RACE # 01 INORGANIC CHEMISTRY

TIME : 40 Min.

OXIDE ORE:

ZnO	→	Zincite
Fe_2O_3	→	Heamatite
Fe_3O_4	→	Magnetite
$AlO_x(OH)_{3-2x}$	→	Bauxite (where $0 < x < 1$)
$Al_2(OH)_4Si_2O_5$	→	Kaolinite (a form of clay)
$Fe_2O_3 \cdot 3H_2O$	→	Limonite
Cu_2O	→	Cuprite or Ruby copper
MnO_2	→	Pyrolusite
SnO_2	→	Tinstone or Casseterite
TiO_2	→	Rutile
$Fe \cdot Cr_2O_4$	→	($FeO + Cr_2O_3$) Chromite ore
$Na_2B_4O_7 \cdot 10H_2O$	→	Borax or Tincal
$Na_2B_4O_7 \cdot 4H_2O$	→	Kernite
$Ca_2B_6O_{11} \cdot 5H_2O$	→	Colemanite
U_3O_8	→	Pitch Blende
$FeO.TiO_2$	→	Ilmenite

SULPHURISED ORE:

PbS	→	Galena
HgS	→	Cinnabar
ZnS	→	Zinc blende/sphalerite
Cu_2S	→	Copper glance/Chalcocite
$CuFeS_2$	→	Copper Pyrite (Chalcopyrite)
FeS_2	→	Iron pyrite or Fool's gold
Ag_2S	→	Silver glance or Argentite

HALIDE ORE:

NaCl	→	Rock Salt
KCl	→	Sylvite / silvine
CaF_2	→	Fluorspar
Na_3AlF_6	→	Cryolite
AgCl	→	Horn Silver
$KCl \cdot MgCl_2 \cdot 6H_2O$	→	Carnallite

Mixture of KCl and NaCl (sylvinite)

OXY SALT ORE:

(1) CARBONATE ORE:

$CaCO_3$	→	Lime stone
$MgCO_3$	→	Magnesite
$CaCO_3 \cdot MgCO_3$	→	Dolomite
$FeCO_3$	→	Siderite
$ZnCO_3$	→	Calamine
$Cu(OH)_2 \cdot CuCO_3$	→	Malachite or Basic Copper Carbonate
$Cu(OH)_2 \cdot 2CuCO_3$	→	Azurite
$PbCO_3$	⟶	Cerrusite

(2) SULPHATE ORE:

$CaSO_4 \cdot 2H_2O$	→	Gypsum
$MgSO_4 \cdot 7H_2O$	→	Epsom Salt
$PbSO_4$	→	Anglesite
$BaSO_4$	→	Baryte
$Na_2SO_4 \cdot 10H_2O$	→	Glauber's salt

(3) NITRATE ORE:

KNO_3	→	Indian Salt petre
$NaNO_3$	→	Chile Salt petre

METALS IN LIVING ENTITIES :

(a) **Magnesium** is found in chlorophyll.

(b) **Potassium** is present in plant roots.

(c) **Manganese, iron** and **copper** are present in chloroplast.

(d) **Zinc** is present in eyes of cats and cows.

(e) **Iron** is present in haemoglobin.

(f) **Calcium** is present in bones.

(g) **Vanadium** is present in cucumbers.

(h) **Chromium** is present in prawn.

(i) **Cobalt** is present in cyanocobalamin (Vitamine-B_{12})

ALLOYS

	NAME OF THE ALLOY	COMPOSITION	USES
1.	Magnelium	Al : 98%, Mg : 2%	For making balance
2.	Duralumin	Al: 95%, Cu : 4 % Mg : 0.5 %, Mn : 0.5%	Air craft parts boat machinary
3.	Aluminium bronze	Al :10%, Cu : 90 %	Making coins, photo frames utensils, golden paints
4.	Alnico	Al : 20%, Ni : 20 % Co: 10%, Steel : 50%	For making permanent magnet
5.	γ-Alloy	Al : 92%, Cu : 4% Mg : 1.5 %, Ni : 2.5 %	Pistons and machine parts
6.	Nickeloy	Al : 95%, Cu : 4 %, Ni : 1%	Air craft parts
7.	Pewter	Pb : 20, Sn : 80	Utensils
8.	Solder	Pb : 60, Sn : 40	Soldering
9.	Type metal	Pb : 75, Sn : 5, Sb:20	Printing type
10.	Bell metal	Cu : 80, Sn : 20	Bells making
11.	Babbit metal	Sn : 90, Sb : 7, Cu : 3	Bearing of machinary
12.	Frary metal	Pb : 97%, Ba: 2%, Ca: 1%	Bearing of machine
13.	Lino type metal	Pb : 83%, Sn : 3%, Sb:14%	Printing type
14.	Brass	Cu:70%, Zn:30%	making utensils condenses tube making
15.	Bronze	Cu: 88-96%, Sn 4-12%	utensils, coins, statues
16.	Monel metal	Cu: 27%, Ni : 68%, Fe : 5%	making pumps, turbines of ships, boilers etc.
17.	German silver	Cu: 50%, Zn: 30%, Ni: 20%	Flower Vase & ornaments
18.	Dutch metal	Cu: 80%, Zn: 20%	Golden yellow colour used for decorative purpose
19	Nichrome	Ni, Cr, Fe	
20.	Gun Metal	Cu : 87%, Zn:3%, Sn :10%	
21.	Con Stantan	Cu : 60% , Ni : 40%	
22.	Artifical Gold	Cu : 90%, Al : 10%	
23.	14 Carat Gold	Au : 54%, Ag : 14% to 30%, Cu : 12-28%	
24.	24 Carat Gold	100% Au	
25.	Elektron	Mg (major part), Al (< 9.5%), Y (5.25%), Nd (2.7%) Ag (2.5%) Gd (1.3%) Zn (0.9%) Zr (0.6%) Mn (0.5%) and other rare earth metals Uses of elektron : Parts of aeroplane and motor cars	
26.	Stellite :	Typical chemical composition of stellite 1 : Elements — Content Cobalt, Co — 57% Chromium, Cr — 28 – 32% Tungsten, W — 11 – 13% Carbon, C — 2 – 3%	

ALLOY OF STEEL

1.	Vanadium	V : 0.2-1%
2.	Chromium	Cr : 2- 4%
3.	Nickel	Ni : 3-5%
4.	Manganese steel	Mn : 10-18%
5.	Stainless steel	Cr : 12-14 % and Ni : 2-4%
6.	Tunguston	W : 10-20%
7.	Invar	Ni : 36%

RACE # 02 | INORGANIC CHEMISTRY

M.M. : 30 | TIME : 40 Min.

Only One Correct Answer :

1. Which of the following is not the ore of zinc. **[3]**

(A) Zincite (B) Colemanite (C) Sphalerite (D) Calamine

2. Which of the following ore is not the ore of Fe **[3]**

(A) Magnetite (B) Magnesite (C) Limonite (D) Siderite

3. The most common elements present in the crust of the Earth are: **[3]**

(A) oxygen, silicon, aluminium (B) oxygen, iron, magnesium

(C) silicon, iron, potassium (D) oxygen, iron, silicon

4. Froth floatation process for the concentration of sulphide ores is an illustration of the practical application of - **[3]**

(A) Adsorption (B) Absorption

(C) Sedimentation (D) Coagulation

5. When ZnS and PbS minerals are present together, then NaCN is added to separate them in the froth floatation process as a depressant, because **[3]**

(A) $Pb(CN)_2$ is precipitated while no effect on ZnS

(B) ZnS forms soluble complex $Na_2[Zn(CN)_4]$

(C) PbS forms soluble complex $Na_2[Pb(CN)_4]$

(D) They cannot be separated by adding NaCN.

6. Which of the following process is not a physical process of separation **[3]**

(A) Levigation (B) Magnetic separation

(C) Leaching (D) Froth floatation

More than one correct :

7. $\underset{\text{(sulphide ore)}}{A} + NaCN \underset{\text{(leaching)}}{\overset{\text{air}}{\rightleftharpoons}} \underset{\text{Complex}}{B} + Na_2S \xrightarrow{O_2} Na_2SO_4$ the B is - **[3]**

(A) Paramagetic (B) Diamagnetic

(C) Linear complex (D) Co-ordination number of central atom is 4

Matrix Match

8. Match **List-I** with **List-II** and select the correct answer using the codes given below the lists. **[3]**

	List–I (Metals)		**List–II (Ores)**
(P)	Tin	(1)	Calamine
(Q)	Zinc	(2)	Cassiterite
(R)	Titanium	(3)	Cerrusite
(S)	Lead	(4)	Rutile

	(P)	(Q)	(R)	(S)		(P)	(Q)	(R)	(S)
(A)	1	2	3	4	(B)	2	1	4	3
(C)	4	3	2	1	(D)	2	1	3	4

9. Match List-I with List-II and select the correct answer using the codes given below the lists: **[3]**

	List-I (Ore)		**List-II (Metal)**
(P)	Carnallite	(1)	Zinc
(Q)	Calamine	(2)	Titanium
(R)	Ilmenite	(3)	Magnesium
(S)	Chalcopyrite	(4)	Copper

	(P)	(Q)	(R)	(S)		(P)	(Q)	(R)	(S)
(A)	1	3	2	4	(B)	1	3	4	2
(C)	3	1	4	2	(D)	3	1	2	4

Integer

10. How many of the following are the containing Pb, **[3]**

Hornsilver, Cerrusite, Chalcopyrite, Galena, Anglesite

FILL THE ANSWER HERE

1.	Ⓐ Ⓑ Ⓒ Ⓓ	**2.**	Ⓐ Ⓑ Ⓒ Ⓓ	**3.**	Ⓐ Ⓑ Ⓒ Ⓓ	**4.**	Ⓐ Ⓑ Ⓒ Ⓓ
5.	Ⓐ Ⓑ Ⓒ Ⓓ	**6.**	Ⓐ Ⓑ Ⓒ Ⓓ	**7.**	Ⓐ Ⓑ Ⓒ Ⓓ	**8.**	Ⓐ Ⓑ Ⓒ Ⓓ
9.	Ⓐ Ⓑ Ⓒ Ⓓ	**10.**	⓪ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨				

RACE # 03 | INORGANIC CHEMISTRY

M.M. : 30 | TIME : 40 Min.

Only One Correct Answer :

1. Which of the following cases roasting process is used for - **[3]**

(A) Extraction of Fe from Fe_2O_3 (B) Extraction of Pb from PbS

(C) Extraction of Zn from zinc blende (D) All of these

2. The substance not likely to contain $CaCO_3$ is: **[3]**

(A) Sea shells (B) Dolomite (C) Marble statue (D) Calcined gypsum

3. Find the **INCORRECT** match **[3]**

(A) Azurite (P) $CuCO_3.2Cu(OH)_2$

(B) Malachite (Q) $Cu(OH)_2.CuCO_3$

(C) Anglesite (R) $PbSO_4$

(D) Chalcocite (S) Cu_2S

4. In Goldschmidt aluminothermic process, thermite mixture contains : **[3]**

(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 12 part Al (D) 3 parts Fe_2O_3 and 1 part Al

5. Which of the following metals are obtained by auto reduction method: **[3]**

Pb, Mn, Cu, Cr, Fe, Al.

(A) Cu, Fe (B) Cu, Pb, Mn (C) Mn, Cr, Pb (D) Pb, Cu

6. Which of the following statement is **CORRECT** **[3]**

(A) Roasting is unnecessarily done for Fe-extraction because there is no sulphide ore

(B) In the smelting step of Cu-extraction, reduction of the ore takes place.

(C) Ores may not be mineral

D) Sphalerite is the ore of the zinc

More than one correct :

7. Carbon reduction is **NOT** used for extraction of Al from Al_2O_3 because **[3]**

(A) High temperature is required

(B) It incurs huge cost

(C) Al is obtained in the solid form and its separation becomes difficult

(D) It forms carbide with the used coke powder at that temperature

Matrix Match :

8. Match the column - [3]

Column-I	Column-II
(A) Froth floatation	(P) Based upon thermal decomposition reaction
(B) Roasting	(Q) Oxidation of the ore takes place
(C) Calcination	(R) Adsorption is associated
(D) Hydrometallurgical reduction	(S) Metal replacement reaction takes place
	(T) High temperature is associated

9. Match the column : **[3]**

Column-I	**Column-II (steps involved during given change)**
(A) $ZnCO_3 \longrightarrow Zn$	(P) Calcination
(B) $ZnS \longrightarrow ZnO$	(Q) Roasting
(C) $HgS \longrightarrow Hg$	(R) Self reduction
(D) $Cu_2S \longrightarrow Cu_2O$	(S) Carbon reduction
	(T) No change in oxidation number of metal

Integer :

10. Find the number(s) of ore of copper from the following **[3]**

(a) Chalcopyrite (b) Azurite (c) Sphalerite (d) Malachite

(e) Tincal (f) Magnetite (g) Fluorspar

FILL THE ANSWER HERE

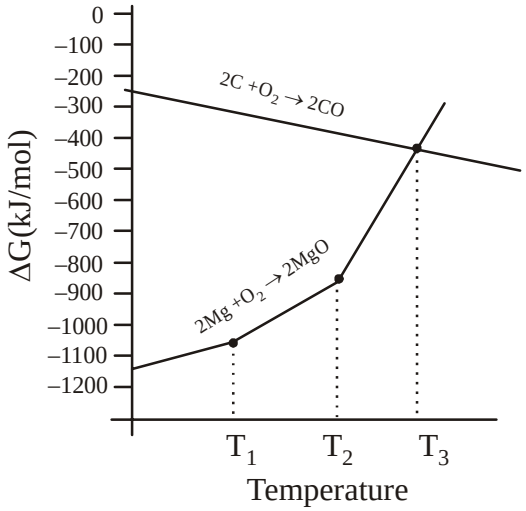
1.	(A) (B) (C) (D)	**2.**	(A) (B) (C) (D)	**3.**	(A) (B) (C) (D)	**4.**	(A) (B) (C) (D)
5.	(A) (B) (C) (D)	**6.**	(A) (B) (C) (D)	**7.**	(A) (B) (C) (D)		
8.	A (P) (Q) (R) (S) (T) B (P) (Q) (R) (S) (T) C (P) (Q) (R) (S) (T) D (P) (Q) (R) (S) (T)	**9.**	A (P) (Q) (R) (S) (T) B (P) (Q) (R) (S) (T) C (P) (Q) (R) (S) (T) D (P) (Q) (R) (S) (T)	**10.**	(0) (1) (2) (3) (4) (5) (6) (7) (8) (9)		

RACE # 04 | INORGANIC CHEMISTRY

M.M. : 30 | TIME : 40 Min.

Only One Correct Answer :

1. Select the **INCORRECT** statements about the plot is / are: **[3]**



(A) T_1 and T_2 are melting point & boiling point of Mg respectively.

(B) T_1 and T_2 are melting point & boiling point of MgO respectively.

(C) Reduction of MgO by coke is possible above T_3

(D) Mg can be extracted from gaseous products by rapid cooling.

2. For same above question find the **CORRECT** statement regarding ΔG^o **[3]**

(A) After T_1 point $|\Delta G^o|$ decreases

(B) After T_2 point $|\Delta G^o|$ increases

(C) After both points $|\Delta G^o|$ decreases

(D) Both (A) and (C) are correct

3. For the reactions at 1500°C, **[3]**

$2C + O_2 \rightarrow 2CO \quad \Delta G^o \approx -530$ kJ

$2MgO \rightarrow 2Mg + O_2 \quad \Delta G^o \approx +730$ kJ

Find the **CORRECT** option :

(A) MgO can be reduced by carbon at this temperature

(B) For the reaction $MgO + C \rightarrow Mg + CO \quad \Delta G^o$ is negative

(C) For the reaction $2M + O_2 \rightarrow 2MO$ (Where M = Mg, C) ΔG^o is more negative for Mg

(D) None of these

4. Based on Ellingaham diagram which of the following statement is **CORRECT** : **[3]**

(A) Slope of graph for most of the metals is down wards

(B) On increasing temperature magnitude of ΔG^o decreases

(C) On increasing temperature free energy change increases

(D) Both (B) and (C) options are correct

5. Which of the following is the principal reducing agent for the reduction of Fe_2O_3 : **[3]**

(A) CO (B) C (C) CO_2 (D) None of these

More than one correct :

6. Graph for metal M_2 is above to the graph for M_1 metal in Ellingham diagram, based on this fact find the **INCORRECT** option. (Both graphs do not intersect each other at any point) **[3]**

(A) Metal M_2 can reduce the oxide of metal M_1

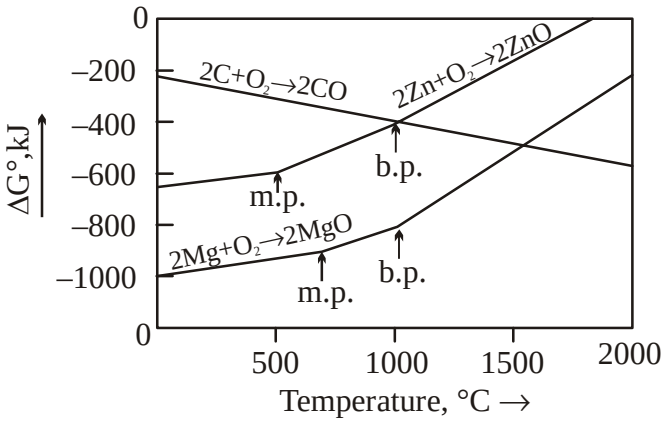
(B) Metal M_1 can reduce the oxide of metal M_2

(C) Both metals can reduce oxides of each other at certain temperature

(D) Metal M_1 can't reduce the oxide of metal M_2

Comprehension (Q.7 to Q.10)

Questions given below are based on the given diagram for extractive metallurgy. **[12]**



The points noted by arrows are the melting and boiling points of the metals zinc and magnesium. ΔG° as a function of temperature for some reactions of extractive metallurgy.

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

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

8. At this temperature ΔG° of the reaction is : $ZnO + C \longrightarrow Zn + CO$

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

9. To make the following reduction process spontaneous, temperature should be :

$ZnO + C \longrightarrow Zn + CO$

(A) < 1000°C (B) > 1100°C (C) < 500°C (D) > 500°C but < 1000°C

10. At 1100°C, which reaction is spontaneous to a maximum extent?

(A) $MgO + C \longrightarrow Mg + CO$ (B) $ZnO + C \longrightarrow Zn + CO$

(C) $MgO + Zn \longrightarrow Mg + ZnO$ (D) $ZnO + Mg \longrightarrow MgO + Zn$

FILL THE ANSWER HERE

1.	Ⓐ Ⓑ Ⓒ Ⓓ	**2.**	Ⓐ Ⓑ Ⓒ Ⓓ	**3.**	Ⓐ Ⓑ Ⓒ Ⓓ	**4.**	Ⓐ Ⓑ Ⓒ Ⓓ
5.	Ⓐ Ⓑ Ⓒ Ⓓ	**6.**	Ⓐ Ⓑ Ⓒ Ⓓ	**7.**	Ⓐ Ⓑ Ⓒ Ⓓ		
8.	Ⓐ Ⓑ Ⓒ Ⓓ	**9.**	Ⓐ Ⓑ Ⓒ Ⓓ	**10.**	Ⓐ Ⓑ Ⓒ Ⓓ		

RACE # 05 INORGANIC CHEMISTRY

MM : 33 TIME : 40 Min.

Only One Correct

1. (Ag + Pb) alloy $\xrightarrow[\text{is added}]{\text{melt and zinc}}$ (Ag + Pb + Zn) melt $\xrightarrow{\text{cool}}$ $\xrightarrow[\text{Layer Y}]{\text{Layer X}}$ **[3]**

Select correct statement based on above scheme :

(A) Layer X contains zinc and silver

(B) Layer Y contains lead and silver but amount of silver in this layer is smaller than in the layer X.

(C) X and Y are immiscible layers

(D) All are correct statements

2. Give the correct order of initials **T** or **F** for following statements. Use **T** if statement is true and **F** if it is false. **[3]**

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

(ii) An ore of Tin containing $FeWO_4$ is concentrated by magnetic separation method.

(iii) Auto reduction process is used in the extraction of Cu & Hg.

(iv) Cassiterite and Rutile are oxide ores of the metals.

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

3. Electrolytic reduction of alumina to aluminium by Hall-Heroult process is carried out: **[3]**

(A) In the presence of NaCl

(B) In the presence of BaF_2

(C) In the presence of cryolite which forms a melt with lower melting temperature

(D) In the presence of cryolite which forms a melt with higher melting temperature

4. During the process of electrorefining of copper some metals present as impurity settle as anode mud. These are: **[3]**

(A) Sn and Ag (B) Pb and Zn (C) Ag and Au (D) Fe and Ni

5. Reduction of a metal oxide by excess carbon at high temperature is a method for the commercial preparation of some metals. This method can be successfully applied in the case of **[3]**

(A) BeO and Al_2O_3 (B) ZnO and Fe_2O_3

(C) CaO and Cr_2O_3 (D) BaO and U_3O_8

6. Electric furnaces are lined with magnesia because: **[3]**

(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\

7. On heating a mixture of Cu_2O and Cu_2S, we get : **[3]**

(A) Cu + SO_2 (B) Cu + SO_3 (C) CuO + CuS (D) Cu_2SO_3

8. Select **INCORRECT** statement regarding silver extraction process. **[3]**

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

(B) When the lead-silver alloy is rich in lead, silver is removed by parke's or pattinson's process.

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

(D) Zinc forms an alloy with silver, from which zinc is separated by distillation.

9. Sulphide → A → Oxide → B → Impure metal → C → Pure metal **[3]**

Step C (refining) involved in purification of Pb metal is

(A) Distillation (B) Bessemerization (C) Cupellation (D) Electrolytic refining

Match the Column

10. **[6]**

Column-I (Ore)	**Column-II (Metal in Ore)**
(A) Ilmenite	(P) Iron
(B) Dolomite	(Q) Magnesium
(C) Carnalite	(R) Potassium
(D) Chromite	(S) Titanium

FILL THE ANSWER HERE

1.	Ⓐ Ⓑ Ⓒ Ⓓ	**2.**	Ⓐ Ⓑ Ⓒ Ⓓ	**3.**	Ⓐ Ⓑ Ⓒ Ⓓ	**4.**	Ⓐ Ⓑ Ⓒ Ⓓ
5.	Ⓐ Ⓑ Ⓒ Ⓓ	**6.**	Ⓐ Ⓑ Ⓒ Ⓓ	**7.**	Ⓐ Ⓑ Ⓒ Ⓓ	**8.**	Ⓐ Ⓑ Ⓒ Ⓓ
9.	Ⓐ Ⓑ Ⓒ Ⓓ	**10**	A Ⓟ Ⓠ Ⓡ Ⓢ B Ⓟ Ⓠ Ⓡ Ⓢ C Ⓟ Ⓠ Ⓡ Ⓢ D Ⓟ Ⓠ Ⓡ Ⓢ				

RACE # 06 INORGANIC CHEMISTRY

MM : 35 TIME : 40 Min.

Only One Correct

1. AgCl on fusion with Na_2CO_3 forms **[3]**

(A) Ag_2CO_3 (B) Ag_2O (C) Ag (D) Ag_2C_2

2. A solution of Na_2SO_4 in water is electrolysed using inert electrodes. The products at cathode and anode are respectively **[3]**

(A) O_2 ; H_2 (B) O_2 ; Na (C) H_2 ; O_2 (D) O_2 ; SO_2

3. Give the correct order of initials **T** or **F** for following statements. Use **T** if statement is true and **F** if it is false. **[3]**

(i) In Gold Schmidt thermite process aluminium acts as a reducing agent.

(ii) Mg is extracted by electrolysis of aq. solution of $MgCl_2$.

(iii) Extraction of Pb is possible by smelting.

(iv) Red Bauxite is purified by Serpeck's process.

(A) TTTF (B) TFFT (C) FTTT (D) TFTF

4. Among the following groups of oxides, the group containing oxides that cannot be reduced by C to give the respective metal is **[3]**

(A) CaO and K_2O (B) Fe_2O_3 and ZnO (C) Cu_2O and SnO_2 (D) PbO and Pb_3O_4

5. Consider the following metallurgical processes: **[3]**

(I) Heating impure metal with CO and distilling the resulting volatile carbonyl (b.p. 43°C) and finally decomposing at 150°—200°C to get the pure metal

(II) Heating the sulphide ore in air until a part is converted to oxide and then further heating in the absence of air to let the oxide react with unchanged metal sulphide.

(III) Electrolysis of the molten electrolyte containing approximately equal amounts of the metal chloride and NaCl to obtain the metal

The processes used for obtaining magnesium, nickel and copper are respectively:

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

6. Select the correct option for the given processes. **[3]**

(i) Process of heating steel to redness and then cooling it very slowly.

(ii) Process of heating steel in presence of NH_3 and producing hard coating of Iron Nitride on the surface of steel.

(iii) Process of heating steel to redness and then cooling it suddenly by plunging it into water or oil.

(iv) Process of heating quenched steel to a temperature well below redness and then cooling it slowly.

(A) Tempering, Nitriding, Annealing & Quenching respectively

(B) Quenching, Nitriding, Annealing & Case Hardening respectively

(C) Tempering, Case harding, Quenching & Annealing respectively

(D) Annealing, Nitriding, Quenching & Tempering respectively

7. When the sample of Cu with Zn impurity is to be purified by electrolysis, the appropriate electrodes are: **[3]**

	Cathode	**Anode**
(A)	Pure Zn	Pure Cu
(B)	Impure sample	Pure Cu
(C)	Impure Zn	Impure sample
(D)	Pure copper	Impure sample

More than one correct

8. During the production of iron and steel. **[4]**

(A) The oxide ore is primarily reduced to iron by solid coke according to the reaction.
$2Fe_2O_3 + 3C \longrightarrow 4Fe + 3CO_2$

(B) The oxide ore is reduced by the carbon monoxide according to the reaction
$Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$

(C) Major silica impurities are removed as calcium silicate slag by addition of a fluxing agent lime stone.

(D) The converter slag containing phosphorus is used as a fertilizer.

9. **Assertion** : Graphite is used as anode but not diamond. **[4]**

Reason: Mobile electron are present in graphite layer which helps in the electrical conductivity

(A) if both (A) and (R) are true and (R) is the correct explanation of (A)

(B) if both (A) and (R) are true but (R) is not correct explanation of (A)

(C) if (A) is true but (R) is false

(D) if (A) is false and (R) is true

Match the Column

10. **[6]**

Column-I (Conversion processes)	**Column-II (Involves which of the following operation/s)**
(A) Auriferrous rock $\rightarrow$ Au	(P) Roasting (separately)
(B) Haemetite containing siderite and magnetite $\rightarrow$ Fe	(Q) Smelting
(C) Bauxite $\rightarrow$ Al	(R) Leaching
(D) Galena $\rightarrow$ Pb (by self reduction)	(S) Electrolytic reduction
	(T) Froth floatation

FILL THE ANSWER HERE

1.	Ⓐ Ⓑ Ⓒ Ⓓ	**2.**	Ⓐ Ⓑ Ⓒ Ⓓ	**3.**	Ⓐ Ⓑ Ⓒ Ⓓ	**4.**	Ⓐ Ⓑ Ⓒ Ⓓ
5.	Ⓐ Ⓑ Ⓒ Ⓓ	**6.**	Ⓐ Ⓑ Ⓒ Ⓓ	**7.**	Ⓐ Ⓑ Ⓒ Ⓓ		
8.	Ⓐ Ⓑ Ⓒ Ⓓ	**9.**	Ⓐ Ⓑ Ⓒ Ⓓ	**10**	A Ⓟ Ⓠ Ⓡ Ⓢ Ⓣ B Ⓟ Ⓠ Ⓡ Ⓢ Ⓣ C Ⓟ Ⓠ Ⓡ Ⓢ Ⓣ D Ⓟ Ⓠ Ⓡ Ⓢ Ⓣ		

RACE # 07 INORGANIC CHEMISTRY

MM : 35 TIME : 40 Min.

Only One Correct

1. SnO_2 is reduced to metallic Sn on smelting oxide with anthracite, limestone and sand. In this, function of sand is : **[3]**

(A) It acts as a flux (B) It removes basic impurities as slag

(C) Both are correct (D) None is correct

2. Extraction of silver from its ore involving NaCN, air and an active metal is known as: **[3]**

(A) Hall process (B) Amalgamation method

(C) Mc Arthur-forrest method (D) Van-Arkel process

3. Which pair of elements can form alloy - **[3]**

(A) Zn and Pb (B) Fe and Hg

(C) Fe and Cr (D) C and Pt

4. If impurity in a metal has a greater affinity for oxygen, then the purification of metal may be carried out by **[3]**

(A) Liquation (B) Distillation

(C) Zone Refining (D) Cupellation

5. In the cyanide process for extraction of gold and silver from ores, the cyanide solution acts as a **[3]**

(A) reducing agent to reduce the gold and silver compounds present in the ores into the metallic states

(B) leaching agent to bring the gold and silver into solution as cyanide complexes and thus separate these metals from the ores

(C) leaching agent to dissolve all the other constituents of the ores leaving the gold and silver as metals

(D) leaching agent to bring the ores into solution.

6. Consider following reactions of metallurgy :

$$\text{Ore 'X'} \xrightarrow{\text{Roasting}} \text{'Y'} + SO_2 \uparrow$$

$$\text{Ore 'Z'} \xrightarrow{\text{Calcination}} \text{'Y'} + CO_2 \uparrow$$

$$\text{'Y'} + C \xrightarrow{1673\ K} A(\text{vapour}) + B_{(g)}$$

where 'A' and 'B' are respectively

(A) ZnO & CO_2 (B) $ZnCO_3$ & CO_2 (C) Zn & CO (D) ZnO & CO

More than one may be correct

7. What products are formed during, the electrolysis of a concentrated aqueous solution of NaCl? **[4]**

(A) Cl_2 (g) (B) NaOH (aq) (C) H_2 (g) (D) None

8. Which of the following are the dissimilarities between calcination and roasting **[4]**

(A) Type of reactions involved for the conversion of ores

(B) Nature of the product in terms of porosity

(C) The way of removal of impurities like S, As and Sb

(D) The nature of ore used for two cases in general

9. Which of the following statement is/are correct regarding the extraction of lead. **[4]**

(A) Carbon reduction can be employed to get Pb from PbS when impurity content is high

(B) Self-reduction can be employed to get Pb from PbS when impurity content is low.

(C) The obtained lead is hard due to the presence of impurity like Sn, As, Sb,Bi etc

(D) **(**$PbSiF_6 + H_2SiF_6$**)** is used as electrolyte for its electrorefining

Match the Column

10. Match Column-I (Metal) with Column-II (Steps involved in Extraction) **[5]**

Column-I (Metal)	**Column-II (Steps Involved in Extraction)**
(A) Aluminium	(P) Smelting
(B) Iron	(Q) Molten metal chloride electrolysis
(C) Magnesium (from sea water)	(R) Bayer process
(D) Copper	(S) Cyanide process
	(T) Froth floatation

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