$ (C) SiO_2 (D) Na_3PO_4

Q.109 Which of the following reactions represent(s) the self-reduction process?

(A) $\begin{cases} HgS + O_2 \rightarrow HgO + SO_2 \\ HgO + HgS \rightarrow Hg + SO_2 \end{cases}$ (B) $\begin{cases} Cu_2S + O_2 \rightarrow Cu_2O + SO_2 \\ Cu_2S + Cu_2O \rightarrow Cu + SO_2 \end{cases}$

(C) $\begin{cases} PbS + O_2 \rightarrow PbO + SO_2 \\ PbO + PbS \rightarrow Pb + SO_2 \end{cases}$ (D) All of these

Q.110 Which of the following represents thermite reduction?

(A) $3Mn_3O_4 + 8Al \longrightarrow 9Mn + 4Al_2O_3$ (B) $Al_2O_3 + 3Mg \xrightarrow{\Delta} 2Al + 3MgO$

(C) $Cu_2S + 2Cu_2O \longrightarrow 6Cu + SO_2$ (D) $Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$

Q.111 Choose the correct option for the following statements

Statement-1 Sulphide ore is firstly converted to oxide and then it is subjected to reduction for the extraction of metal.

Statement-2 In calcination, the ore is heated in a regular supply of air in a furnace at a temperature below melting point of the calcined product.

Statement-3 Carbon can be used in place of Mg metal during commercial extraction of Ti-metal in Kroll process.

Statement-4 In commercial extraction of Mn by Thermite process, three parts of MnO_2 and one part of Al as reductant, is used.

(A) TTFF (B) FFFT (C) TFFT (D) TFFF

Q.112 Extraction of manganese from Mn_3O_4 by the use of aluminium is an example of :

(A) Amalgamation (B) hydrometallurgy (C) electrometallurgy (D) Pyrometallurgy

Q.113 Slag is formed by reaction between:

(A) impurities and coke (B) impurities and ore

(C) impurities and flux (D) flux and coke

Q.114 The slag consists of molten impurities, generally, in the form of:

(A) Metal carbonate (B) Metal silicate

(C) Metal oxide (D) Metal nitrate

Q.115 Refractory materials are used in furnaces because

(A) they maintain temperature of the furnace (B) they can withstand high temperature

(C) they prevent formation of CO (D) they help in burning of coal

Q.116 Which of the following statement is correct regarding the slag obtained during the extraction of a metal like copper or iron?

(A) The slag is lighter and has lower melting point than the metal

(B) The slag is heavier and has lower melting point than the metal

(C) The slag is lighter and has higher melting point than the metal

(D) The slag is heavier and has higher melting point than the metal

Q.117 Among the following groups of oxides, the group containing oxides that is reduced by carbon for their respective extraction.

(A) CaO and K_2O (B) Fe_2O_3, ZnO and SnO_2

(C) Al_2O_3, B_2O_3 (D) Cr_2O_3, Mn_3O_4

Q.118 Which of the following match is incorrect

Extraction Method	**Metal(s)**
(A) Self reduction	Hg, Pb
(B) Electrolytic reduction	Na, Al
(C) Hydrometallurgy	Pb, Zn
(D) Alumino-thermite reduction	Mn, Cr

Q.119 Heating of pyrites in air for oxidation of sulphur is called

(A) Roasting (B) Calcination (C) Smelting (D) Levigation

Q.120 Which is not basic flux

(A) Lime stone (B) SiO_2 (C) Magnesite (D) None

Q.121 In the extraction of iron lime stone added to the blast furnace, calcium ion is obtained mainly in the form of

(A) $CaSiO_3$ (B) $CaCO_3$ (C) Ca (D) CaO

Q.122 The slag obtained during the extraction of copper from copper pyrites is composed mainly of

(A) $CaSiO_3$ (B) $FeSiO_3$ (C) $CuSiO_3$ (D) SiO_2

Q.123 Which of the following reaction taking place in the Blast furnace is endothermic

(A) $CaCO_3 \rightarrow CaO + CO_2$ (B) $2C + O_2 \rightarrow 2CO$

(C) $C + O_2 \rightarrow CO_2$ (D) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

Q.124 In the modern blast furnaces, in the extraction of iron the charge consists of a mixture of

(A) Fe_2O_3+ lime stone + anthracite coal (B) Fe_2O_3+ limestone + coke

(C) $Fe_2O_3.3H_2O$ + dolomite + coke (D) Iron pyrites + lime stone + bituminous coal

Q.125 A metal obtained directly by roasting of its sulphide ore is

(A) Cu (B) Pb (C) Hg (D) Zn

Q.126 Heating mixture of Cu_2O and Cu_2S will give

(A) $Cu + SO_2$ (B) $Cu + SO_3$ (C) CuO +CuS (D) $Cu_2O + S$

Q.127 In the extraction of copper from its sulphide ore, the metal is finally obtained by the reduction of cuprous oxide with

(A) Copper (I) sulphide (Cu_2S) (B) Sulphur dioxide (SO_2)

(C) Iron sulphide (FeS) (D) Carbon monoxide (CO)

Q.128 Alumino-thermite process is used for the extraction of

(A) Al (B) Cr (C) Fe (D) Cu

Q.129 In alumino-thermite process, aluminium is used as

(A) Oxidising agent (B) Flux

(C) Reducing agent (D) Ignition agent

Q.130 Aluminium is extracted in large quantities by

(A) Heating cryolite in a limited quantity of air

(B) Reducing aluminium oxide with coke

(C) Reducing aluminium oxide with sodium

(D) Electrolysing aluminium oxide dissolved in fused cryolite

Q.131 After partial roasting, the sulphide of lead is reduced by

(A) Reduction by carbon (B) Electrolysis

(C) Self-reduction (D) Cyanide process

Q.132 Aluminium is extracted from alumina (Al_2O_3) by electrolysis of a molten mixture of

(A) $Al_2O_3 + HF + NaAlF_4$ (B) $Al_2O_3 + CaF_2 + NaAlF_4$

(C) $Al_2O_3 + Na_3AlF_6 + CaF_2$ (D) $Al_2O_3 + KF + Na_3AlF_6$

Q.133 Extraction ofchromium from chromic oxide, the method used is

(A) Alumino-thermic process (B) Electrolytic reduction

(C) Carbon reduction (D) Carbon monoxide reduction

Q.134 Bauxte ore is made up of$Al_2O_3 + SiO_2 + TiO_2 + Fe_2O_3$. The ore is treated with conc. NaOH solution at 500 K and 35 bar pressure for few hours and filtered, In the filtrate the species present, are

(A) $NaAlO_2$ only (B) $Na_2Ti(OH)_6$ only

(C) Both $NaAlO_2$ and Na_2SiO_3 (D) Na_2SiO_3 only

Q.135 The autoreduction process is not used for extraction of

(A) Hg (B) Cu (C) Pb (D) Fe

Q.136 Pb and Sn are extracted from their chief ore respectively by.

(A) Carbon reduction and self reduction (B) Self reduction and carbon reduction.

(C) Electrolysis and self reduction. (D) Self reduction and electrolysis.

Q.137 Slag formed during extraction of iron is

(A) Fe_3C (B) $FeSiO_3$ (C) $MgSiO_3$ (D) $CaSiO_3$

Q.138 The methods chiefly used for the extraction of lead and tin from their ores are respectively.

(A) Self reduction and carbon reduction (B) Self reduction and electrolytic reduction

(C) Carbon reduction and self reduction (D) Cyanide process and carbon reduction

Q.139 Complex is formed in the extraction of

(A) Fe (B) Cu (C) Ag (D) Na

Q.140 Spiegelesin is an alloy of

(A) Fe, Co and Cr (B) Fe, Co and Mg (C) Fe, Mg and C (D) Fe, C and Mn

Q.141 From which of the following ore, the concerned metal is not commercially extracted by self reduction.

(A) Ag_2S (B) PbS (C) $CuFeS_2$ (D) Cu_2S

Q.142 The reduction of a metal oxide by aluminium is called:

(A) Ellingham process (B) Goldschmidt's aluminothermite process

(C) Kroll's process (D) Van Arkel process

Q.143 Blister Cu contains about:

(A) 60 % Cu (B) 90 % Cu (C) 98 % Cu (D) 100 % Cu

Q.144 Self-reduction of Cu_2S to Cu is carried out in ..... step

(A) Roasting (B) Smelting (C) Bessemerization (D) Poling

Q.145 In which of the following process, silver metal can not be obtained.

(A) As a by product in the electrolytic refining of copper

(B) Parke's process

(C) By reaction of argentite ore with excess KCN followed by metal displacement

(D) By treatment of Horn silver with Aqua Regia

Q.146 Incorrect reduction process is :

(A) $2[Ag(CN)_2]^- + Zn \longrightarrow [Zn(CN)_4]^{2-} + '2Ag$

(B) $Cu_2O + H_2 \xrightarrow{\Delta} 2Cu + H_2O$

(C) $ZnO + Cu \xrightarrow{\Delta} Zn + CuO$

(D) $TiCl_4 + 2Mg \xrightarrow{\Delta} Ti + 2MgCl_2$

Q.147 In which of the following isolations no reducing agent is required:

(A) Iron from haematite (B) Tin from Tinstoe

(C) Mercury from cinnabar (D) Zinc from zinc blende

Q.148 Which of the following combination of reactions is involved during commercial extraction of copper metal

(A) $Cu_2S + \frac{3}{2} O_2 \xrightarrow{\Delta} Cu_2O + SO_2$; $Cu_2O + C \xrightarrow{\Delta} Cu + CO$

(B) $Cu_2S + \frac{3}{2} O_2 \xrightarrow{\Delta} Cu_2O + SO_2$; $2Cu_2O + Cu_2S \xrightarrow{\Delta} 6Cu + SO_2$

(C) $Cu_2S + \frac{3}{2} O_2 \xrightarrow{\Delta} Cu_2O + SO_2$; $2Cu_2O + Si \xrightarrow{\Delta} 4Cu + SiO_2$

(D) $Cu_2S + \frac{3}{2} O_2 \xrightarrow{\Delta} Cu_2O + SO_2$; $Cu_2O + CO \xrightarrow{\Delta} 2Cu + CO_2$

Q.149 Iron obtained directly from blast furance is:

(A) wrought iron (B) cast iron (C) pig iron (D) steel

Q.150 Which one of the following reactions will occur on heating $AgNO_3$?

(A) $2AgNO_3 \longrightarrow 2Ag + N_2 + 3O_2$ (B) $3AgNO_3 \longrightarrow Ag_2O + N_2O_3 + O_2$

(C) $2AgNO_3 \longrightarrow 2AgNO_2 + O_2$ (D) $2AgNO_3 \longrightarrow 2Ag + NO_2 + O_2$

Q.151 Boron can be obtained by various methods but not by:

(A) thermal decomposition of B_2H_6 (B) pyrolysis of BI_3 (Van Arkel)

(C) Reduction of BCl_3 by H_2 (D) electrolysis of fused BCl_3

Q.152 Black tin is

(A) an alloy of Sn (B) an allotrope of Sn

(C) 60-70 percent SnO_2 (D) 100 percent SnO_2

Q.153 Incorrect statement during extraction of Al by Hall-Heroult process is :

(A) cryolite $Na_3[AlF_6]$ lowers the working temperature.

(B) Al is obtained at cathode and probably CO at anode

(C) Anode rods are disintegrated due to their oxidation

(D) Pure aluminium floats above molten electrolyte.

Q.154 Which of the following species is desirable substance in extraction of copper but not in extraction of iron?

(A) $CaSiO_3$ (B) $FeSiO_3$ (C) SiO_2 (D) coke

Q.155 Main source of lead is PbS. It is converted to Pb by:

(A): $PbS \xrightarrow[\Delta]{air} PbO + SO_2$, $PbO \xrightarrow{c} Pb + CO_2$ (B): $PbS \xrightarrow[\Delta]{air} PbO + PbS \longrightarrow Pb + SO_2$

Self-reduction pocess is:

(A) A (B) B (C) both (D) none

Q.156 Which of the following reaction does not occur in Bessemer's converter?

(A) $FeS + Cu_2O \longrightarrow Cu_2S + FeO$ (B) $2Cu_2S + 3O_2 \longrightarrow 2Cu_2O + 2SO_2\uparrow$

(C) $2CuFeS_2 + O_2 \longrightarrow Cu_2S + 2FeS + SO_2$ (D) $FeO + SiO_2 \longrightarrow FeSiO_3$

Q.157 In McArthur forest method zinc powder is used as

(A) oxidising agent (B) reducing agent (C) solvent (D) solvating agent

Q.158 The metal which can be extracted by both sea-water and ores from the earth's crust is:

(A) Magnesium (B) Lead (C) Iron (D) Aluminium

Q.159 Electrolyte used in the commercial extraction of aluminium is :

(A) $Al(OH)_3$ in NaOH solution

(B) Molten mica and CaF_2

(C) Molten mixture of Al_2O_3, Na_3AlF_6 & CaF_2

(D) Molten potash alum

Q.160 Use T if statement is true and F if it is false for following statement.

(i) Cu metal is extracted from its sulphide ore by reduction of Cu_2O with FeS.

(ii) Calamine containing impurity of $FeCr_2O_4$ is concentrated by magnetic separation.

(iii) Self reduction is used for the extraction of Cu & Hg.

(iv) Cassiterite and Rutile are oxide ores of their respective metals

(A) TFTT (B) TIFT (C) FTTT (D) FFFT

Q.161 During extraction of aluminium the carbon anodes are replaced periodically because:

(A) carbon anodes are gradually lost due to formation of Al_4C_3

(B) Carbon anodes melt and mix up with the electrolyte

(C) Oxygen liberated at the carbon anode reacts with anode to form CO

(D) Carbon anode reduces Al_2O_3 into Al

Q.162 In the extraction of aluminium

Process X : Used for purification of red bauxite by leaching.

Process Y : Used for purification of white bauxite and removes impurity of Z then correct statement is.

(A) X = Hall and Heroult's process and Z = SiO_2

(B) X =Baeyer's process and Z = SiO_2

(C) X =Serpeck's process and Z = iron oxide

(D) X =Baeyer's process and Z = iron oxide

Q.163 Magnesium is commercially extracted by :

(A) self-reduction process (B) Dow's sea process

(C) Thermite reduction (D) Leaching followed by metal displacement

Q.164 Bauxite is leached with:

(A) N_2 + Coke (B) NaCN (C) NaOH (D) Na_2CO_3

Q.165 Silver ore dissolves in dilute solution of NaCN in the presence of air to form:

(A)AgCN (B) $[Ag(CN)_2]^-$ (C) AgSCN (D) $[Ag(CN)_4^-]$

Q.166 For extraction of sodium from NaCl, the electrolytic mixture NaCl + KCl + $CaCl_2$ is used. During extraction process, only sodium is deposited on cathode but K and Ca do not because

(A) Na is more volatite than K and Ca

(B) Na is less reactive than K and Ca

(C) NaCl is less stable than Na_3AlF_6 and $CaCl_2$

(D) the discharge potential of Na^+ is less than that of K^+ and Ca^{2+} ions.

Q.167 What is the chemical composition of matte?

(A) Cu_2O + FeS (B) Cu_2O + Cu_2S (C) FeS + SiO_2 (D) Cu_2S + FeS

Q.168 Dow's process is used for:

(A) Extraction of sodium metal (B) Extraction of Mg from molten carnallite

(C) Extraction of magnesium from sea water (D) Purification of aluminium

Q.169 Which of the following reaction occurs in the reduction zone during extraction of iron?

(A) $CaO + SiO_2 \longrightarrow CaSiO_3$(slag) (B) $Fe_2O_3 + 3C \longrightarrow 2Fe + CO$

(C) $FeO + CO \longrightarrow Fe + CO_2$ (D) $CO_2 + C \longrightarrow 2CO$

Q.170 In the metallurgy of iron, the upper layer obtained at the bottom of blast furnace mainly contains:

(A) $CaSiO_3$ (B) Spongy iron (C) Fe_2O_3 (D) $FeSiO_3$

Q.171 In the extraction of aluminium during electrolysis stage:

(A) Al_2O_3 undergoes dissociation

(B) AlF_3 undergoes dissociation

(C) Al_2O_3 and AlF_3 both underg'o dissociation

(D) Neither of the two undergoes dissociation

Q.172 In the extraction of copper from its sulphide ore the metal is formed by the reduction of Cu_2O with:

(A) FeS (B) CO (C) Cu_2S (D) SO_2

Q.173 Which one of the following statements is incorrect?

(A) Tin is extracted by carbon reduction (smelting)

(B) Aluminium is extracted by Hall's process which involves carbon reduction.

(C) Extraction of lead does not involve bessemerisation

(D) Silver is extracted by cyanide process

Q.174 Fused carnallite on electrolysis gives:

(A) Ca and Cl_2 (B) Na and CO_2 (C) Al and Cl_2 (D) Mg and Cl_2

REFINING

Q.175 Van Arkel method of purification of metals involves converting the metal to a

(A) Volatile stable compound

(B) Volatile thermally unstable compound

(C) Non volatile stable compound

(D) None of the above

Q.176 If the impurity in a metal has a greater affinity for oxygen and is more easily oxidised than the metal, then the purification of metal may be carried out by

(A) Cyanidation (B) Zone refining (C) Electrolytc refining (D) Cupelation

Q.177 (Ag + Pb) alloy $\xrightarrow{\text{Melt and zinc is added}}$ (Ag + Pb + Zn) melt $\xrightarrow{\text{Cool}}$ $\xrightarrow[\text{Bottom Layer (Y)}]{\text{Upper Layer (X)}}$ Select correct statement based on above scheme

(A) Layer X contain Zn and Ag

(B) Layer Y contains Pb and Ag but amount of silver in this layer is smaller than in layer X

(C) X and Y are immiscible layer

(D) All are correct statements

Q.178 The method of zone refining is based on the principle of

(A) Greater solubility of the impurity in the molten state than in the solid

(B) Greater mobility of the pure metal than that of the impurity

(C) Higher melting point of the impurity than that of the pure metal

(D) Greater noble character of the solid metal than that of the impurity

Q.179 Van-Arkel method of purification of metals involves converting the metal to a

(A) Volatile thermally stable compound (B) Non-volatile stable compound

(C) Volatile thermally unstable compound (D) None of the above

Q.180 Zone refining is based on the principle of

(A) fractional distillation (B) fracitonal crystallisation

(C) partitition coefficient (D) chromatographic separation

Q.181 In electrorefining of metals , the anode is made of :

(A) Impure metal concerned (B) Pure metal concerned

(C) Graphite (D) Platinum

Q.182 Which of the following statement is incorrect?

(A) Liquation is applied when the metal has low melting point than those of impurities.

(B) Presence of carbon in steel makes it hard due to having cementite impurity.

(C) Less reactive metals like Hg, Pb and Cu are obtained by auto reduction from their sulphide ores.

(D) Amalgamation is used for purification of mercury

Q.183 Zinc does not form alloy with

(A) Cu (B) Sn (C)Pb (D)Ag

Q.184 Which ofthe following process involves the principle of fractional crystallisation for refining of an element?

(A) Parke's process (B) Mond's process (C) Van Arkel process (D) Zone refining

Q.185 Mg can be obtained by:

(A) heating $MgCl_2$(anhydrous) with Na in the atmosphere of coal gas

(B) electrolysis of fused anhydrous carnallite

(C) both methods

(D) one of.the above.

Q.186 NaCl and $CaCl_2$ are added to fused $MgCl_2$ during extraction of Mg because.

(A) Melting point of electrolyte is decreased and its conductivity is increased

(B) Melting point of electrolyte is increased and its conductivity is decreased

(C) Both melting point and conductivity of electrolyte are decreased

(D) Both melting point and conductivity of electrolyte are increased

Q.187 Incorrect match is

(A) Bayer's method	NaOH solution
(B) Matte	98% CuS + 2% FeS
(C) Van Arkel method	BI_3
(D) Thomas slag	Bessemerization

Q.188 Purest form of iron is :

(A) cast iron (B) wrought iron (C) pig iron (D) None ofthese

Q.189 Tempering of steel:

(A) to obtain steel of a particular hardness

(B) increases mechanical strength

(C) changes content of carbon in the form of cementite

(D) All of the above

Q.190 Bessemerisation is used in the extraction / Refining of

I : Fe II : Cu III : Al IV: Silver

(A) I, II (B) II, III (C) I, III (D) all

Q.191 The method of extraction of Ag by cyano complex formation followed by metal displacement is called:

(A) Parke's method (B) McArthur-Forest method

(C) Serpeck method (D) Hall's method

Q.192 Silica is added during extraction of copper in order to remove

(A) cuprous sulphide (B) ferrous oxide

(C) cupric oxide (D) cuprous oxide

Q.193 Addition of manganese makes steel useful in making rails of railroads, because manganese

(A) gives hardness to steel (B) helps the formation of oxides of iron

(C) reduces impurity of SiO_2 into silicon (D) reduces hardness

Q.194 A piece of steel is heated to red hot and then it is dipped into cold water, this treatment of iron makes it

(A) soft and malleable (B) hard but not brittle

(C) more brittle (D) hard and brittle

Q.195 Modern method of steel manufacturing is

(A) open hearth process (B) L.D. Process

(C) Bessemerisation (D) Cupellation

Q.196 The chemical process of manufacturing of steel from its ore haematite involves

(A) oxidation (B) reduction followed by oxidation

(C) oxidation followed by reduction (D) oxidation followed by decomposition and reduction

Q.197 Which of the following metal acts as scavenger in steal manufacturing.

(A) Cr (B) Mn (C) Ti (D) Pb

Q.198 Railway wagon axles are made by

(A) Sherardising (B) Annealing (C) Tempering (D) Case hardening

Q.199 In electrolytic refining of metals, electrolysis of an aqueous solution of its complex salt is done with impure metal as anode and an strip of pure metal as cathode. This method cannot be used for the refining of the metal

(A) Silver (B) Copper (C)Aluminium (D) Zinc

Q.200 Cupellation process is used in the metallugry of

(A) Copper (B) Silver (C) Aluminium (D) Iron

Q.201 Zone refining is a method to obtain

(A) Ultra pure Hg (B) Ultra pure Lead (C) Ultra pure Silicon (D) Ultra pure Sn

Q.202 Metal which is refined by poling is

(A) Sodium (B) Blister copper (C) Zinc (D) Silver

Q.203 Silver obtained from argentiferrous lead containing lead impurity is purified by

(A) Distillation (B) Froth floatation

(C) Cupellation (D) Aqueous NaCN in absence of air

Q.204 The method not used in metallurgy to refine the impure metal is

(A) Mond's process (B) Van-Arkel process (C) Froth floatation (D) Liq uation

Q.205 Method used for obtaining ultra pure silicon used as a semiconductor material is

(A) Oxidation (B) Electrochemical (C) Crystallization (D) Zone refining

Q.206 In electrorefining of copper, some gold is deposited as

(A) anode mud (B) cathode mud (C) flux (D) slag

Q.207 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) Zone refining (B) Cupellation (C) Poling (D) Van-Arkel

Q.208 Refining of silver is carried out by :

(A) Liquation (B) Poling (C) Cupellation (D) Vapour phase refining

Q.209 Which does not represent correct method?

(A) $TiCl_4 + 2\,Mg \xrightarrow{\Delta} Ti + 2MgCl_2$: Kroll process

(B) $Ni(CO)_4 \xrightarrow{\Delta} Ni + 4CO$: Mond's process

(C) $PbI_2 \xrightarrow{\Delta} Pb + I_2$: Van Arkel process

(D) $ZrI_4 \xrightarrow{\Delta} Zr + 2I_2$: Van Arkel process

Q.210 In the form of by product, tungstan is mainly obtained during electrolysis refining of :

(A) Pb (B) Sn (C) Cu (D) Al

Q.211 In the extraction of nickel by Mond's process, the metal is obtained by:

(A) electrochemical reduction (B) thermal decomposition

(C) chemical reduction by aluminium (D) reduction by carbon

Q.212 When copper is purified by electrorefining process, noble metals like Ag and Au are found in

(A) cathode mud (B) over anode

(C) anode mud (D) over cathode or anode

Q.213 Formation of $Ni(CO)_4$ and subsequent its decomposition into Ni and CO (recycled) makes basis of Mond's process

$$Ni + 4CO \xrightarrow{T_1} Ni(CO)_4 \xrightarrow{T_2} Ni + 4CO$$

T_1 and T_2 are:

(A) 100°C, 50°C (B) 50°C, 100°C (C) 50°C, 230°C (D) 230°C, 50°C

Q.214 In making of steel, phosphorous separates as :

(A) Slag. $Ca_3(PO_4)_2$ (B) volatile, P_2O_5 (C) slag, $FePO_4$ (D) Ca_3P_2

Q.215 Incorrect statement regarding silver extraction process is :

(A) When the lead-silver composition is rich in silver, lead is removed by the cupellation process.

(B) When lead-silver composition is rich in lead, most of lead is removed by Pattinson's process.

(C) Zinc forms an alloy with lead, from which lead is separated by distillation

(D) Zinc dissolves silver, from which zinc is separated by distillation.

Q.216 Which process is based on Distribution law

(A) Pattinson's process (B) Parke's process (C) Kroll process (D) Moisson process

Q.217 During poling which ofthe following oxide(s) is/are not reduced by hydrocarbons.

(A) SnO_2 (B) Fe_2O_3 (C) Cu_2O (D) both A and C

Q.218 Ultrapure form of Si and Ge are obtained from.

(A) zone-refining (B) electrorefining

(C) Van-Arkel's process (D) cupellation process

Q.219 The metal for which, its property of forming of volatile complex is used for its purification.

(A) Cobalt (B) Nickel (C) Vanadium (D) Iron

Q.220 In the purification of aluminium by Hoope's process, impurities of silicon and copper are added to the molten impure aluminium in order to :

(A) make the melt conducting (B) reduce CaO into Ca

(C) smooth deposition of aluminium ion (D) make the melt heavier

Q.221 In electrorefining of metal, the anode is made of thick plate of impure metal and this method is not used for 1 refining of :

(A) Silver (B) Copper (C) Aluminium (D) Gold

Q.222 % of silver in 'german silver' is

(A) 0 (B)80 (C) 90 (D) 10

Q.223 Which method of purification is presented by the following reactions?

$$\underset{\text{(Impure)}}{Ti + 2I_2} \xrightarrow{500\,K} TiI_4 \xrightarrow{1675\,K} \underset{\text{(Pure)}}{Ti + 2I_2}$$

(A) Cupellation (B) Polling (C) Van Arkel (D) Zone refining

Q.224 Which of the following metals may be present in the anode mud during electrorefining of copper?

I. Gold ; II. Iron ; III. Silver ; IV. magnesium

(A) I and II (B) II and IV (C) I and III (D) III and IV

Q.225 Mercury is purified by:

(A) Leaching (B) Distillation (C) Cupellation (D) Vapour phase refining

Q.226 Which is not correctly matched :

(A) Spiegleisan : Mn + Fe+C (B) Dow's sea water process : $Ca(OH)_2$

(C) Parke's process : Ag (D) Liquation : Spelter (Impure Zn)

Q.227 Silver and gold are often obtained as valuable by-products during:

(A) Smelting (B) Electrolytic refining

(C) Zone refining (D) Iron making

Q.228 Extraction of pure Zn metal from its sulphide ore does not involve

(A) Roasting (B) Distillation (C) Self reduction (D) Rapid Cooling

Q.229 Which of the following match is incorrect

Extraction Method	**Metal(s)**
(A) Self reduction	Hg, Pb
(B) Electrolytic reduction	Na, Al
(C) Hydrometallurgy	Pb, Zn
(D) Alumino-thermite reduction	Mn, Cr

Q.230 Which of the following metal is commercially extracted by Pyrometallurgy

(A) Ag (B) Al (C) Cu (D) Mg

EXERCISE-2

[MULTIPLE CORRECT CHOICE TYPE]

Q.1 Auto reduction process is used in the extraction of

(A) Cu (B) Hg (C) Al (D) Fe

Q.2 Metal(s) which does/do not form amalgam is/are

(A) Fe (B) Pt (C) Na (D)Au

Q.3 Metal(s) which is/are extracted by smelting (Carbon reduction) process

(A) Cr (B) Fe (C) Zn (D) Sn

Q.4 Extraction of silver from argentiferrous lead (Pb +Ag) involves

(A) distillation method (B) cupellation

(C) Pattinson's process (D) Parke's process

Q.5 Which of the following reduction reactions are actually employed in commerical extraction of metals?

(A) $Fe_2O_3 + 2Al \rightarrow Al_2O_3 + 2Fe$

(B) $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$

(C) $2Na[Au(CN)_2] + Zn \rightarrow Na_2[Zn(CN)_4] + 2Au$

(D) $Cu_2O + H_2 \rightarrow 2Cu + H_2O$

Q.6 Conversion of concentrated ore into metal oxide is required because

(A) Reduction of metal oxide thermodynamically feasible

(B) Non metal impurities like As, Sb, S are removed as volatile oxides

(C) Organic impurities are burnt away.

(D) it makes ore porus

Q.7 Which of the following can be obtained by electrolytic reduction of their compounds in aqueous solution?

(A) Gold (B) Aluminium (C) Silver (D) Copper

Q.8 During extraction of iron, correct statement(s) about slag formation is/are

(A) It prevents oxidation of pig iron (B) Heat energy is evolved

(C) It exists in molten form (D) It is used in cement industry

Q.9 Roasting is usually carried out in

(A) Blast furnace (B) Reverberatory furnace

(C) Bessemer's converter (D) Electric furnace

Q.10 Which of the following reaction(s) occur during calcination?

(A) $Zn(OH)_2ZnCO_3 \xrightarrow{\Delta} 2ZnO + CO_2\uparrow + H_2O\uparrow$

(B) $4FeS_2 + 11O_2\uparrow \xrightarrow{\Delta} 2Fe_2O_3 + 8SO_2\uparrow$

(C) $2Al(OH)_3 \xrightarrow{\Delta} Al_2O_3 + 3H_2O\uparrow$

(D) $MgCl_2.6H_2O \xrightarrow[\text{Dry HCl gas}]{\Delta} MgCl_2 + 6H_2O\uparrow$

Q.11 Which of the following statement(s) is / are common between roasting and sintering?

(A) Both require heating of the ore.

(B) Both involve burning away of organic matter.

(C) Both the process cause partial fusion of ore

(D) Both are performed only for sulphide ores

Q.12 The correct statement(s) is / are

(A) Calcination and roasting can be carried out in blast furance

(B) The sandy and rocky materials associated with ore are called matrix

(C) In froth floatation process $CuSO_4$ converts $Na_2[Zn(CN)_4]$ into ZnS

(D) substance that reacts with gangue to form fusible mass is called slag

Q.13 Which of the following is/are true for calcination of a metal ore?

(A) It makes the ore more porous .

(B) The ore is heated to a temperature when fusion just begins

(C) Hydrated salts lose their water of crystallisation

(D) Impurities of S, As and Sb are removed in the form of their volatile oxides.

Q.14 The difference(s) between roasting and calcination is (are)

(A) roasting is highly endothermic while calcination is not.

(B) partial fusion occurs in calcination but not in roasting.

(C) calcination is performed in limited supply of air but roasting employs excess air.

(D) combustion reactions occur in roasting but not in calcination.

Q.15 In electrorefining of metals anode and cathode are taken as thick slab of impure metal and a strip of pure- metal respectively while the electrolyte is aq. solution of a complex metal salt. This method cannot be applied for the refining of

(A) Copper (B) Sodium (C) Aluminium (D) Silver

Q.16 Which of the following metal is not refined by fractional distillation?

(A) Zn (B) Cd (C) Hg (D) Sn

Q.17 Hg and Pb are comercially extracted from their respective sulphide ores by Pyrometallurgy whereas Pyrometallurgy is not applied in the extraction of Ag from Ag_2S because

(A) Roasting of PbS is thermodynamically feasible below its melting point

(B) Roasting of Ag_2S is not thermodynamically feasible

(C) Roasting of HgS is feasible at low temperature

(D) ΔG_f of Ag_2O becomes positive on normal heating

Q.18 Which of the following process(es) are used for purification of Bauxite ore?

(A) Hall's process (B) Serpeck's process

(C) Baeyer's process (D) Mond's process

Q.19 Common impurities present in Bauxite are

(A) Cu_2O (B) TiO_2 (C) Fe_2O_3 (D) SiO_2

Q.20 Amphoteric nature of alumina is employed in which of the following process for extraction of aluminium?

(A) Baeyer's process (B) Hall's process

(C) Serpek's process (D) Hall-Heroult's process

Q.21 Which of the following is/are regarded as ores of iron?

(A) Haematite (B) Magnesite (C) Rolled gold (D) Copper pyrites

Q.22 Dolomite is an ore of :

(A) Aluminium (B) Magnesium (C) Calcium (D) Potassium

Q.23 Which of the following statement(s) is/are correct:

(A) Cuprite and Zincite are oxide ores

(B) Magnesite and carnallite are carbonate ores

(C) Chalcocite and azurite are ores of copper

(D) Felspar and mica minerals contain aluminium.

Q.24 During extraction of metallic sodium by electrolysis of fused NaCl (Down's process), small amount of $CaCl_2$ is added in order to

(A) Improves the electrical conductivity

(B) Decreases the melting point of NaCl

(C) Reduces vapourization of isolated sodium metal

(D) Acts as dessicant

Q.25 Correct statement(s) about extraction of copper from matte is/are

(A) Matte is treated in Bessemer converter

(B) Molten matte is electrolysed

(C) It is treated with a blast of hot air and in presence of silica linings.

(D) From matte blister copper is obtained by self reduction

Q.26 The main reaction(s) which occur(s) in blastfurnace during extraction of iron from haematite is(are)

(A) $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$ (B) $FeO + SiO_2 \rightarrow FeSiO_3$

(C) $Fe_2O_3 + C \rightarrow 2Fe + 3CO$ (D) $CaO + SiO_2 \rightarrow CaSiO_3$

Q.27 During extraction of iron which of the following reaction(s) exhibit development ofelemental impurities in iron:

(A) $CaO + SiO_2 \longrightarrow CaSiO_3$ (B) $MnO + C \xrightarrow{\Delta} Mn + CO$

(C) $Ca_3(PO_4)_2 \xrightarrow{\Delta} P_4O_{10} \xrightarrow[\Delta]{C} P_4$ (D) $SiO_2 + 2C \xrightarrow{\Delta} Si + 2CO\uparrow$

Q.28 The role of fluorspar (CaF_2) which is added in small quantities in the electrolytic reduction of alumina dissolved in fused cryolite (Na_3AlF_6) is

(A) as a catalyst

(B) to make the fused mixture very conducting

(C) to lower the temperature of the melt

(D) to decrease the rate of oxidation of carbon at the anode.

Q.29 Which of the following statement(s) is/are correct for the extractive metallurgy of aluminium?

(A) Red bauxite contains the major impurities of iron oxides and minor % of TiO_2.

(B) Red bauxite is purified by Hall's and Serpeck's process

(C) Hall-Heroult process is used for the electrolytic reduction of molten alumina dissolved in molten cryolite.

(D) In electrolytic reduction of alumina gases / vapours of CO, CO_2 and f1orocarbons are liberated at anode.

Q.30 Which of the following processe(s) occur(s) during the extraction of copper from chalcopyrites ?
(A) Froth floatation (B) Roasting (C) Bessemerisation (D) leaching

Q.31 In the extraction of copper from chalcopyrites, the impurity of iron sulphide is removed as $FeSiO_3$ in :
(A) Electrolytic refining (B) Bessemerisation
(C) Roasting (D) Poling

Q.32 Which of the following statement(s) is/are correct?
(A) In Serpeck's process silica is removed by heating the bauxite to 1800°C with coke in a current of N_2
(B) In extraction of lead from galena roasting and self reduction takes place in the same furnance but under different conditions of tempt and supply of air
(C) Tin is obtained by the carbon reduction of black tin (SnO_2).
(D) None

Q.33 The anode mud obtained during electrolytic refining of copper may contain:
(A) Se and Te (B) Platinum (C) silver (D) gold

Q.34 Correct matched is / are

(A) Bayer's method	NaOH solution
(B) Matte	98% CuS + 2% FeS
(C) Van Arkel method	BI_3
(D) Thomas slag	Bessemerization

Q.35 In the extraction of respective metal correct match is/are

	Metals	**Process**
(A)	Pb	Pattinson's Process
(B)	Cu	Bessemerisation
(C)	Ag	pyrometallurgy
(D)	Zn	Carbon Reduction

Q.36 Which of the following process is not involved in the commercial extraction of pure zinc?
(A) Froth Floatation (B) Distillation (C) Self-Reduction (D) Rapid cooling

Q.37 Which ofthe following statement is/ are **CORRECT** regarding silver extraction from argentiferrous lead.
(A) When lead-silver composition is rich in lead, then silver is removed by Parke's method
(B) When lead-silver composition is rich in silver, then lead is removed by Cupellation method
(C) Zinc dissolves silver, from which zinc is separated by distillation
(D) Zinc dissolves in lead, from which lead is separated by distillation.

Q.38 Zone refining is used for purification of
(A)Ge (B) Si (C)Ga (D) B

Q.39 Spelter, is purified by :
(A) electrolysis process (B) fractional distillation
(C) polling (D) Parke's process

Q.40 Correct statement (s) about refining of impure aluminium by Hoop's process is/are .
(A) Three layers have different densities
(B) Middle layer consists of cryolite and BaF_2
(C) The upper layer is of pure aluminium which acts as a cathode
(D) The bottom layer is of impure aluminium which acts as an anode

Q.41 Poling is employed in refining of
(A) iron (B) copper (C) tin (D) lead

Q.42 Liquation process is applied for the purification of :
(A) Copper (B) tin (C) iron (D) lead

Q.43 Which of the following statement(s) is/are **TRUE**?
(A) Silver is purified by cupellation method
(B) Tin is purified by liquation followed by poling
(C) Bessemerisation is used in the metallurgy of copper
(D) Extraction of Ag by parke's method is based on distribution law

[REASONING TYPE]

These questions consist of two statements each printed as Assertion and Reason. While answering these questions you are required to choose anyone of the following four responses to encircle (A, B, C, D) as per instructions given below:
(A) If both Assertion and Reason are true and Reason is a correct explanation ofAssertion . •
(B) If both Assertion and Reason are true and Reason is not a correct explanation of Assertion.
(C) If Assertion is true but Reason is false.
(D) IfAssertion is false but Reason is true.

Q.44 **Asseration :** Oxide ores of iron undergo in calcination and roasting in a reverberatory furnance.
Reason: The water is removed, carbonates are decomposed. and impurities are oxidised.

Q.45 **Asseration :** Extraction of gold from its native ore involves leaching the metal with CN^-
Reason : This is an oxidation of native ore.

Q.46 **Asseration :** Extraction of zinc from sphalerite ore involves the roasting followed by reduction with coke.
Reason: Zinc can be commercially extracted by hydrometallurgy.

Q.47 **Asseration :** The reduction of a metal oxide is easier if the extracted metal is in liquid state at the temperature of reduction.
Reason: When the metal formed is in liquid state then value of entropy change ΔS of the reduction process is more positive and the value of ΔG becomes more negative.

Q.48 **Asseration :** CuO can be reduced by carbon.
Reason: CuO is basic oxide

Q.49 **Assertion :** Zone refining is used to obtain element in high degree of purity.
Reason : During electroefining pure metal is liberated at cathode.

Q.50 **Assertion :** Highly electropositive metals are extracted by electrolysis of their aq. salt solutions.
Reason : Highly electropositive metals cannot be reduced by chemical reduction methods.

Q.51 **Assertion :** During calcination the ore is heated below its melint in the limited supply of oxygen.
Reason : The process of calcination is carried out for sulphide ores.

Q.52 **Assertion:** All metals cannot be obtained by carbon reduction.
Reason: Carbon is a very strong reducing agent.

Q.53 **Assertion:** Platinum and gold occur in native state in nature.
Reason: Platinum and gold are noble metals.

Q.54 **Assertion:** Magnesia and quick lime (CaO) are used as basic refractory material.
Reason: MgO and CaO can withstand very high temperatures.

Q.55 **Assertion:** Magnesium can be prepared by the electrolysis of aq. $MgCl_2$.
Reason: The reduction potential of Mg^{2+} is much lower than that of H^+.

Q.56 **Assertion:** In smelting, roasted ore is heated with powdered coke in presence of a flux.
Reason: Metal oxides are reduced to metals by C or CO and impurities are removed as slag.

Q.57 **Assertion:** Alkali metals can not be prepared by the electrolysis of their chlorides in aqueous solution.
Reason: Reduction potentials of alkali metals cations is much lower than that of H^+.

Q.58 **Assertion:** Al is used as a reducing agent in aluminothermite process.
Reason: Al has a lower melting point than Fe, Cr and Mn.

Q.59 **Assertion:** Gold occurs in native state
Reason: Gold dissolves in aqua-regia.

Q.60 **Assertion:** Froth floatation process is used to concentrate sulphide ores.
Reason: There is difference in wettability of ore and gangue particles.

Q.61 **Assertion:** Argentite ore is concentrated by froth floatation process.
Reason: Argentite is a sulphide ore.

Q.62 **Assertion:** Sulphide ores are concentrated by froth floatation process.
Reason: Pine oil acts as a frothing agent in froth floatation process.

Q.63 **Assertion:** Wolframite impurities are separated from cassiterite by electromagnetic separation.
Reason: Cassiterite being magnetic is attracted by the magnet and forms a separate heap.

Q.64 **Asseration :** Cast iron is different from pig iron.
Reason : Cast iron is made by melting pig iron with scrap iron using hot air blast and has about 3% carbon content.

Q.65 **Asseration :** Silica is added as a flux in reverberatory furnace, in the extraction of copper from copper pyrites.
Reason: Silica decreases the melting point of the ore and brings the conductivity.

Q.66 **Asseration :** The principle involved in the extraction of tin from tin stone is the carbon reduction of SnO_2 to Sn.
Reason: Tin is extracted commercially from ore cassiterite by reduction with hydrogen.

Q.67 **Assertion:** Galena is roasted in limited supply of air in reverberatory furnace at a temperature so that at this temperature molten lead can be obtained in self reduction stage.
Reason: Galena is partially converted to PbO and $PbSO_4$ which are reduced by remaining unroasted galena to matallic lead.

Q.68 **Assertion:** Silver extraction is done by dissolving its ore into cyanide solution.
Reason: In cyanide process, the silver is precipitated from soluble complex of silver by zinc-dust.

Q.69 **Assertion:** Heamatite ore containing a small quantity of siderite ore is always calcined followed by roasting.
Reason: $FeCO_3 \longrightarrow FeO + CO_2$; $FeO + O_2 \longrightarrow Fe_2O_3$, Prevents the loss of iron as $FeSiO_3$.

Q.70 **Assertion:** In Hall -Heroult process aluminium is extracted by the electrolytic reduction of alumina dissolved in molten cryolite and fluorspar.
Reason: The cryolite and fluorspar lower the melting point of melt and make it more conducting.

Q.71 **Assertion:** Commercial extraction of iron metal from iron oxide ore is carried out by heating with coke.
Reason: Siderite ore is carbonate ore of iron.

Q.72 **Asseration:** The graphite rod is burnt away in Hall-Heroult process for aluminium.
Reason: The oxygen liberated at anode in the process reacts with the carbon anode producing CO and CO_2

Q.73 **Assertion:** Nickel is purified by the thermal decomposition of nickel tetracarbonyl.
Reason: Nickel is a transitional element.

Q.74 **Assertion:** Titanium is-purified by Van-Arkel method
Reason: Ti reacts with I_2 to form TiI_4 which decomposes at 1700 K to give pure Ti.

Q.75 **Assertion:** Lead, tin and bismuth are purified by liquation method.
Reason: Lead, tin and bismuth have low m.p. as compared to impurities.

Q.76 **Asseration:** Fused substance exists in three different layers in Hoop's process and these layers remains distinct during refining.
Reason: All the layers have different densities

[PARAGRAPH TYPE]

Paragraph for question nos. 77 to 78

At high temperature carbon reacts with water to produce a mixture of carbon monoxide, (CO) and hydrogen, (H_2).

$$C + H_2O \xrightarrow{\text{red heat}} CO + H_2 \text{ (water gas)}$$

CO is separated from H_2 and then used to separate nickel from cobalt by forming a volatile compound, nickel tetracarbonyl, $Ni(CO)_4$

$$Ni + 4CO \longrightarrow Ni(CO)_4$$

Q.77 How many moles of $Ni(CO)_4$ could be obtained from the CO produced by the reaction of 75.0 g of carbon? (Assume 100% reaction and 100% recovery in both steps.)

(A) 6.25 (B) 1.563 (C) 3.125 (D) 25.0

Q.78 Formation of volatile $Ni(CO)_4$ and its subsequent heating gives pure Ni, process is called:

(A) Hall's Process (B) Dow's Process

(C) Serpeck 's Process (D) Mond's Process

Paragraph for question nos. 79 to 82

Magnesium is a valuable, light weight metal used as a structural material as well as in alloys, in batteries. and in chemical synthesis. Although magneium is plentiful in Earth's crust, it is cheaper to "mine" the metal from seawater. Magnesium forms the second most abundant cation in the sea (after sodium); there are about 1.3 g of magnesium in a kilogram of sea-water. The process from obtaining magnesium from sea -water employs all three types of reactions precipitation, acid-base, and redox reactions.

Q.79 Precipitation reaction involves formation of:

(A) insoluble $MgCO_3$ by adding Na_2CO_3 (B) insoluble $Mg(OH)_2$ by adding $Ca(OH)_2$

(C) insoluble $MgSO_4$ by adding Na_2SO_4 (D) insoluble $MgCl_2$ by adding NaCl

Q.80 Acid-base reaction involves reaction between:

(A) $MgCO_3$ and HCl (B) $Mg(OH)_2$ and H_2SO_4

(C) $Mg(OH)_2$ and HCl (D) $MgCO_3$ and H_2SO_4

Q.81 Redox reaction involves reaction between:

(A) in the electrolytic cell when fused $MgCl_2$ is subjected to electrolysis.

(B) when fused $MgCl_2$ is heated

(C) when fused $MgCO_3$ is strongly heated

(D) in none ofthe above.

Q.82 Instead of calcium hydroxide, why don't we simply add sodium hydroxide to seawater to precipitate magnesium hydroxide?

(A) Solubility of $Ca(OH)_2$ is higher than that of NaOH.

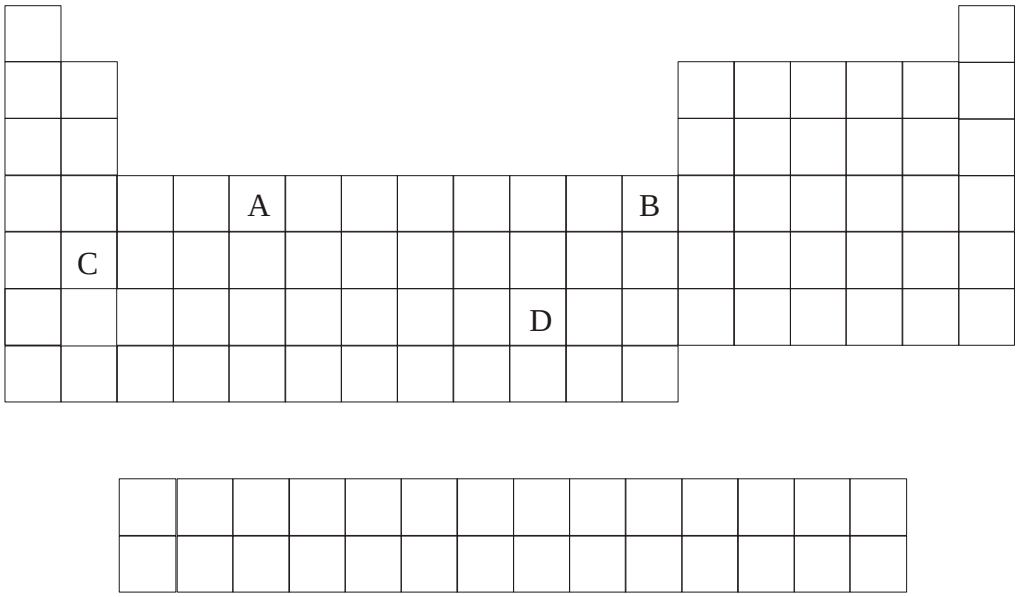
(B) NaOH may dissolve $Mg(OH)_2$ formed.

(C) NaOH may also precipitate other species.

(D) NaOH, being a weak electrolyte will not coagulate $Mg(OH)_2$

Paragraph for question nos. 83 to 86

Look at the location of elemenls A, B, C and D in the following periodic table and answer the questions given below



Q.83 Which of the elements indicated by A, B, C and D is expected to be found in native ORE.

(A) A (B) B (C) C (D) D

Q.84 Which is found as its sulphide ORE ?

(A) A (B) B (C) C (D) D

Q.85 Which is found as its carbonate ORE?

(A) A (B) B (C) C (D) D

Q.86 Imagine a planet with an atmosphere that contains O_2 and SO_2 but no CO_2 and H_2O. What is the chemical composition of the mineral you would expect to find for the alkaline earth metals (M) on such a planet?

(A) MCO_3, $MHCO_3$ (B) MSO_3, MSO_4

(C) $M(HSO_3)_2$ $M(HSO_4)_2$ (D)All

Paragraph for question nos. 87 to 90

Amongst the various ores of a metal (M) (sulphide, carbonates, oxides, hydrated or hydroxides) two ores [X] and [Y] show the following reactivity.

(i) [X] on calcination gives a black solid (S), carbon dioxide and water.

(ii) [X] dissolved in dil. HCl on reaction with KI gives a white ppt. (P) and iodine gas.

(iii) [Y] on roasting gives metal (M) and a gas (G_1) which turns acidified $K_2Cr_2O_7$ solution green.

(iv) [Y] on reaction with conc. HCl gives a white ppt. (MS) and another gas (G_2) which turns lead acetate solution black and also reacts with gas (G_1) to precipitate colloidal sulphur in presence of moisture.

The M, S, [X] and [Y] gives greenish blue flame.

Q.87 The metal ores [Xl and [Y] are respectively

(A) Carbonate and sulphide ores (B) Sulphide and carbonate ores

(C) Carbonate and hydroxide ores (D) Carbonate and oxide ores

Q.88 Which of the following statements is correct about [Y]?

(A) [Y] is converted to metal (M) by self reduction

(B) Soda extract of [Y] gives yellow ppt with suspension of $CdCO_3$

(C) [Y] is chalcocites

(D) All of these

Q.89 The gas (G_1) acts as

(A) Oxidising agent (B) Reducing agent

(C) Oxidising and reducing agent (D) Fluxing agent

Q.90 The white ppt. (P) is of

(A) CuI (B) CuI_2 (C) $K_2[CuI_4]$ (D) None

Paragraph for question nos. 91 to 93

Dow's process of extraction of Mg involves extraction of Mg from sea water. Sea water is concentrated in sun light and is then treated with milk of lime. Magnesium hydroxide obtained is reacted with dilute HCl and $MgCl_2$ is crystallised. The molten mixture containing 35% $MgCl_2$, 50% NaCl and 15% $CaCl_2$ is electrolysed when magnesium is discharged at cathode. NaCl and $CaCl_2$ are added to lower the fusion temperature and to increase the conductance. Mg electrolysed is protected from atmoshperic oxidation by a blanket of inert gases.

Q.91 Select the correct statement

(A) Magnesium forms metal carbide in carbon reduction at high temperature

(B) Hydrated magneisum chloride is made anhydrous by heating in presence of dry HCl gas

(C) Anhydrous fused carnallite on electrolysis diposit magnesium at cathode

(D) All of these

Q.92 In the hydrated chloride of magnesium, $MgCl_2.xH_2O$, the value of x is

(A) 6 (B) 4 (C) 2 (D) 10

Q.93 Molten mixture of NaCl and $CaCl_2$ is added to the heated $MgCl_2$ because

(A) It increases the melting point of $MgCl_2$

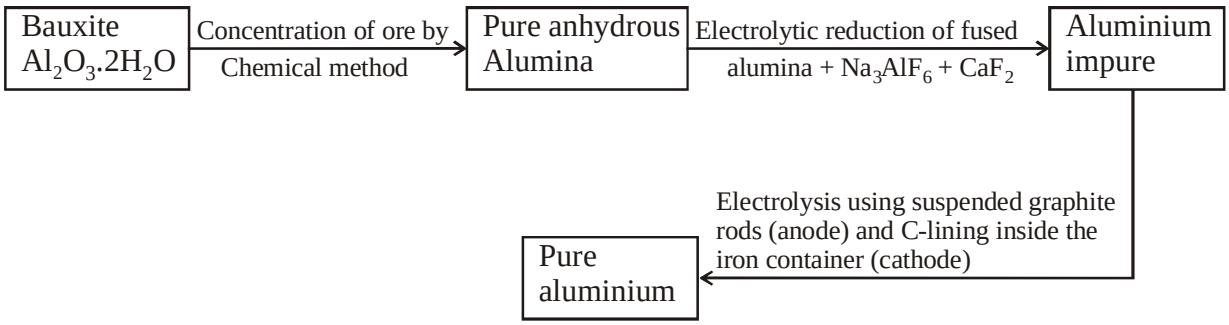
(B) $CaCl_2$ acts as a dehydrating agent

(C) ($CaCl_2$ + NaCl) lowers the melting point of $MgCl_2$

(D) None of these

Paragraph for question nos. 94 to 96

Following flow diagram represents the extraction of aluminium from bauxite.



Q.94 The purpose of adding cryolite is

(A) To increase the electrical conductivity of pure aluminium

(B) To lower the melting point of Al_2O_3

(C) To remove the impurities as slag

(D) To increase the aluminium percentage in the yield

Q.95 Coke powder is spread over the molten electrolyte to

(A) Prevent the loss of heat by radiation from the surface of electrolyte.

(B) Prevent the rate of corrosion of graphite anode

(C) Can prevent oxidation of molten aluminium by air

(D) All

Q.96 Select the correct statement

(A) Bauxite is purified by Hall's, Serpeck's and Baeyer's processes

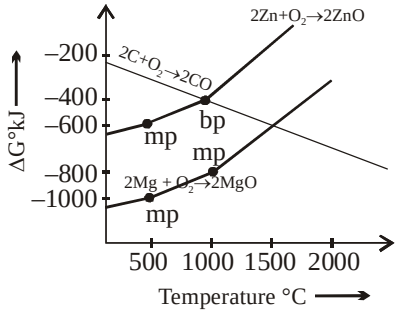
(B) In electrochemical process for aluminium extraction, a molten mixture of Al_2O_3, Na_3AlF_6 and CaF_2 is used as electrolyte

(C) Hydrated alumina is converted to anhydrous alumina by calcination process

(D) All of these

Paragraph for question nos. Q.97 to 99

In the diagram points are melting and boiling points ofthe metal zinc and magnesium. ΔG° is a function of temperature for some reactions of extractive metallurgy.



Q.97 At what approximate temperature, zinc and carbon have equal affinity for oxygen?

(A) 1000°C (B) 1500° (C) 500° (D) 1200°C

Q.98 At this temperature, ΔG of the reaction

$ZnO + C \longrightarrow Zn + CO$ is

(A) –ve (B) + ve (C) zero (D) Nothing can be said

Q.99 To make the following reduction process, spontaneous temperature should be

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

(A) < 1000°C (B) > 1000°C (C) < 500°C (D) > 500°C but < 1000°C

Paragraph for question nos. 100 to 102

Questions are based on following reactions:

(I) $FeCr_2O_4 + NaOH + air \longrightarrow (A) + Fe_2O_3$

(II) $(A) + (B) \longrightarrow Na_2Cr_2O_7$

(III) $Na_2Cr_2O_7 + X \xrightarrow{\Delta} Cr_2O_3$

(IV) $Cr_2O_3 + Y \xrightarrow{\Delta} Cr$

Q.100 Compounds (A) and (B) are:

(A) Na_2CrO_4 , H_2SO_4 (B) $Na_2Cr_2O_7$, HCl

(C) CrO_3, H_2SO_4 (D) $[Cr(H_2O)_6](OH)_3$

Q.101 (X) and (Y) are:

(A) C and Al (B) Al and C (C) C in both (D) Al in both

Q.102 Na_2CrO_4 and Fe_2O_3 are separated by

(A) dissolving in conc. H_2SO_4 (B) dissolving in NH_3

(C) dissolving in H_2O (D) dissolving in dil.HCl

[MATCH THE COLUMN]

Q.103

Column-I (Reaction involved in different process)	**Column-II (Process)**
(A) $4Au + 8NaCN + 2H_2O + O_2$ (air) $\rightarrow 4Na[Au(CN)_2] + 4NaOH$	(P) Leaching
(B) $CuFeS_2 + 2H_2SO_4 \rightarrow CuSO_4 + FeSO_4 + 2H_2S$	(Q) Smelting
(C) $Fe_3O_4 + 4CO \xrightarrow{823\ K} 3Fe + CO$	(R) Hydrometallurgy
(D) $MgCl_2.6H_2O \xrightarrow[Dry\ HCl(g)]{823\ K} MgCl_2 + 6H_2O$	(S) Calcination
	(T) Dow's process

Q.104

Column-I (Reaction involved in different metal extraction process)	**Column-II (Process)**
(A) $FeO + SiO_2 \longrightarrow FeSiO_3$	(P) Calcination
(B) $MgCl_2.6H_2O \xrightarrow[\Delta]{Dry\ HCl} MgCl_2$	(Q) Hydrometallurgy
(C) $Cu_2S + 2Cu_2O \xrightarrow{\Delta} 6Cu + SO_2$	(R) Smelting
(D) $Fe_2O_3 + 3C \longrightarrow 2Fe + 3CO$	(S) Roasting
(E) $2Na[Ag(CN)_2] + Zn \longrightarrow Na_2[Zn(CN)_4] + 2Ag$	(T) Bessemerisation

Q.105 Match the following choosing one entry from column X and the appropriate entry from column Y.

	Column X		**Column Y**
(A)	Al	(P)	Calamine
(B)	Cu	(Q)	Cryolite
(C)	Mg	(R)	Malachite
(D)	Zn	(S)	Carnallite

Q.106

	Column I (Process)		**Column II (Electrolyte)**
(A)	Downs cell process	(P)	Fused $MgCl_2$
(B)	Dow sea water process	(Q)	Fused ($Al_2O_3 + Na_3AlF_6$)
(C)	Hall-Heroult process	(R)	Fused KHF_2
(D)	Moissan process	(S)	Fused (40 % NaCl + 60 % $CaCl_2$)

Q.107

	Column I		**Column II**
(A)	Van Arkel method	(P)	Refining of Mercury
(B)	Zone refining	(Q)	Purification of titanium
(C)	Cupellation	(R)	Refining of Germenium
(D)	Poling	(S)	Refining of silver

Q.108

	Column I (Property)		**Column II (Element / Compound)**
(A)	Explosive	(P)	Cu
(B)	Self-reduction	(Q)	Fe_3O_4
(C)	Magnetic material	(R)	$Cu(CH_3COO)_2.Cu(OH)_2$
(D)	Green Verdigris	(S)	$Pb(NO_3)_2$

Q.109

	Column I		**Column II**
(A)	Cyanide process	(P)	Ultrapure Ge
(B)	Floatation process	(Q)	Dressing of HgS
(C)	Electrolytic reduction	(R)	Extraction of Al
(D)	Zone refining	(S)	Extraction of Au

Q.110

	Column I (Metals)		**Column II (Method used for refining)**
(A)	Iron & Copper	(P)	Poling
(B)	Zirconium & Titanium	(Q)	Bessemerisation
(C)	Lead & Tin	(R)	Van-Arkel
(D)	Copper & Tin	(S)	Liquation

Q.111

	Column I (Metals)		**Column II (Method used for refining)**
(A)	Iron	(P)	Siderite
(B)	Tin	(Q)	Silver glance
(C)	Magnesium	(R)	Cassiterite
(D)	Silver	(S)	Dolomite

Q.112 Select CORRECT match

(A)	Difference in densities	(P)	Magnetic separation
(B)	Bauxite	(Q)	Gravity separation
(C)	$CuFeS_2$	(R)	Pyrometallurgy
(D)	Wulframites ($FeWO_4$ + $MnWO_4$)	(S)	Leaching

[INTEGER TYPE]

Q.113 Consider following ORES and calculate the value of expression $\left(\frac{Q+R}{P\times S}\right)$.

Fe_2O_3 , SnO_2 , PbS, $MgCl_2$, HgS , ZnS , Al_2O_3 , Ag_2S , Cu_2S

where, P = Number of ores from which metal is commercially extracted by Hydrometallurgy.

Q = Number of ores from which metal is commercially extracted by Self reduction.

R = Number of ores from which metal is commercially extracted by Carbon reduction.

S = Number of ores from which metal is commercially extracted by Electrolytic reduction.

Q.114 How many of the following metals is extracted by self reduction process?

Pb, Au, Mg, Sn, Fe, Al, Ag, Hg, Na, Zn, Cu, Ca

If your answer is 2, write the answer as 0002.

Q.115 For how many metals carbon reduction method is/are mainly applicable.

Sn, Al, Cr, Mn, Pb, Ca, Na, Zn

Q.116 In order to concentrate galena (which contains ZnS as impurity) by froth-floatation process, sodium cyanide is used as depressant. NaCN dissolves ZnS due to formation of water soluble complex**(A)**. Find **the value of w + x + y + z**.

where **w** = coordination number of central metal ion in complex ion of (A)

x = number of unpaired electrons in (A).

y = total number of possible linkage isomers of (A) including (A).

z = maximum number of atoms in a single plane in the complex ion of (A).

Q.117 In how many following ores, during the extraction of metal roasting process is carrying out.

Galena, Chalcopyrite, Casseterite, Haematite, Bauxite, Carnalite

[ANSWER KEY]

EXERCISE-1

Q.1	C	Q.2	A	Q.3	A	Q.4	B	Q.5	C
Q.6	D	Q.7	B	Q.8	D	Q.9	A	Q.10	D
Q.11	A	Q.12	B	Q.13	A	Q.14	D	Q.15	A
Q.16	A	Q.17	D	Q.18	C	Q.19	B,C	Q.20	A
Q.21	B	Q.22	D	Q.23	A	Q.24	B	Q.25	D
Q.26	B	Q.27	C	Q.28	A	Q.29	C	Q.30	D
Q.31	C	Q.32	A	Q.33	D	Q.34	D	Q.35	D
Q.36	D	Q.37	B	Q.38	D	Q.39	C	Q.40	B
Q.41	D	Q.42	D	Q.43	C	Q.44	C	Q.45	D
Q.46	B	Q.47	A	Q.48	B	Q.49	A	Q.50	C
Q.51	B	Q.52	C	Q.53	A	Q.54	B	Q.55	A
Q.56	B	Q.57	A	Q.58	B	Q.59	B	Q.60	C
Q.61	B	Q.62	B	Q.63	D	Q.64	B	Q.65	B
Q.66	D	Q.67	B	Q.68	A	Q.69	B	Q.70	A
Q.71	A	Q.72	D	Q.73	B	Q.74	A	Q.75	C
Q.76	D	Q.77	D	Q.78	B	Q.79	D	Q.80	A
Q.81	B	Q.82	C	Q.83	C	Q.84	B	Q.85	D
Q.86	A	Q.87	B	Q.88	B	Q.89	D	Q.90	A
Q.91	B	Q.92	B	Q.93	D	Q.94	D	Q.95	D
Q.96	D	Q.97	B	Q.98	D	Q.99	D	Q.100	B
Q.101	C	Q.102	C	Q.103	C	Q.104	D	Q.105	C
Q.106	C	Q.107	B	Q.108	B	Q.109	D	Q.110	A
Q.111	D	Q.112	D	Q.113	C	Q.114	B	Q.115	B
Q.116	A	Q.117	B	Q.118	C	Q.119	A	Q.120	B
Q.121	A	Q.122	B	Q.123	A	Q.124	B	Q.125	C
Q.126	A	Q.127	A	Q.128	B	Q.129	C	Q.130	D
Q.131	C	Q.132	C	Q.133	A	Q.134	C	Q.135	D
Q.136	B	Q.137	D	Q.138	A	Q.139	C	Q.140	D
Q.141	A	Q.142	B	Q.143	C	Q.144	C	Q.145	D
Q.146	C	Q.147	C	Q.148	B	Q.149	C	Q.150	D
Q.151	D	Q.152	C	Q.153	D	Q.154	C	Q.155	B
Q.156	C	Q.157	B	Q.158	A	Q.159	C	Q.160	C
Q.161	C	Q.162	B	Q.163	B	Q.164	C	Q.165	B
Q.166	D	Q.167	D	Q.168	C	Q.169	C	Q.170	A

Q.171 B	Q.172 C	Q.173 B	Q.174 D	Q.175 B
Q.176 D	Q.177 D	Q.178 A	Q.179 C	Q.180 B
Q.181 A	Q.182 D	Q.183 C	Q.184 D	Q.185 C
Q.186 A	Q.187 B	Q.188 B	Q.189 D	Q.190 A
Q.191 B	Q.192 B	Q.193 A	Q.194 D	Q.195 B
Q.196 B	Q.197 B	Q.198 D	Q.199 C	Q.200 B
Q.201 C	Q.202 B	Q.203 C	Q.204 C	Q.205 D
Q.206 A	Q.207 D	Q.208 C	Q.209 C	Q.210 B
Q.211 B	Q.212 C	Q.213 C	Q.214 A	Q.215 C
Q.216 B	Q.217 B	Q.218 A	Q.219 B	Q.220 D
Q.221 C	Q.222 A	Q.223 C	Q.224 C	Q.225 B
Q.226 D	Q.227 B	Q.228 C	Q.229 C	Q.230 C

EXERCISE-2

Q.1	AB	Q.2	AB	Q.3	BCD	Q.4	ABCD	Q.5	BC
Q.6	ABCD	Q.7	ACD	Q.8	ABCD	Q.9	AB	Q.10	ACD
Q.11	AB	Q.12	ABC	Q.13	AC	Q.14	CD	Q.15	BC
Q.16	D	Q.17	ABCD	Q.18	ABC	Q.19	BCD	Q.20	AB
Q.21	A	Q.22	BC	Q.23	ACD	Q.24	ABC	Q.25	ACD
Q.26	AD	Q.27	BCD	Q.28	BC	Q.29	ACD	Q.30	ABC
Q.31	BC	Q.32	ABC	Q.33	ABCD	Q.34	ACD	Q.35	ABD
Q.36	C	Q.37	ABC	Q.38	ABCD	Q.39	AB	Q.40	ABCD
Q.41	BCD	Q.42	BD	Q.43	ABCD	Q.44	A	Q.45	B
Q.46	C	Q.47	A	Q.48	B	Q.49	B	Q.50	D
Q.51	C	Q.52	B	Q.53	A	Q.54	A	Q.55	D
Q.56	A	Q.57	A	Q.58	B	Q.59	B	Q.60	A
Q.61	A	Q.62	B	Q.63	C	Q.64	A	Q.65	C
Q.66	C	Q.67	A	Q.68	A	Q.69	A	Q.70	A
Q.71	B	Q.72	A	Q.73	B	Q.74	A	Q.75	A
Q.76	A	Q.77	B	Q.78	D	Q.79	B	Q.80	C
Q.81	A	Q.82	C	Q.83	D	Q.84	B	Q.85	B
Q.86	B	Q.87	A	Q.88	D	Q.89	C	Q.90	A
Q.91	D	Q.92	A	Q.93	C	Q.94	B	Q.95	D
Q.96	D	Q.97	A	Q.98	C	Q.99	B	Q.100	A

Q.101 A Q.102 C Q.103 (A) PR (B) PR (C) Q (D) ST

Q.104 (A) RST, (B) P (C) T (D) R (E) Q Q.105 (A) Q (B) R (C) S (D) P

Q.106 (A) S (B) P (C) Q (D) R Q.107 (A) Q (B) R (C) P (D) S

Q.108 (A) S (B) P (C) Q (D) R Q.109 (A) S (B) Q (C) R (D) P

Q.110 (A) Q (B) R (C) PS (D) P Q.111 (A) P (B) R (C) S (D) Q

Q.112 (A) Q (B) S (C) R (D) P Q.113 3 Q.114 0003 Q.115 3

Q.116 14 Q.117 4