# CHEMISTRY

## JEE (MAIN AND ADVANCED) CHEMISTRY

## METALLURGY

**Level I**

**1.** Gravity separation method is based upon.

A. Preferential washing of ores and gangue particles

B. Difference in densities of ore particles and impurities

C. Difference in chemical properties of ore particles and impurities

D. None of these

**Answer: B**

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**2.** In the froth flotation process for the purification of minerals the particles float because

A. they are light

B. they are insoluble

C. their surface is preferentially wetted by oil

D. they bear an electrostatic charge

**Answer: C**

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**3.** Froth floatation process for the concentration of ores is an illustration of the practical application of

A. Adsorption

B. Absorption

C. Coagulation

D. Sedimentation

**Answer: A**

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**4.** Gravity separation process may be used for the concentration of

A. Chalcopyrite

B. Bauxite

C. Haematiteq

D. Calamine

**Answer: C**

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**5.** Wolframite $(FeWO_4)$ is separated from cassiterite by

A. Froth flotation method

B. Levigation

C. Electromagenetic method

D. Electrostatic separation method

**Answer: C**

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**6.** Among the following statements the incorrect one is

A. Calamine and siderite are carbonates

B. Argentite and cuprite are oxides

C. Zine blende and iron pyrites are sulphides

D. Malachite and azurite are ores of copper 2

**Answer: B**

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**7.** The formula of 'spinel' is $AB_2, O_2$ where $\Delta$ is....., and B is...

A. $A$ II A element $B$ II A metal

B. $A$ III A element $B$ II A element

C. $A$ III Transition metal in $B$ Transition metal in $+2$ state

D. $A$ II A element $B$ Transition metal in $+2$ state

**Answer: A**

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**8.** Refractory metals are used in construction of furnaces because

A. they can withstand high temperature

B. they are chemically inert

C. their melting point is high

D. none of these

**Answer: C**

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**9.** Match the following

| List-I | List-II |
|---|---|
| $(A)$ felspar | $(I)[Ag_3SbS_3]$ |
| $(B)$ Asbestos | $(II)Al_2O_3H_2O$ |
| $(C)$ Pyragyrite | $(III)MgSO_4.H_2O$ |
| $(D)$ diaspore | $(IV)KAlSi_3O_8$ |
| | $(V)CaMg(SiO_3)_4$ |

The correct answer is

A. $\begin{matrix} A & B & C & D \\ IV & V & II & I \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ IV & V & I & II \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ IV & I & III & II \end{matrix}$

D.
| $A$ | $B$ | $C$ | $D$ |
|---|---|---|---|
| $II$ | $V$ | $IV$ | $I$ |

**Answer: B**

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**10.** Which one of the following is used as conditioner in froth flotation process

A. Pine oil

B. Soduium ethyl xanthate

C. Sodium carbonate

D. Olive oil Etration of crude metal

**Answer: C**

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**11.** During extraction of a metal there is roasted if it is a

A. Sulphate ore

B. Sulphide ore

C. Carbonate ore

D. Oxide ore

**Answer: B**

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**12.** A mixture of $Al_2O_2$ and $Fe_2$ can be separated by using

A. Sodium hydroxide

B. Cold water

C. Ethyl alcohol

D. Boiling wate

**Answer: A**

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**13.** Extraction of metals from sulphide cres is done by

A. Electrolysis

B. Smelting

C. Hydrometallurgy

D. roasting

**Answer: B**

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**14.** The substance widely used to remove silica present as impurity, from the ore is

A. $CaO$

B. $P_2O_5$

C. $SiC$

D. $Na_2CO_3$

**Answer: A**

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**15.** To remove basic impurities from the ore the substance generally used is (Roorke screening

A. $SiO_2$

B. $P_2O_5$

C. $P_2O_5($ or $)SiO_2$

D. $CaCO_3$

**Answer: C**

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**16.** During melting an additional substance added to form a fusible product. It is known as

A. Slag

B. Mud

C. Gangue

D. Flulx

**Answer: D**

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**17.** Extraction of aluminium from aluminium oxide $(Al_2/O_3)$is het done by

A. electrolytic reduction of $Al_2O_3$

B. reduction of $Al_2O_3$ with carbon

C. reduction of $Al_2O_3$ with sodium

D. reduction of $Al_2O_3$ with CO

**Answer: A**

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**18.** Calcination is the peccess of heating the ore

A. in inert gas

B. in the presence of air

C. in the absence of air

D. in the presence of CaO and MgO

**Answer: C**

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**19.** In Baeyer's process before digesting the ce with concentrated sodium lydroxide it must be

A. Dissolved in cryolite

B. Roasted to convert $FeO$ to $Fe_2O_3$

C. Evaporated to remove water

D. Dissolved in $\in CaF_2$

**Answer: B**

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**20.** Which of the following reagent is used to operate the impurity from red bonite

A. Conc. HCl

B. Cnc. $H_2SO_4$

C. $NaOH$

D. $HNO_3$

**Answer: C**

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**21.** Smelting is ally carried out in

A. Blast fumace

B. Open hearth furnace

C. Muffle furnace

D. Electric furnace

**Answer: A**

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**22.** Formation of metallic copper from the sulphide ore in the normal thermo-metallurgical pro essentially involves which one of the following reaction

A. $CuS + \frac{3}{2}O_2 \rightarrow CuO + SO_2, CuS + C \rightarrow Cu + CO$

B. $CUS + \frac{3}{2}O_2 \rightarrow Cu \oplus SO_2, CuO + CuS \rightarrow 3Cu + SO_2$

C. $CuS + 2O_2 \rightarrow CuSO_4, CuSO_4 \rightarrow 2Cu + 2SO_4$

D. $Cus + \frac{3}{2}O_2 \rightarrow CuO + SO_2, CuO + CO \rightarrow Cu + CO_2$

**Answer: B**

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**23.** the most electropositive metals are isolated from their ors by

A. High temperature reduction with carbon

B. Self reduction

C. Thermal decomposition

D. Electrolysis of fused ionic salts

**Answer: D**

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**24.** In oxidisin roasting of Zn, S porducts are

A. $ZnO + SO_2$

B. $ZnO + ZnSO_4 + SO_2$

C. $ZnCl_2$

D. $Zn + SO_2$

**Answer: A**

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**25.** In sulphatizing roasting of Zns, products are

A. $ZnO + SO_2$

B. $ZnO + ZnSO_4 + SO_2$

C. $ZnCl_2$

D. $Zn + SO_2$

**Answer: B**

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**26.** $Ag_2S$ or in mixed with NaCl and heated to $6000^\circ$ in the presence of air t5hen product formed are

A. $Ag + SO_4$

B. $AgCl + SO_2$

C. $AgCl + Na_2SO_4$

D. $AgCl + Na_2S$

**Answer: C**

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**27.** Volatile metals like Zn, Cd and Jg are generally purified by

A. Distillation

B. electrolysis

C. Poling

D. Cupllation

**Answer: A**

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**28.** In order to refine blister copper it is melted in a furnance and is strirred with gree longs of woman the purpose is

A. To expel the dissolved gasses in the blister

B. To bring the impuriies to surface and oxidise them

C. The increses the carbon content of copper

D. to reduce the metallic oxikde impurities with hydrocarbon gases libereated from the wood

**Answer: D**

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**29.** In the metallurgy of which of the following capellation process is used

A. Copper

B. Silver

C. Iron

D. Aluminium

**Answer: B**

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**30.** In xone-refining method the molten zone

A. consists of impurities only

B. contains more impurity than the original metal

C. contains the purified metal only

D. moves to either side

**Answer: B**

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**31.** Thin and lead can be refined by

A. Cupellation

B. Liquation

C. Poling

D. Bessemerisations

**Answer: B**

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**32.** Silver containing lead as an impurity is purified by

A. Poling

B. Cupellation

C. Levigation

D. Distillation

**Answer: B**

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**33.** Which of the following process is used for concentration of ores and for refining metals

A. Liquation

B. Leaching

C. distillation

D. Poling

**Answer: A**

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**34.** In the extraction of silver from argentite are the one is treated with dilute solution of NaCN in water in the presence of Y, whereby the following reaction takes place.

$Ag_2X + 4NaCN + 2Y \rightarrow 2Na\left[Ag(CN)_2\right] + Na_2XO_4X$ and $Y$ in this reaction are repesented by

A. CI and S

B. S and $O_2$

C. $O$ and $O_2$

D. O and S

**Answer: B**

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**35.** Which is the chief one of copper?

A. Galena

B. Copper pyrites

C. Sphalerite

D. Siderite

**Answer: B**

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**36.** The matte obtained in the callurgy of copper has the approximate Composition

A. $FeS + CuO$

B. $Cu_2S + FeO$

C. $Cu_2S + FeS$

D. $CuS + FeS_2$

**Answer: C**

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**37.** The fux used in the secting of copper pyrites is

A. limes tone

B. silica

C. borax

D. $P_2O_5$

**Answer: B**

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**38.** Roasted on one is mixed with coke and time stone and smelted in blast fumice. Which among the following does not represent the correct answer about the reactions taking place in the blast fumace.

A. In the lower part, called zone of fusion temperature (1773 K) coke burns to $CO_2$ producing 97000 calories of beat

B. In the middle part, limestone decomoses to give $Co_2$ and lime which acts as a reducing agent.

C. in the middle part of the furnace called one of heat absorption (temperture 1073-1273 K) $CO_2$ is reduced to CO

D. At the top is the one of reduction temperature (673-973 K). Here iron oxide is reduced to spongy iron by

**Answer: B**

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**39.** Calcination is the peccess of heating the ore

A. $Cu_2O + FeS$

B. $FeSiO_3$

C. $CuFeS_2$

D. $Cu_2S + FeO$

**Answer: B**

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**40.** Blister Cu is about :

A. $60\ \%\ Cu$

B. $90\ \%\ Cu$

C. $98\ \%\ Cu$

D. $100\ \%\ Cu$

**Answer: C**

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**41.** Heating mixture of $Cu_2O$ and $Cu_2$ S will give

A. $Cu + SO_2$

B. $Cu + SO_3$

C. $CuO + CuS$

D. $Cu_2SO_3$

**Answer: A**

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**42.** Zince is obtained or large scale by

A. Electrolysis of $ZnCl_2$

B. Redeuction of ZnO

C. Precipitation with Ag

D. Any of these methods

**Answer: B**

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**43.** in Belgian process for reduction of ZnO to Z reductant is

A. Al

B. Coal or Coke

C. $H_2$

D. Water gas

**Answer: B**

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**44.** Impurities in the zinc spelter are

A. Ag and Au

B. Cd and Pd

C. Cd and Pb

D. Cd As and Au

**Answer: C**

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**45.** The magnatite of iron is its

A. Chloride

B. Sulphate

C. Nitrate

D. Oxide

**Answer: D**

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**46.** Most abundant one of iron is

A. magnetite

B. hematite

C. limonite

D. pyrites

**Answer: B**

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**47.** Mark the wrong statement among the following. The iron ore after washing is roasted with a little coal in excess of air. During roasting

A. moisture is removed

B. S and As are removed in the form of their volatile oxides

C. Any ferrous oxide is oxidised to femric wride

D. The mass becomes compact and thus makes it suitable for ready redaction to metallic iron.

**Answer: D**

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**48.** The reducing agent added in the extraction of Iron from oxide one of iron is

A. coke

B. Aluminium

C. carbon monoxide

D. zinc

**Answer: A**

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**49.** The iron obtained from blast funkce is

A. Pig iron

B. Silver

C. Soft iron

D. Steel

**Answer: A**

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**50.** In the middle part of blast fumace, irone is treated with limestone to remove

A. C

B. CaO

C. $SiO_2$

D. $Fe_2O$

**Answer: C**

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**51.** In the manufacture of iron from hacmatite, the limestone acts as

A. A reducing agent

B. Flux

C. Slag

D. Gangue

**Answer: B**

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**52.** Role of limestone used in re extraction

A. Oxidation of Fe ore

B. Reduction of Fe are

C. Formation of slag

D. Purification of Fe formed

**Answer: C**

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**53.** In the extraction of iron, the slag produced is

A. CO

B. $FesSiO_3$

C. $MgSiO_3$

D. $CaSiO_3$

**Answer: D**

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**54.** Which of the following metal can be extracted by smelting

A. Al

B. Fe

C. Mg

D. All

**Answer: B**

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**55.** Which one of the following elements constitutes a major impurity in pig iron ?

A. Silicon

B. Oxygen

C. Sulphur

D. Carbon

**Answer: D**

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**56.** In which of the following porcentage of carboni inimum

A. Pig iron

B. Cast iron

C. Wrought iron

D. Pig iron and wrough iron

**Answer: A**

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**57.** The purest form of commercial iron is

A. Pig iron

B. Cast iron

C. Wrought iron

D. Pig iron and cast iron

**Answer: C**

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**58.** Weight ratio of roasted on, coke and limestone fed into the blast mace in the manufacture of case iron is

A. $8:1:4$

B. $6:4:1$

C. $8:4:1$

D. $8:4:3$

**Answer: C**

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**59.** Spiegeleisen is on alloy of

A. Fe, Mn C

B. Fe, Mg, C

C. Mn, C, Zn

D. Fe, Mn, Mg

**Answer: A**

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**60.** Major Component in spiegeleisen is

A. Fe, Mn C

B. Mg

C. Mn, C, Zn

D. C

**Answer: A**

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**61.** Carbon is present in pig Iron as

A. FeC

B. $FeC_2$

C. $Fe_3C$

D. $Fe_{10}C$

**Answer: C**

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**62.** The metal that occurs in the native state as well as in the combined formis

A. Silver

B. Magnesium

C. Aluminum

D. Manganese

**Answer: A**

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**63.** A common metal widely used in the displacement method to obtain other metals is

A. Cupellation

B. Fe

C. Zn

D. Ca

**Answer: C**

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**64.** From sodium argento cyanide Nal A CN, silver is proe pitated by adding a powder of

A. Gold

B. Zinc

C. Mercury

D. Gold or Mercury

**Answer: B**

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**65.** The metal extracted by lcaching with a cyanide is

A. Mg

B. Ag

C. Cu

D. Na

**Answer: B**

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**66.** The chemical reagent used for leaching of gold and silver ores is

A. Sodium hydroxide

B. Potassium cyanide

C. Potassium cyanate

D. Sodium sulphate

**Answer: B**

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**67.** Name the metal M, which is extracted based on the following equation

$$4M + 8CN + 2H_2O + O_2 \rightarrow 4\left[M(CN)_2\right] + 4OH : 2[M(CN_2)]^- + Zn \rightarrow$$

A. Cupellation

B. Au (or) Ag

C. Hg

D. Ni

**Answer: B**

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**68.** Native silver metal forms a water soluble complex with a dilute aqueous solution of NaCN in the presence of

A. Nitrogen

B. Oxygen

C. Carbon dioxide

D. Argon

**Answer: B**

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**69.** Which of the following metals can be used for precipitation of silver from sodium argento cyanide solution

A. Zn

B. Cu

C. Al

D. All

**Answer: D**

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**70.** The final step in the metallurgical extraction of Cu metal from u pyrites takes place in a Bessemet converter. The reaction taking place

A. $Cu_2SO + O_2 \rightarrow 2Cu + SO_2$

B. $4Cu_2O + FeS \rightarrow 8Cu + FeSO_4$

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

D. $Cu_2S + 2FeO \rightarrow 2CuO + 2Fe + sO_2$

**Answer: C**

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**71.** l high temperature the amount of sodium formed in the Castner process decreases due to

A. Sodium metal high densit

B. Sodium metal dissolves in fused NaOH

C. High electrode potential

D. Low jonisation potential

**Answer: B**

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**72.** The substance added to Nacl in Down's process to lower the melting point of NaCl

A. KCl

B. $K_2CO_3$

C. $CaCl_2$

D. $AlCl_3$

**Answer: C**

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**73.** In the Down's process at low temperature sodium extracted is more because

A. Solubility of sodium metal in fused electrolyte is less

B. Vapour pressure of sodium is more

C. Solubility of sodium in fused state is high

D. Common salt is the electrolyte used

**Answer: A**

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**74.** (A): Magnesium metal can easily be extracted from sea water rather than sodium metal,

(R):$Mg(OH)_2$ is less soluble in water than NaOH.

A. A and are true, R explains A

B. A and Rare true, Reinot explain A

C. A is true R is false

D. A is false R is true

**Answer: A**

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**75.** What is the reaction occuring at the anode in Duw's process for the extraction of sodium?

A. $4OH^- \rightarrow 2H_2O + O_2 + 4e^-$

B. $Na^+ + e^- \rightarrow Na$

C. $2Cl^- \rightarrow Cl_2 2e^-$

D. $NaH \rightarrow Na^+ + OH^-$

**Answer: C**

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**76.** Which one of the following electrolyte is used in Down's process of extracting sodium metal?

A. $NaCl + KCl + KF$

B. NaCl

C. $NAOH + KCl + KF$

D. $NaCl + NaOH$

**Answer: A**

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**77.** In the Castner process for the extraction of sodium, the anode is made of..... Metal.

A. Copper

B. Iron

C. Sodium

D. Nickel

**Answer: D**

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**78.** The electrolyte used in castner's process of sodium extraction is

A. Aquesous $Na_2CO_3$

B. Aqueous $NaOH$

C. $NaCl + NaCl_2$

D. Fused anhydrous NaOH

**Answer: D**

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**79.** In the extraction of sodium by Down's process, cathode and anode are respectively

A. Copper and Nickel

B. Copper and Chromium

C. Nickel and Chromium

D. Iron and Graphite

**Answer: D**

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**80.** Of the following metuls that cannot be obtained by elecrolysis of the aqueous solution of their satts is are

A. Ag

B. Mg

C. Cu

D. Al and Mg

**Answer: D**

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**81.** (A) In the extraction of Mg from used anhydrous $MgCl_2$ air gap of the electrolytic cell is to be replaced by inert gas.

(R) Oxidation of Mg metal is to be prevented during its extraction by electrolytic reduction of anhydrous $MgCl_2$

A. A and are true, R explains A

B. A and Rare true, Reinot explain A

C. A is true R is false

D. A is false R is true

**Answer: A**

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**82.** Sea water contains Magnesium in the form of

A. Carbonate

B. Chloride

C. Suphate

D. Both 2 & 3

**Answer: D**

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**83.** Magnesium metal is extracted from

A. Camallite

B. Magnesite

C. Sea wate

D. All of these

**Answer: D**

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**84.** Hydrated magnesium chloride, on strong heating gives finally

A. $MgCl_2$

B. $MgO$

C. $Mg(OH)Cl$

D. $Mg_2OCl_2$

**Answer: B**

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**85.** On heating $MgCl_2.2H_2O$ at $350^\circ C$ in the presence of anhydrous $MgC_2$, is formed

A. dry HCl

B. CO gas

C. $SO_2$

D. Air

**Answer: A**

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**86.** In the Hanging method of reduction of Magnesia with carbon, the backward reaction is prevented by quenching the mixture of magnesium vapour and cartoon monoxide with

A. HCl gas

B. CO gas

C. $CAF_2$

D. $H_2$

**Answer: D**

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**87.** MgO can be reudced with

A. Silicon

B. Ferro- Silicion

C. $CaC_2$

D. Al the above

**Answer: D**

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**88.** In the Hansging method Magnesia is reduced using.

A. Si

B. $CaC_2$

C. $FeSi$

D. Cocke

**Answer: D**

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**89.** In the Bayer's process of purification of red hauxite the leaching agent is

A. concentrated caustic soda

B. $Na_2CO_3$

C. $NaCN$

D. KCN

**Answer: A**

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**90.** Chemical leaching in seful in the concentration of

A. copper pyrites

B. bauxite

C. galena

D. cassiterite

**Answer: B**

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**91.** The electrolytic reduction method for the preparation of aluminium is called

A. Hoop's process

B. Baeyer's process

C. Hall and Heroult process

D. Serpeck process

**Answer: C**

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**92.** The important by product in the purification of bauxite by Serpeck's process is

A. HCl

B. $N_2$

C. $NH_3$

D. $NO_2$

**Answer: C**

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**93.** The reaction not involved in the concentration of bauxite are by Hall's process is

A. $Al_2O_3 + Na_2CO_3 \rightarrow 2NaAlO_3 + CO_2$

B. $2NaAlO_2 + 3H_2O + CO_2 \rightarrow 2Al(OH)_3 + Na_2CO_3$

C. $2Al(OH)_3 \rightarrow Al_2O_3 + 3H_2O$

D. $AlN + H_2O \rightarrow Al(OH)_3 + NH_3$

**Answer: D**

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**94.** The Product not involved in the concentration of bauxite are by Hall's process is

A. Al

B. Na

C. $O_2$

D. $H_2$

**Answer: C**

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**95.** $Al_2O_3 \rightarrow AIN \rightarrow Al(OH)_2 \rightarrow Al_2O_3$. The sequence of these products involved in

A. Bayer's Process

B. Serpeck's process

C. Hall's process

D. Hoope's process

**Answer: B**

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**96.** The reagent and intermediate product in Halls process are

A. $NaOH, NaAlO_2$

B. $Na_2CO_3, NaAlO_2$

C. $N_2 + CO, NH_3$

D. $NaOH, AlN$

**Answer: B**

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**97.** In the purification bauxite by Hall's process

A. The bauxite oreheated with concentrated NaOH solution at $150^\circ C$

B. The bauxite ore is heated with $NaHCO_3$

C. The bauxite ore is mixed with ooke and heated at $1800^\circ C$ in u current of $N_2$

D. The bauxite ore is fused with $Na_2CO_3$

**Answer: D**

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**98.** Match the following

| List-I (mineral) | List-II) (type of mineral) |
|---|---|
| (1) Zircon | $(a)$ Sulphate |
| (2) Monazite | $(b)$ Silicate |
| (3) Pentlandite | $(c)$ Sulphide |
| (4) Anglesite | $(d)$ Phosphate |

Corect match is

A. $\begin{matrix} 1 & 2 & 3 & 4 \\ b & d & c & a \end{matrix}$

B. $\begin{matrix} 1 & 2 & 3 & 4 \\ a & b & c & d \end{matrix}$

C. $\begin{matrix} 1 & 2 & 3 & 4 \\ b & c & d & a \end{matrix}$

D. $\begin{matrix} 1 & 2 & 3 & 4 \\ a & d & c & b \end{matrix}$

**Answer: A**

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**99.** X' is substance which combines chemically with impurities associated with the ore to form casily fusible mass'Y! Her X and Yare

A. Flux, slag

B. Slag, flux

C. Gangue, slag

D. Reductant, flux

**Answer: A**

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**100.** In Goldsmith thermite process reductant in

A. Coke

B. Aluminium

C. Water gas

D. CO

**Answer: B**

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**101.** In Goldsmith thermite process, element undergoing oxidation is

A. Chromium

B. Manganese

C. Chromium and Manganese

D. Aluminium

**Answer: D**

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**102.** In which of the following products are in the molte state

A. Calcination

B. Oxidizing roasting

C. Sulphatizing routing

D. Smelting

**Answer: D**

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**103.** Match the following

| List-I | List-II |
|---|---|
| (1)Liquation | $(a)$Volatile metals with non volatile impurit |
| (2)Poling | $(b)$Metal with its metal oxies as impurity |
| (3)Cupellation | $(c)$Metal with easily oxidisable impurities |
| (4)Distillation | $(d)$Metal and impurities differ in M.P |

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**104.** Various types of one in the blast bumace are given in the List and reactions take place traction of iron are given in List II

| List-I | List-II |
|---|---|
| (1)Zone of reduction | $(a)C + O_2 \rightarrow CO_2$ |
| (2)Zone of heat absoroption | $(b)CO_2 + C \rightarrow 2CO$ |
| (3)Zone of fusion | $(c)Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$ |

A. $\begin{matrix} 1 & 2 & 3 \\ a & b & c \end{matrix}$

B. $\begin{matrix} 1 & 2 & 3 \\ c & b & a \end{matrix}$

C. $\begin{matrix} 1 & 2 & 3 \\ b & c & a \end{matrix}$

D. $\begin{matrix} 1 & 2 & 3 \\ c & a & b \end{matrix}$

**Answer: B**

Watch Video Solution

**105.** Match the following :

| List-I | List-II |
|---|---|
| (1)vanArkel method | (1)Manufacture of caustic soda |
| $(B)$Solvay process | (2)Purification of Titanium |
| $(C)$Cupellation | (3)Manufacture of$Na_2CO_3$ |
| $(D)$Poling | (4)Purification of copper |
| | (5)Refining of silver |

A. $\begin{matrix} A & B & C & D \\ 2 & 1 & 3 & 4 \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ 4 & 3 & 2 & 5 \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ 2 & 3 & 5 & 4 \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ 5 & 1 & 3 & 4 \end{matrix}$

**Answer: C**

Watch Video Solution

**106.** Match the following

| List-I (Type of mineral) | List-II |
|---|---|
| (1) Oxide | $(a)$ Kaolinite |
| (2) Carbonate | $(b)$ Calamine |
| (3) Sulphide | $(c)$ Copper glance |
| (4) Silicate | $(d)$ Cuprite |

A. $\begin{matrix} 1 & 2 & 3 & 4 \\ d & b & c & a \end{matrix}$

B. $\begin{matrix} 1 & 2 & 3 & 4 \\ b & d & a & c \end{matrix}$

C. $\begin{matrix} 1 & 2 & 3 & 4 \\ a & b & c & d \end{matrix}$

D. $\begin{matrix} 1 & 2 & 3 & 4 \\ b & a & c & d \end{matrix}$

**Answer: A**

Watch Video Solution

**107.** Match the following

| List-I (ore) | List-II(Metal) |
|---|---|
| (1) Malachite | $(a)Cu$ |
| (2) Siderite | $(b)Zn$ |
| (3) Sphalerite | $(c)Fe$ |
| (4) Kaolinite | $(d)Al$ |

A. $\begin{matrix}1 & 2 & 3 & 4\\ b & c & a & d\end{matrix}$

B. $\begin{matrix}1 & 2 & 3 & 4\\ d & b & c & a\end{matrix}$

C. $\begin{matrix}1 & 2 & 3 & 4\\ a & b & c & d\end{matrix}$

D. $\begin{matrix}1 & 2 & 3 & 4\\ c & a & d & b\end{matrix}$

**Answer: B**

Watch Video Solution

**108.** Match the following

| List - I | List - II |
|---|---|
| 1) Argentite | a) $KCl$ |
| 2) Horn silver | b) $AgCl$ |
| 3) Ruby silver | c) $Ag_2S$ |
| 4) Sylvine | d) $3Ag_2S.Sb_2S_3$ |

The correct match is

$\begin{matrix}1 & 2 & 3 & 4\end{matrix}$

A. $\begin{matrix}c & b & d & a\end{matrix}$

B. $\begin{matrix}d & b & c & a\end{matrix}$

C. $b \quad c \quad d \quad a$

D. $d \quad c \quad b \quad a$

**Answer: C**

Watch Video Solution

**109.** Match the following

| List - I | List - II |
|---|---|
| I. Cyanide process | a) Ultrapure Ge |
| II. Floatation proces | b) Pine oil |
| III. Electrolytic reduction | c) Extraction of Al |
| IV. Zone refining | d) Extraction of Au |

A. $A.\ I-c, II-a, III-d, IV-b$

B. $B.\ I-d, II-b, III-c, IV-a$

C. $C.\ I-c, II-b, III-d, IV-a$

D. $D.\ I-d, II-a, III-c, IV-b$

**Answer: B**

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Watch Video Solution

**110.** Match the following

| List -I | List - II |
|---|---|
| 1) Puddling process | a) Extraction of Ag from argentite |
| 2) Bessemer process | b) Extraction of Ag from argentiferrous lead. |
| 3) Mac arthur forrest process | c) Manufacture of wrought iron from pig iron |
| 4) Pattinson's process | d) Manufacture of steel from pig iron. |

The correct match is

A. $\begin{matrix} 1 & 2 & 3 & 4 \\ d & c & a & b \end{matrix}$

B. $\begin{matrix} 1 & 2 & 3 & 4 \\ c & d & a & b \end{matrix}$

C. $\begin{matrix} 1 & 2 & 3 & 4 \\ d & c & b & a \end{matrix}$

D. $\begin{matrix} 1 & 2 & 3 & 4 \\ c & d & b & a \end{matrix}$

**Answer: B**

Watch Video Solution

**111.** (A): Efficiency of the reverberatary furnace is less

(R): The waste gases formed in the fumace reactions leave the furnace through chimney.

A. A and are true, R explains A

B. A and Rare true, Reinot explain A

C. A is true R is false

D. A is false R is true

**Answer: A**

Watch Video Solution

**112.** (A): In the smelting of copper pyrites in blast furace, $Cu_2S$ formed but not FeS.

(R): Ca has greater affinity to 'S than to where as fe has greater affinity to than to's

A. A and are true, R explains A

B. A and Rare true, Reinot explain A

C. A is true R is false

D. A is false R is true

**Answer: A**

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## Level Ii Lectrure Sheet Exercise I

**1.** Which of the following ores is/are oxide ones)?

A. Tinstone

B. Bauxite

C. both

D. Carnallite

**Answer: C**

Watch Video Solution

**2.** Which metalls) is (are) generally found in native state?

A. Fe

B. Co

C. Au

D. Na

**Answer: C**

Watch Video Solution

**3.** In which of the following pairs, both the minerals are oxides ?

A. Sylvine, salpetreb

B. Galena, litharge

C. Siderite, corundum

D. Cuprite, tinstone Extract

**Answer: D**

Watch Video Solution

**4.** Which of the following processes involves the roasting process.

A. $ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$

B. $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$

C. $2PbS + O_2 \rightarrow 2PbO + 2SO_2$

D. $Al_2O_3.2H_2O \rightarrow Al_2O_3 + 2H_2O$

**Answer: A::C**

Watch Video Solution

**5.** Which of the following metals is leached by cyanide process a

A. Al

B. Na

C. Ag

D. Mg

**Answer: C**

Watch Video Solution

**6.** Hydrometallurgy is useful in the extraction of

A. Sn

B. Al

C. Cu

D. Mg

**Answer: C::D**

Watch Video Solution

**7.** The metal obtained by self reduction process is

A. Cu

B. Hg

C. Pb

D. Al

**Answer: A::B::C**

Watch Video Solution

**8.** The ore concentrated by electromagnetic separation is

A. Wolframine

B. Haemetite

C. Casseterite

D. Rock salt

**Answer: A::B::C**

Watch Video Solution

**9.** Ellingham diagram does not represents

A. Change of $\Delta G$ with temperature

B. Change of $\Delta H$ with temperature

C. Change of $\Delta G$ with pressure

D. Change of $(\Delta G - T\Delta S)$ with temperature

**Answer: B::C::D**

Watch Video Solution

**10.** Which of the following process makes the one porous?

A. Roasting

B. Calcination

C. Reduction

D. Distillation

**Answer: A::B::C**

Watch Video Solution

**11.** The extraction of metals from oxide ores involve

A. Reduction with carbon

B. Reduction with aluminium

C. Electrolyte reduction

D. Reduction with CO.

**Answer: A::B::C::D**

Watch Video Solution

**12.** Metals which can be extracted by smelting process are:

A. Pb

B. Fe

C. Zn

D. Al

**Answer: A::B::C**

Watch Video Solution

**13.** Roosting is carried out to

A. convert sulphide to oxide and sulphate

B. remove water of hydration

C. melt the ore

D. remove arsenic and sulphur impurities

**Answer: A::D**

Watch Video Solution

**14.** of the following reduction process, correct processes are:

A. $Fe_2O_3 + C \rightarrow Fe$

B. $ZnO + C \rightarrow Zn$

C. $Ca_3(PO_4)_2 + C \rightarrow P$

D. $PbO + C \rightarrow Pb$

**Answer: A::B::D**

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**15.** Roasting of copper pyrites is done

A. to remove moisture

B. to oxidise free sulphur

C. to decompose pyrite into $Cu_2S$ and $Fes$

D. to remove volatile organic impurities

**Answer: A::B::C::D**

Watch Video Solution

**16.** Highly electropositive metals can not he extracted by carbon reduction process because these

A. Metals combine with carbon to form carbides

B. Metal oxides are reduced by carbon

C. Metal oxides are not reduced by carbon

D. Loss of metal is more by vaporisation

**Answer: A::D**

Watch Video Solution

**17.** Which one of the following metals can be extracted by aluminothermit process

A. Manganese

B. Iron

C. Chromium

D. Magnesium

**Answer: A::B::C**

Watch Video Solution

**18.** For which of the following metal the carbon reduction cannot be used ?

A. Lead

B. manganese

C. Tungsten

D. Iron

**Answer: B::C::D**

Watch Video Solution

**19.** The advantages of using carbon to reduce a number of oxides and other compounds are

A. easy availability of coke

B. low cost of carbon

C. tendency of carbon to show catenation

D. presence of carbon lowers the melting point of the oxides

**Answer: A::B**

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**20.** The disadvantages of carbon reduction method are:

A. high temperature needed which is expensive and requires the use of a blast furnace

B. many metals combine with carbon forming carbides

C. carbon combines with oxygen to form poisonous CO

D. carbon cannot be used with highly electro-positive metals

**Answer: A::B**

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**21.** The chemical treatment of the ore for concentration is done in the case of

A. aluminium

B. Silver

C. copper

D. gold

**Answer: A::B::D**

Watch Video Solution

**22.** What are the froth stabilizers in forth floatation process

A. Aniline

B. Pine oil

C. Cresol

D. Xanthate

**Answer: A::C**

Watch Video Solution

**23.** Froth flotation

A. is a physical method of separating mineral from the gangue

B. is a method to concentrate the ore depending on the difference in wetability of gange and there

C. is used for the sulphide ores

D. is a method in which impurities sink to the bottom

**Answer: A::B::C::D**

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**24.** The function of adding cryolite in the clectrolytic reduction of alumina by Hall–Héroult process is to

A. dissolve alumina

B. lower the melting point of alumina

C. Lower the fuel boiling point

D. increase the electrical conducitity of alumina

**Answer: A::B::C::D**

Watch Video Solution

**25.** Electrolysis method is used for the extraction of

A. Cu

B. Fe

C. Al

D. Na

**Answer: C::D**

Watch Video Solution

**26.** Which of the following equation reprsents smelting process

A. $ZnCO_3 \xrightarrow{\Delta} ZnO + CO_2$

B. $2PbS + 3O_2 \xrightarrow{\Delta} 2PbO + 2SO_2$

C. $Al_2O_3.3H_2O \xrightarrow{\Delta} Al_2O_3 + 3H_2O$

D. $FeO_3 + 3C \rightarrow 2Fe + 3CO$

**Answer: D**

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**27.** In the extraction of which of the following metals is used for amalgamation?

A. Ag

B. Au

C. Cu

D. Fe

**Answer: A::B**

Watch Video Solution

**28.** The flux that can be used for the removal of hasic impurities like Cound Fe from anore is (are)

A. $SiO_2$

B. $Na_2B_4O_710H_2$

C. $MgCO_3$

D. $CaCO_3$

**Answer: A::B**

Watch Video Solution

**29.** Chemical reduction is used in the extraction of

A. Chromium

B. Manganese

C. Copper

D. Iron

**Answer: A::B**

Watch Video Solution

**30.** Bessemerisation is used in the metallurgy of

A. Al

B. Fe

C. Cu

D. Ag

**Answer: B::C**

Watch Video Solution

**31.** Electro-metallurgical process (electrolysis of fused electrolyte) is employed to extract

A. Iron

B. Al

C. Silver

D. Sodium

**Answer: B::D**

Watch Video Solution

**32.** Electrolytic reduction is used in the extraction of

A. Magnesium

B. Sodium

C. Aluminium

D. Gold

**Answer: A::B::C**

Watch Video Solution

**33.** Carbon is used as a common reducing agent in the extraction of

A. Ag

B. Zn

C. pb

D. Fe

**Answer: B::C::D**

Watch Video Solution

**34.** The smelting of iron in a blast furnace involves the following process except

A. Combustion

B. reduction

C. Slag formation

D. sublimation

**Answer: A::B::C**

Watch Video Solution

**35.** Which of the following reaction in the blast furnaces are endothermic ?

A. $C_{(s)} + O_{2(g)} \Leftrightarrow CO_{2(g)}$

B. $CO_{2(g)} + C_{(s)} \Leftrightarrow 2CO_{(g)}$

C. $CaCO_{3(s)} \Leftrightarrow CaO_{(s)} + CO_{2(g)}$

D. $Fe_2O_{3(s)} + 3CO_{(g)} \Leftrightarrow 2Fe(l) + 3CO_{2(g)}$

**Answer: B::C**

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**36.** Silver is extracted by

A. Cupellation method

B. Parke's process

C. Pattinson's process

D. All

**Answer: D**

Watch Video Solution

**37.** In the electrolysis of alumina cryolite is added to:

A. lower the melting point of alumina

B. increase the electrical conductivity

C. both

D. remove impurities from alumina

**Answer: C**

Watch Video Solution

**38.** Which of the following metals) can be obtained by electrolysis of their aqueous salt solutions

A. Ag

B. Mg

C. Cu

D. Zn

**Answer: B**

Watch Video Solution

**39.** Electrolytic process is used for the extraction of

A. Alkali metal

B. Alkaline earth metals

C. Al

D. All

**Answer: D**

Watch Video Solution

**40.** Which of the following contains) aluminium

A. Feldspar

B. Epson

C. Fluorspar

D. Flourite

**Answer: A**

Watch Video Solution

**41.** Which of the following mineralores contains magnesium?

A. Magnetite

B. Magnesite

C. Asbestos

D. Carnalite

**Answer: B::C::D**

Watch Video Solution

**42.** Which of the following is are present in mica?

A. K

B. Al

C. Si

D. Ca

**Answer: A::C::D**

Watch Video Solution

**43.** Which is (are) ore (s) of almun num?

A. Cryolite

B. Buite

C. Malachite

D. Cupeite

**Answer: A::B**

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## Level Ii Lectrure Sheet Exercise Ii Passage I

**1.** Electrolysis is an important technique for extraction of metals and each low of the solution needs a minimum voltage to get discharged and this value is expressed in terms of discharge potential. For some metal ions the discharge potentials follow the order give below :

$Li^+ > K^+ > Ca^{2+} > Na^+ > Mg^{2+} > Al^{3+} > Zn^{2+} > Fe^{2+} > Ni^{2+}$

For some anions the discharge potentials are in the order:

$SO_4^{2-} > NO_3^- > OH^- > Br^- > I^-$

When aqueous solution of cuprous bromide is electrolysed the product obtained a cathode will be

A. Cu

B. $H_2$

C. $Br_2$

D. $O_2$

**Answer: A**

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Watch Video Solution

**2.** Electrolysis is an important technique for extraction of metals and each low of the solution needs a minimum voltage to get discharged and this value is expressed in terms of discharge potential. For some metal ions the discharge potentials follow the order give below :

$Li^+ > K^+ > Ca^{2+} > Na^+ > Mg^{2+} > Al^{3+} > Zn^{2+} > Fe^{2+} > Ni^{2+}$

For some anions the discharge potentials are in the order:

$SO_4^{2-} > NO_3^- > OH^- > Br^- > I^-$

The product formed at anode and cathode, when dilute H2.So4 is electrolysed are

A. $SO_2, H_2$

B. $SO_3, H_2$

C. $H_2S_2O_8$

D. $O_2, H_2$

**Answer: D**

Watch Video Solution

**3.** Electrolysis is an important technique for extraction of metals and each low of the solution needs a minimum voltage to get discharged and this value is expressed in terms of discharge potential. For some metal ions the discharge potentials follow the order give below :

$Li^+ > K^+ > Ca^{2+} > Na^+ > Mg^{2+} > Al^{3+} > Zn^{2+} > Fe^{2+} > Ni^{2+}$

For some anions the discharge potentials are in the order:

$SO_4^{2-} > NO_3^- > OH^- > Br^- > I^-$

A mixture containing chlorides of sodium, calcium and zinc is electrolysed in presence of water The product obtained at cathode will be

A. NaCl

B. $H_2$

C. $Ca$

D. Zn

**Answer: B**

Watch Video Solution

**4.** Electrolysis is an important technique for extraction of metals and each low of the solution needs a minimum voltage to get discharged and this value is expressed in terms of discharge potential. For some metal ions the discharge potentials follow the order give below :

$$Li^+ > K^+ > Ca^{2+} > Na^+ > Mg^{2+} > Al^{3+} > Zn^{2+} > Fe^{2+} > Ni^{2+}$$

For some anions the discharge potentials are in the order:

$$SO_4^{2-} > NO_3^- > OH^- > Br^- > I^-$$

When cone. $H_2SO_4$ is electrolysed with high current density using Pl clectrodes, the product obtained at anodes

A. $SO_2$

B. $SO_3$

C. $O_2$

D. $H_2S_2O_8$

**Answer: D**

Watch Video Solution

**5.** Electrolysis is an important technique for extraction of metals and each low of the solution needs a minimum voltage to get discharged and this value is expressed in terms of discharge potential. For some metal ions the discharge potentials follow the order give below :

$$Li^+ > K^+ > Ca^{2+} > Na^+ > Mg^{2+} > Al^{3+} > Zn^{2+} > Fe^{2+} > Ni^{2+}$$

For some anions the discharge potentials are in the order:

$$SO_4^{2-} > NO_3^- > OH^- > Br^- > I^-$$

When aqueous NaCl is electrolysed by using Hg electrode, the product obtained at cathode is

A. Na-Hg amalgam

B. Na

C. $H_2$

D. Hg

**Answer: A**

Watch Video Solution

## Level Ii Lectrure Sheet Exercise Ii Passage Ii

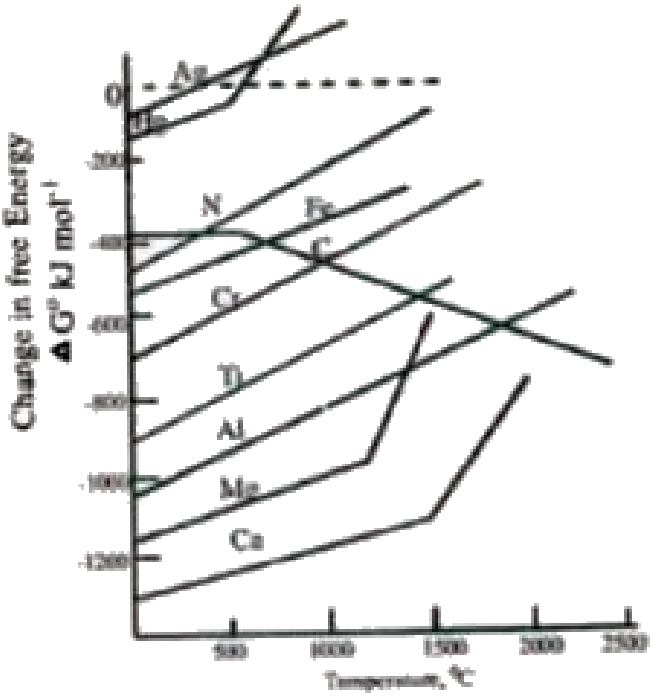
**1.** For a spontaneous reaction, the free energy change must be negative. $\Delta G = \Delta H - TDelaS$ is the enthalpy change during the reaction. T is absolute temperature, and AS is the change in entropy during the reaction. Consider a reaction such as the formation ofan oxide .

$M + O_2MO$

Dloxygen is used wp in the course of this reaction. Gases have a more random structure (less ordered) than liquid or solids consequently gases have a higher entropy than liquids and solids, in this reaction (entropy or randomness) decreases, hence is negative. Thus, the temperature is raised the $\Delta S$ becomes more negative. Since, $T\Delta S$ is subtracted in the equation, then SG becomes less negative. Thus, the free energy changes increases with the increase in temperature.

The free energy changes that occur when one mole of common reactant in this case dioxygen) is we may e plotted graphically against temperature for a number of reactions of metals to their oxides. The following plot is called an Ellingham diagram for metal oxide. Understanding of Ellingham diagram is extremely important for the

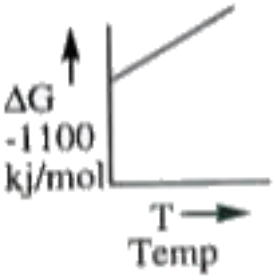
efficient extraction of metals.



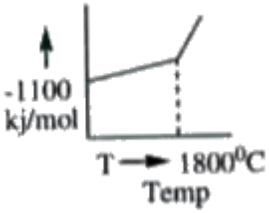

For the conversion of Ca(s) to CaO(s) which of the following represent the

$\Delta G$ vs T :

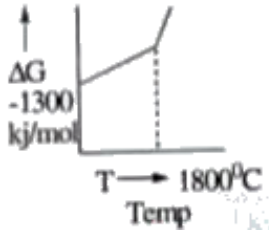
A.



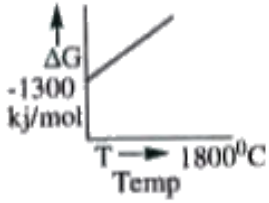
B.




C.




D.




**Answer: C**

Watch Video Solution

**2.** For a spontaneous reaction, the free energy change must be negative. $\Delta G = \Delta H - T\Delta S$ is the enthalpy change during the reaction. T is absolute temperature, and AS is the change in entropy during the reaction. Consider a reaction such as the formation ofan oxide .

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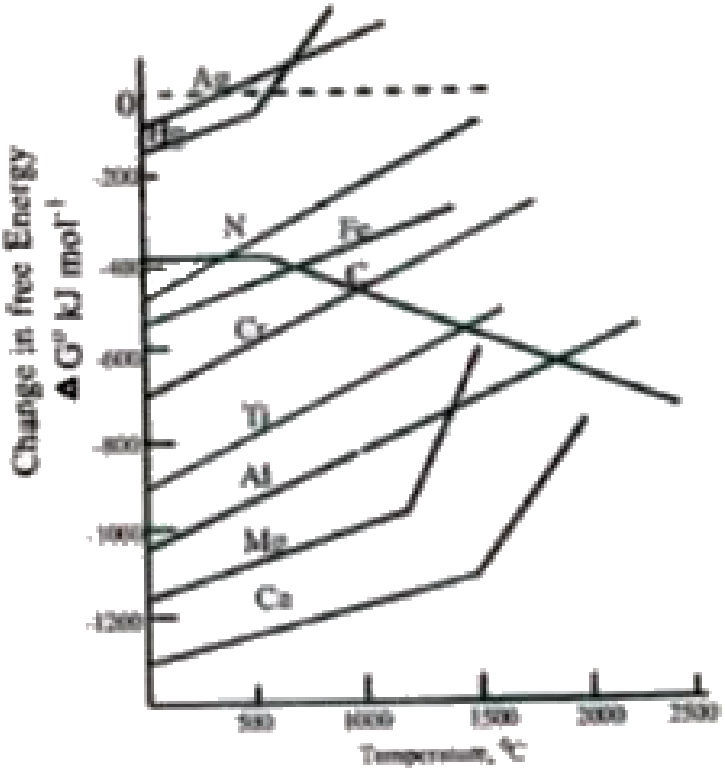


Free energy change of Hg and Mg for the convertion to oxides the slope of $\Delta G$. T has been changed above the boiling points of the given metal because

A. above the boiling point of the metal entropy is increased

B. above the boiling point of the metal the entropy is decreased

C. above the boiling point of the metal the entropy change is equal to zero

D. All of these

**Answer: A**

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**3.** For a spontaneous reaction, the free energy change must be negative. $\Delta G = \Delta H - T\Delta S$ is the enthalpy change during the reaction. T is absolute temperature, and AS is the change in entropy during the reaction. Consider a reaction such as the formation ofan oxide .

$M + O_2 MO$

Dloxygen is used wp in the course of this reaction. Gases have a more random structure (less ordered) than liquid or solids consequently gases have a higher entropy than liquids and solids, in this reaction (entropy or randomness) decreases, hence is negative. Thus, the temperature is raised the $\Delta S$ becomes more negative. Since, $T\Delta S$ is subtracted in the equation, then SG becomes less negative. Thus, the free energy changes increases with the increase in temperature.

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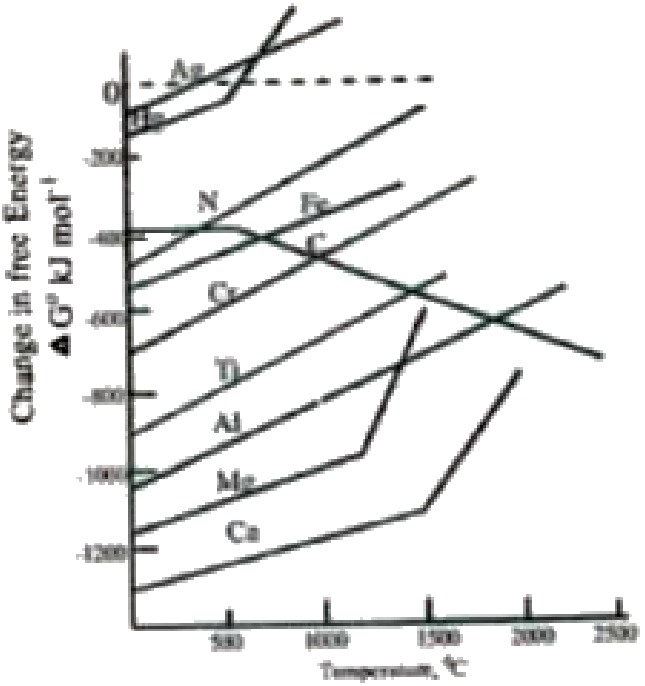


Which of the following elements can be prepared by heating the oxide above $400^{\circ}C$ ?

A. Hg

B. Mg

C. Fe

D. Al

**Answer: A**

Watch Video Solution

**4.** For a spontaneous reaction, the free energy change must be negative. $\Delta G = \Delta H - T\Delta S$ is the enthalpy change during the reaction. T is absolute temperature, and AS is the change in entropy during the reaction. Consider a reaction such as the formation ofan oxide .

$M + O_2 MO$

Dloxygen is used wp in the course of this reaction. Gases have a more random structure (less ordered) than liquid or solids consequently gases have a higher entropy than liquids and solids, in this reaction (entropy or randomness) decreases, hence is negative. Thus, the temperature is raised the $\Delta S$ becomes more negative. Since, $T\Delta S$ is subtracted in the equation, then SG becomes less negative. Thus, the free energy changes increases with the increase in temperature.

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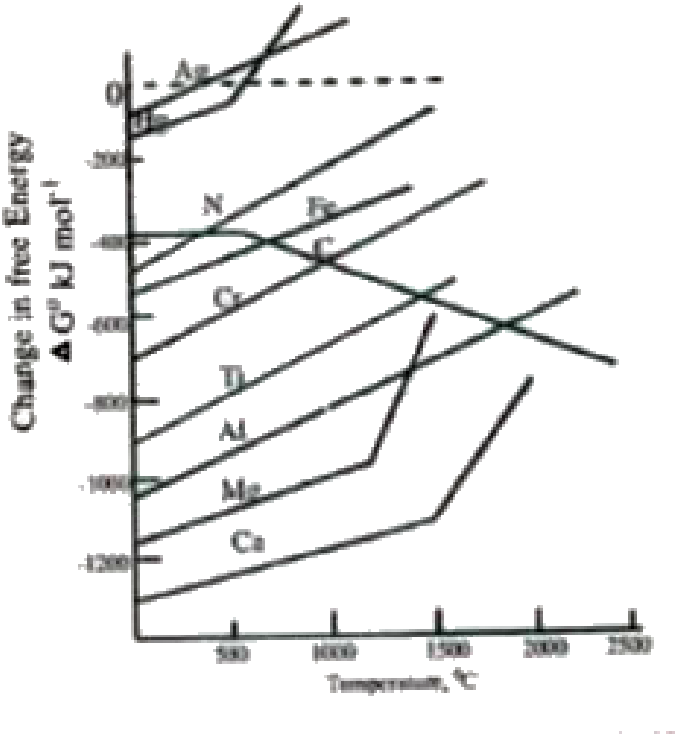


As per the Ellingham diagram of oxides which of the following conclusion is true?

A. Al reduces $Fe_2O_2$ whereas MgO cannot be reduced by Al at $1500^\circ C$

B. Fe reduce $Al_2O_3$, whereas MgO cannot be reduced by Al at $1500^\circ C$

C. Al reduce $Fe_2O_3$ whereas MgO cannot be reduced by Al at $1500^\circ C$

D. Al can reduce both $Fe_2O_3$ and $Mgo$ to be corresponding metal at $1500^\circ C$

**Answer: A**

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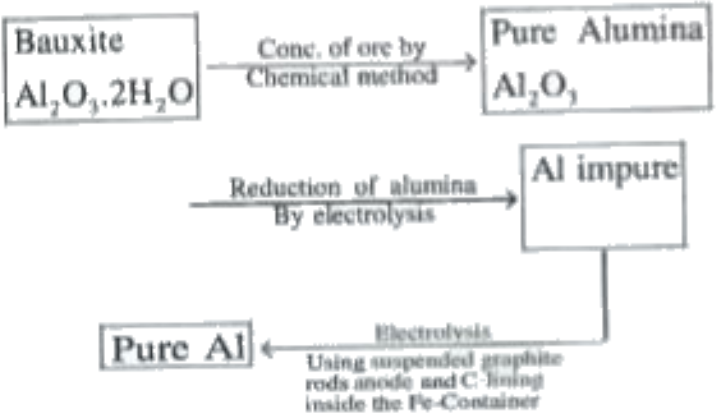
## Level Ii Lectrure Sheet Exercise Ii Passage Iii

**1.** Extraction of Aluminiunt can be understood by :



Electrolytic reduction of $Al_2O_3$:

$$\begin{aligned}&\text{Electrolyte} &&: (Al_2O_3 + \text{Cryolite})\\ &\text{Cathode} &&: \text{Graphite inside the Fe container}\\ &\text{Anode} &&: \text{Graphite rods}\end{aligned}$$

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 Al %in the yield

**Answer: B**

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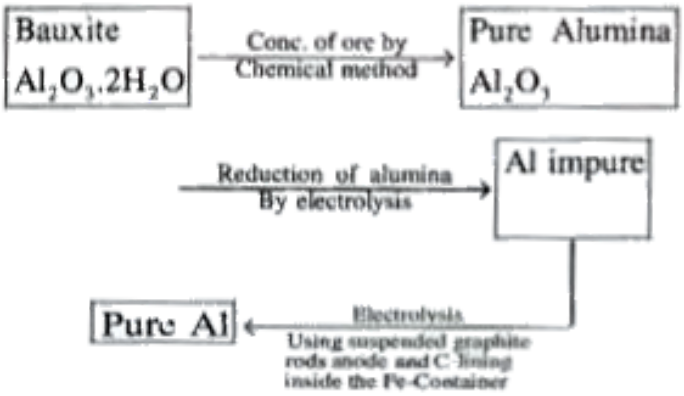
**2.** Extraction of Aluminiunt can be understood by :




Electrolytic reduction of $Al_2O_3$ :

| | |
|---|---|
| Electrolyte | $: (Al_2O_3 + \text{Cryolite})$ |
| Cathode | :Graphite inside the Fe container |
| Anode | :Graphite rods |

Coke powder is spreaded over the molten electrolyte to

A. prevent the heat radiation lies from the surface

B. prevent the corrosion of graphite anode

C. prevent oxidation of molten aluminium by air

D. both (a) & (b)

**Answer: C**

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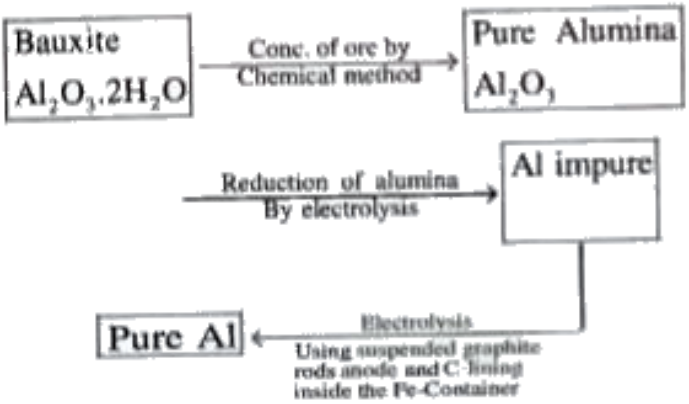
**3.** Extraction of Aluminiunt can be understood by :




Electrolytic reduction of $Al_2O_3$ :

| | |
|---|---|
| Electrolyte | : $(Al_2O_3 + \text{Cryolite})$ |
| Cathode | :Graphite inside the Fe container |
| Anode | :Graphite rods |

The function of fluorur $(CaF_2)$ is

A. to decrease the melting point of electrolyte

B. to increase electrolytic conductivity power

C. to remove the impurities as slag

D. all of the above

**Answer: A**

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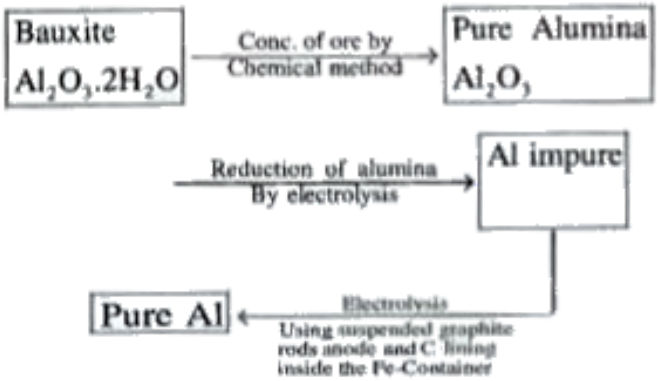
**4.** Extraction of Aluminiunt can be understood by :




Electrolytic reduction of $Al_2O_3$ :

$\text{Electrolyte} \quad : (Al_2O_3 + \text{Cryolite})$

$\text{Cathode} \quad :\text{Graphite inside the Fe container}$

$\text{Anode} \quad :\text{Graphite rods}$

The molten electrolytes contains $Na^+, Ca^{2+}, Ca^{2+}$ but only Al get deposited at cathode because :

A. standard reduction potential of Al is more than those of Na & Ca

B. Standard oxidation potential of Al is more than those of Na & Ca

C. Discharge potential of $Al^{3+}$ is higher than $Na^+$ & $Ca^+$

D. Graphite reacts only with $Al^{3+}$ and not with $Na^+ \& Ca^{2+}$

**Answer: A**

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## Level Ii Lectrure Sheet Exercise Ii Passage Iv

**1.** The heating process for the extraction of elements are quite old but highly acceptable method for the extraction of elements. Become in this process the elements produced is in the highly pure state. Mostly $As$, $Sb$, $Ni$, $Zr$, $B$ etc are prepared by this principle 4 mumber of metal sulphides which may be reated first in air to partially convert them to the aride, and then further roasted in the absence of air, wing self reduction. How does impure Ni is purified

A. impure $Ni + CO_2 \rightarrow NiCO_3 \xrightarrow{\Delta} NiO + CO_2 \xrightarrow{\Delta} Ni(s)$

B. impure

$$Ni + CO \xrightarrow{50^\circ C} Ni(CO)_3(g) \xrightarrow{\Delta} Nis + Co(g) \xrightarrow{\text{Condensation}} Ni(s)$$

pure

C. impure $Ni + CO_2 \xrightarrow{50^\circ C} Ni(CO)_4, (s) \xrightarrow{\Delta} Ni(s) + CO(g)$

D. impure $Ni + CO \xrightarrow{50^\circ C} Ni(CO)_4(g) \xrightarrow{30^\circ C} Ni(c) + CO(g)$

**Answer: B**

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**2.** The heating process for the extraction of elements are quite old but highly acceptable method for the extraction of elements. Become in this process the elements produced is in the highly pure state. Mostly $As$, $Sb$, $Ni$, $Zr$, $B$ etc are prepared by this principle 4 mumber of metal sulphides which may be reated first in air to partially convert them to the aride, and then further roasted in the absence of air, wing self reduction. In the purification Zr and Ti, which of the following is/are true

A. $Zr + 2I_2 \rightarrow ZrI_4 \xrightarrow[\text{the white hot w}]{\text{passed over}}$ the pure Zr is deposited on W :

B. $Ti + 2I_2 \rightarrow TiI_4 \xrightarrow[\text{the white hot w}]{\text{passed over}}$ the pure Ti is deposited on W :

C. $Zr + 2I_2 \rightarrow ZrI_4 \xrightarrow[\text{\& then heated}]{\text{mixed with W}} ZrI_4$ is reudced to $ZrI_4$

D. Both a & b are correct

**Answer: D**

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**3.** The heating process for the extraction of elements are quite old but highly acceptable method for the extraction of elements. Become in this process the elements produced is in the highly pure state. Mostly $As$, $Sb$, $Ni$, $Zr$, $B$ etc are prepared by this principle 4 mumber of metal sulphides which may be reated first in air to partially convert them to the aride, and then further roasted in the absence of air, wing self reduction. For which of the given sulphides auto reduction is applicable

A. CuS

B. PbS

C. HgS

D. All

**Answer: D**

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**4.** The heating process for the extraction of elements are quite old but highly acceptable method for the extraction of elements. Become in this process the elements produced is in the highly pure state. Mostly $As$, $Sb$, $Ni$, $Zr$, $B$ etc are prepared by this principle 4 mumber of metal sulphides which may be reated first in air to partially convert them to the aride, and then further roasted in the absence of air, wing self reduction. The $H_2$(g) is not widely used as a reducing agent because

A. $H_2$ decompose to atomic hydrogen at higher temperature

B. $H_2$ isomerises to orthohydrogen at higher temperature

C. many metal form hydrides at lower temperature

D. there is also a risk of explosion from hydrogen and dioxygen in air

**Answer: C**

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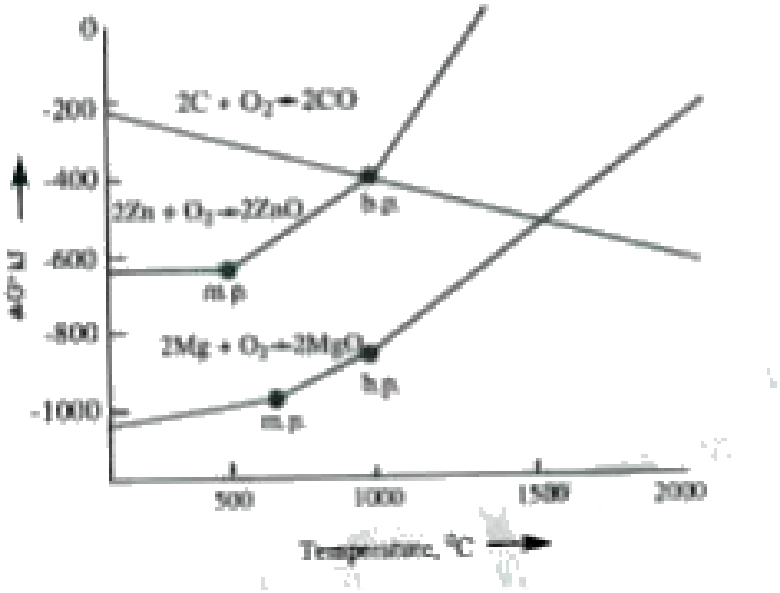
## Level Ii Lectrure Sheet Exercise Ii Passage V

**1.** The Killingham diagram for sing, magnesium and carbon converting into corresponding oxides is shown below :




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

A. $1000^\circ C$

B. $1500^\circ C$

C. $500^\circ C$

D. $1200^\circ C$

**Answer: A**

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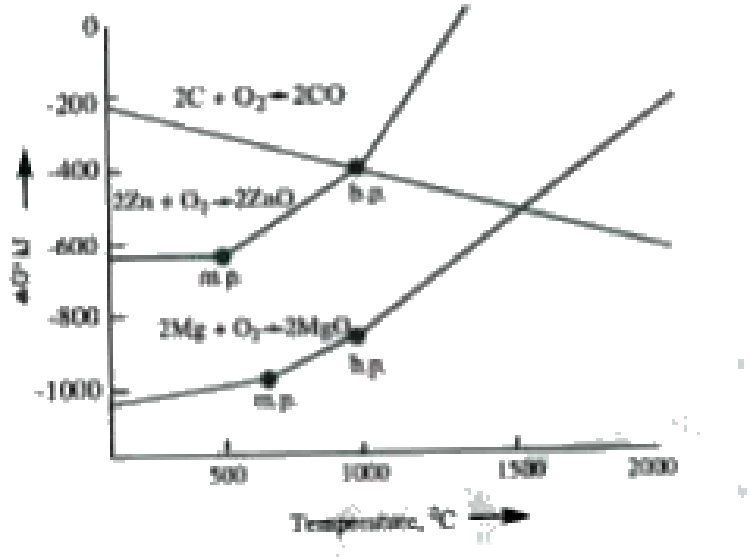
**2.** The Killingham diagram for sing, magnesium and carbon converting into corresponding oxides is shown below :




To make the following reduction process spontaneous, temperature should be

A. $1000^\circ C$

B. $> 1100^\circ C$

C. $< 5000^\circ C$

D. $< 1000^\circ C$

**Answer: B**

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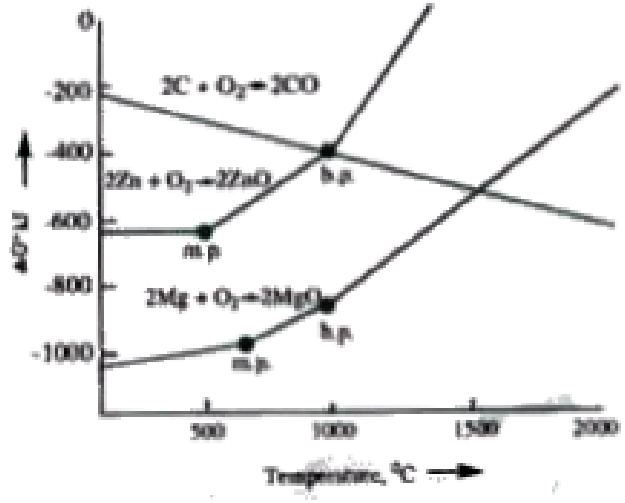
**3.** The Killingham diagram for sing, magnesium and carbon converting into corresponding oxides is shown below :




At $1000^\circ C$ which reaction is spontaneous to a maximum extent ?

A. $MgO + C \rightarrow Mg + CO$

B. $ZnO + C \rightarrow Zn + CO$

C. $MgO + Zn \rightarrow Mg + ZnO$

D. $ZnO + Mg \rightarrow MgO + Zn$

**Answer: D**

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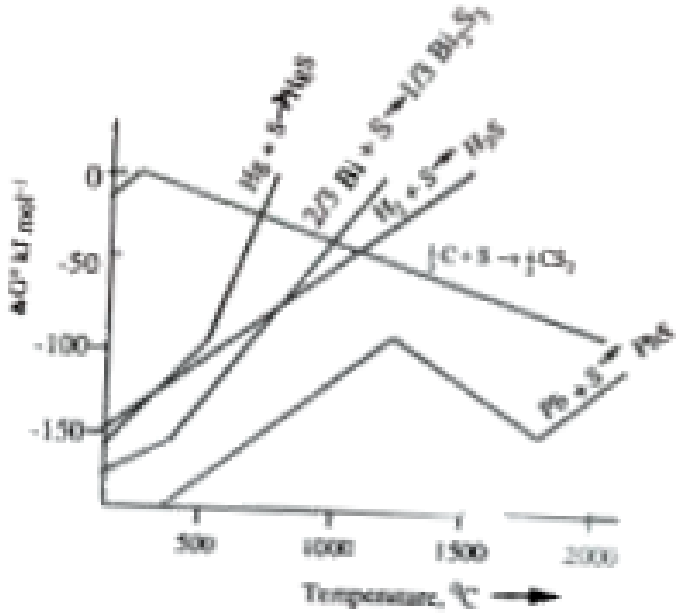
Level Ii Lectrure Sheet Exercise Ii Passage Vi

**1.** The Ellingham diagram for a number of metallic sulphides is shown below




Formation of which of the sulphides is most spontaneous ?

A. HgS

B. $Bi_2S_3$

C. $PbS$

D. $CS_2$

**Answer: C**

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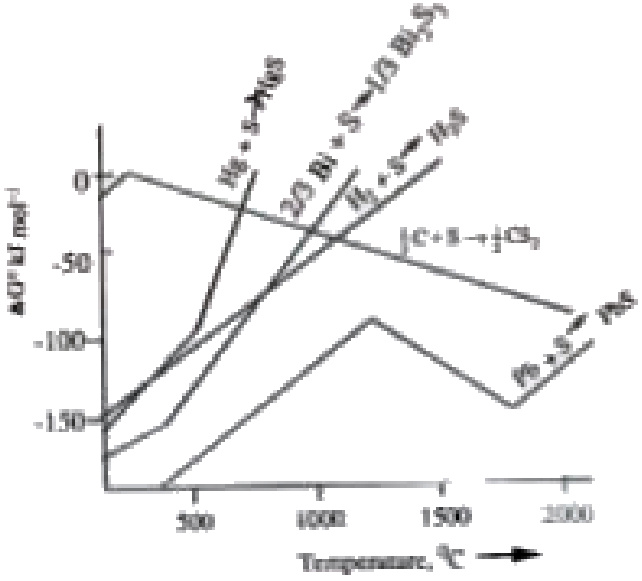
**2.** The Ellingham diagram for a number of metallic sulphides is shown below




Which sulphide occurs to minimum extent in nature

A. HgS

B. $H_2S$

C. $Bil_2S_3$

D. $CS_2$

**Answer: D**

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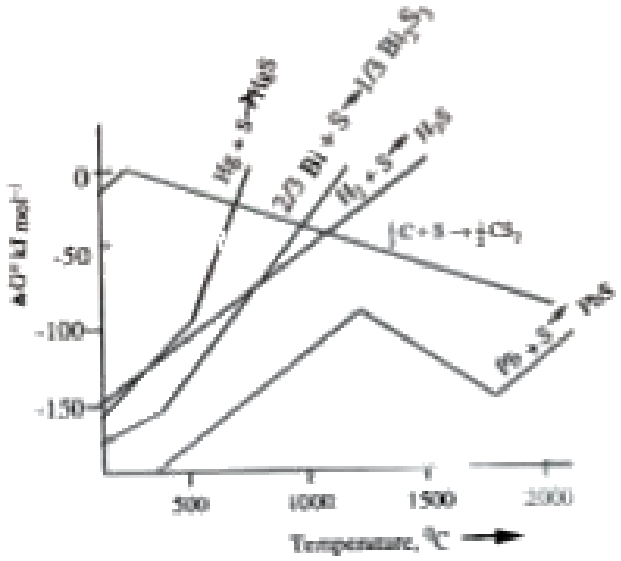
**3.** The Ellingham diagram for a number of metallic sulphides is shown below




Which of the following sulphides can not be reduced to metal by $H_2$ at about $1000^\circ c$

A. HgS

B. PbS

C. $Bi_2S_3$

D. All of these

**Answer: B**

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## Level Ii Lectrure Sheet Exercise Ii Passage Vii

**1.** Magnesium is a valuable, light weight metal used as a structural material as well as in alloy hatteries and in chemical s . Although magnesium is plentiful in Earth s maire found in the sea water after sodium). There is about 1.3 8 of magnesium in every kilogram of se water. The process for obtaining magnesium from en water employs all three types of reaction Le precipitation, acid-base, and redox reactions

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 $H_2SO_4$

**Answer: C**

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**2.** Magnesium is a valuable, light weight metal used as a structural material as well as in alloy hatteries and in chemical s . Although magnesium is plentiful in Earth s maire found in the sea water after sodium). There is about 1.3 8 of magnesium in every kilogram of se water. The process for obtaining magnesium from en water employs all three types of reaction Le precipitation, acid-base, and redox reactions

Redox reaction takes place in the extraction of Mg :

A. in the electrolytic cell when fuse $MgCl_2$ is subjected to electrolysis

B. when fused $MgCO_3$ is heated

C. when fused $MgCO_3$is strongly heated

D. none of the above

**Answer: A**

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## Level Ii Lectrure Sheet Exercise Ii Passage Viii

**1.** $FeCr_2O_4 + NaOH + \text{air} \rightarrow (A) + Fe_2O_3(A) + (B) \rightarrow Na_2Cr_2O_7$

$Na_2Cr_2O_7 + X \xrightarrow{\Delta} Cr_3, O_3Cr_3 + Y(\Delta) \rightarrow Cr$

Compounds (A) and (B) are :

A. $Na_2CrO_4 . H_2SO_4$

B. $Na_2Cr_2O_7, HCl$

C. $Na_2CrO_5, H_2SO_4$

D. $Na_4\left[Fe(OH)_6\right] . H_2SO_4$

**Answer: A**

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**2.** $FeCr_2O_4 + NaOH + \text{air} \rightarrow (A) + Fe_2O_3(A) + (B) \rightarrow Na_2Cr_2O_7$

$Na_2Cr_2O_7 + X \xrightarrow{\Delta} Cr_3, O_3Cr_3 + Y(\Delta) \rightarrow Cr$

(X) and (Y) are :

A. C and Al

B. Al and C

C. C in both

D. Al in both

**Answer: A**

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**3.** $FeCr_2O_4 + NaOH + \text{air} \rightarrow (A) + Fe_2O_3(A) + (B) \rightarrow Na_2Cr_2O_7$

$Na_2Cr_2O_7 + X \xrightarrow{\Delta} Cr_3, O_3Cr_3 + Y(\Delta) \rightarrow Cr$

$Na_2CrO_4$ 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

**Answer: C**

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## Level Ii Lectrure Sheet Exercise Iii

**1.** Match the following questions Match Column (Metal) with Column - 1 (Process of extraction) and select the correct answe using the codes given below the Columns

| COLUMN - I (Metal) | COLUMN - II (Process of extraction) |
|---|---|
| A) Aluminium | p) Blast furnace |
| B) Iron | q) Mond's process |
| C) Nickel | r) Bayer's process |
| D) Copper | s) Froth floatation |

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**2.** Match Column-1 with Column - Il and select the correct answer using the codes given below the Columns :

| COLUMN - I | COLUMN - II |
|---|---|
| A) Van Arkel method | p) Refining of silver |
| B) Solvay process | q) Purification of titanium |
| C) Cupellation | r) manufacture of $Na_2CO_3$ |
| D) Poling | s) Purification of copper |

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**3.** Match Column with Columll and select the correct answer using the codes given below Columns:

| COLUMN - I (Mineral) | COLUMN - II (Formula) |
|---|---|
| A) Mirabilite | p) $Al_2O_3.\ 2SiO_2.2H_2O$ |
| B) Kaolin | q) $CuFeS_2$ |
| C) Chalcopyrite | r) $2Fe_2O_3.3H_2O$ |
| D) Limonite | s) $Na_2SO_4.10H_2O$ |

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**4.** Match Column - with Column II and select the correct answer using the codes given below the Columns :

| COLUMN - I (Metals) | COLUMN - II (Ores) |
|---|---|
| A) Zinc | p) Azurite |
| B) Tin | q) Carnalite |
| C) Copper | r) Calamine |
| D) Magnesium | s) Cassiterite |

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**5.** Match Column with Column - II and select the correct answer using the codes given below Columns :

| COLUMN - I | COLUMN - II |
|---|---|
| A) Bauxite | p) Copper |
| B) Monazite | q) Uranium |
| C) Malachite | r) Thorium |
| D) Pitch blende | s) Aluminium |

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**6.** Match the extraction processes listed in Column with metals listed in Column:

| COLUMN - I | COLUMN - II |
|---|---|
| A) Self reduction | p) Lead |
| B) Carbon reduction | q) Silver |
| C) Complex formation and displacement by metal | r) Copper |
| D) Decomposition of iodide | s) Boron |

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**7.** Match the following columns

| COLUMN - I | COLUMN - II |
|---|---|
| A) poling | p) Titanium |
| B) Cupellation | q) Copper |
| C) Electro refining | r) Silver |
| D) van arkel method | s) Tin |

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**8.** Match the following columns

| COLUMN - I | COLUMN - II |
|---|---|
| A) Mond's process | p) $Cr_2O_3 + 2Al \xrightarrow{\Delta} 2Cr + Al_2O_3$ |
| B) van Arkel process | q) $TiCl_4 + 2Mg \xrightarrow{\Delta} Ti + 2MgCl_2$ |
| C) Thermite process | r) $Ni(CO)_4 \xrightarrow{\Delta} Ni + 4CO$ |
| D) Kroll's process | s) $ZrI_4 \xrightarrow{\Delta} Zr + 2I_2$ |

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**9.** Match the following columns

| COLUMN - I | COLUMN - II |
|---|---|
| A) Pb | p) Bessemerisation |
| B) Cu | q) Roasting |
| C) Zn | r) Pyrometallurgy |
| D) Fe (Steel) | s) Self - reduction method |

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## Practice Sheet 1 Single Or More Than One Option Questions

**1.** The froth-floation process is based upon

A. magnetic properties of gange

B. specific gravity of ore particles

C. prefential wetting of ore particles

D. preferential wetting of gangue

**Answer: C**

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**2.** The process of removing of lighter ganse particles by washing in a current of water is called

A. levigation

B. liquation

C. leaching

D. cupellation

**Answer: A**

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**3.** Gravity separation method is based upon

A. prefential washing of ores and gangue particles

B. diferences in dinsities of ore particles and impurities

C. diferences in chemical properties of ore particles and impurities

D. none

**Answer: B**

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**4.** Which of the following is a foaming agent in froth flation process

A. pine oil

B. amyl xanthate

C. $CuSO_4$

D. $KCN$

**Answer: A**

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**5.** The substance used as an activator in froth floation process

A. Potasium ethyl xanthate

B. NaCN

C. $CuSO_4$

D. pipe oil

**Answer: C**

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**6.** Which of the following is used as depressant in froth floatation process.

A. Amyl xanthate

B. pine oil

C. $CuSO_4$

D. KCN

**Answer: D**

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**7.** Rutile is seperated from chlonapatite by

A. Froth floation method

B. levigation

C. electromagnetic seperation method

D. electrostatic seperation method

**Answer: C**

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**8.** Roasting process is applied to which of the following ores

A. Galena

B. arsenoprites

C. copperglance

D. all

**Answer: D**

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**9.** In which of following ces calcination process is not appliable

A. $CaCO_3$

B. $Al_2O_32H_2O$

C. $CuCO_3.Cu(OH)_2$

D. $ZnS$

**Answer: D**

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**10.** Calcination is used in metallurgy for removal of

A. water and sulphide

B. water and $CO_2$

C. $H_2O$ and $H_2S$

D. water and $CO_2$ and $H_2S$

**Answer: B**

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**11.** Carbonate ores are mostly of

A. group 1 elements b) group

B. group 2 element

C. group 3 elements

D. group 4 elements

**Answer: B**

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**12.** Of the following the metals that cannot be obtained by eletrolysis at the aqueous solution of their salts are

A. Ag

B. Mg

C. Cu

D. Al

**Answer: B::D**

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**13.** Which of the following minerals contains Fe

A. magnetite

B. magnesite

C. siderite

D. lemonite

**Answer: A::C::D**

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**14.** Which of the following ore is/are extracted from its oxide by sir reduction method

A. Cu

B. Hg

C. Al

D. Pb

**Answer: A::B::D**

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**15.** Beryl is mineral of

A. Be

B. Al

C. Mg

D. Fe

**Answer: A::B**

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**16.** Bistler copper is purified by

A. paling

B. cupellation

C. electro refining

D. Bessemeiziation

**Answer: A::C**

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## Practice Sheet 1 Passage I

**1.** Silver metal is extracted from $Ag_2S$ by cyanide process. The one is concentrated through froth floation process. The concentrated ore is the leached and solution is r ed with reducing agents to get spongy silver

which then purified by fusion with an oxidant followed by electrolysis.

Leaching of $Ag_2S$ is carried out by heating it with a dilute solution of

A. NaCN alone

B. NaCN in presence of $O_2$

C. HCl

D. NaOH

**Answer: B**

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**2.** Silver metal is extracted from $Ag_2S$ by cyanide process. The one is concentrated through froth floation process. The concentrated ore is the leached and solution is r ed with reducing agents to get spongy silver which then purified by fusion with an oxidant followed by electrolysis.

Ag is precipitated from an aqueous solution of sodium argentocynide by adding

A. Zn dust

B. Cu power

C. NaHg

D. $Na_2S_2O_3$

**Answer: A**

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**3.** Silver metal is extracted from $Ag_2S$ by cyanide process. The one is concentrated through froth floation process. The concentrated ore is the leached and solution is r ed with reducing agents to get spongy silver which then purified by fusion with an oxidant followed by electrolysis. Which of the following statements about electrolytic refining of silver is not true

A. Anode consists of impure silver

B. cathode consists of pure silver

C. Electrolytic solution consists of $AgNO_3$ and $HNO_3$

D. Elecipitated solution consists of $AgNO_3$ and $HCl$

**Answer: C**

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## Practice Sheet 1 Passage Ii

**1.** A black are [x]on fraiment $Na_2CO_3$ in the presence of air gives a green compound (a). When Rreen compound (a) died in water it producess dark precipitate (b) and pink solution (e) crystal of (e) when treated with propene produces dark ppr (b)

Geometry around central atom in (a) and (c) respectively

A. tetrahedral, tetrahedral

B. square planar, tetrahedral

C. octahedral, tetrahedral

D. tetrahedral, octahedral

**Answer: A**

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**2.** A black are [x]on fraiment $Na_2CO_3$ in the presence of air gives a green compound (a). When Rreen compound (a) died in water it producess dark precipitate (b) and pink solution (e) crystal of (e) when treated with propene produces dark ppr (b)

Metal present in ore extracted by

A. electrolytic method

B. cyanide process

C. thermite process

D. self reduction

**Answer: C**

Watch Video Solution

**3.** A black are [x]on fraiment $Na_2CO_3$ in the presence of air gives a green compound (a). When Rreen compound (a) died in water it producess dark precipitate (b) and pink solution (e) crystal of (e) when treated with propene produces dark ppr (b)

Solution $\xrightarrow{Sa_2 / H^+} (d)\text{solution} \xrightarrow[(R)]{\text{reagent}} (c)$ solution reagent (R) can be used.

A. $OH^- / SO_3$

B. $H_2O / H^+$

C. $PbO_2 / H^+$

D. $Sn^{+2} / H^+$

**Answer: C**

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Practice Sheet 1 Match The Following Questions

**1.** Match the following columns

| COLUMN - I | COLUMN - II |
|---|---|
| A) chalcopyrite → copper (pure) | p) froth floatation |
| B) zinc blend → zinc (pure) | q) carbon reduction |
| C) Bauxite → aluminium (pure) | r) Roasting |
| D) gelena → Lead (pure) | s) Au |
| | t) electrolytic refining |

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**2.** Match the following columns

| COLUMN - I | COLUMN - II |
|---|---|
| A) Mica | p) Lead |
| B) Limonite | q) copper |
| C) cerussite | r) aluminium |
| D) Azurite | s) carbonate ore |

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## Practice Sheet 1 Integer Answer Type Questions

**1.** The oxidation state of Al in cryolite

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**2.** What is oxidation state of Fe in fools gold

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**3.** Galena $\xrightarrow{\text{roasting}}$ etal oxide + gas oxidation state of 's' in galena - oxidation state of product

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**4.** Epsom salt is $MgSO_4H_2O$ What is the value of x' in epsom salt

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**5.** The ratio of Cu and Sn metals in bronze

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**6.** The number of transition metals present in Rinmann's greens compound.

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## Practice Sheet 2 Single Or More Than One Option Questions

**1.** The correct statement is

A. Dolomite is the ce of Zinc

B. Galena is the ore of mercury

C. Pyrolusite is the one of Iron

D. Cassiterite is the ore of Tin

**Answer: D**

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**2.** Which is knwis blister copper

A. Pure copper

B. 98% copper

C. Ore of coppe

D. Alloy of copper

**Answer: B**

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**3.** In the metallurgy of Zinc, the Zine dust obtained from roasting and reduction of ZnS contains same It is removed by

A. Absorbance of UV light and reemission of white light

B. Shock cooling by contact with a shower of molten lead

C. X-ray method

D. smelting

**Answer: B**

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**4.** Which ore contains both Cu and Fe?

A. Cuprite

B. Chalcocite

C. Chalcopyrite

D. Malachite

**Answer: C**

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**5.** Statement: 1 For the change occuring during roasting of sphalerite, the entropy change is negtive

Statement-2. Two different compounds of Zine are formed during roasting

A. Both I and II are correct and II is correct explanation of I

B. Both in and II are correct and li is not correct explanation of l

C. is true but ll is false

D. is false but II is true

**Answer: B**

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**6.** Statement 1: For extraction of copper, malachite is calcunited but chalcocite is roasted

Statement 2: Both roasting and calisation conert all the ares into their oxides

A. Both I and II are correct and II is correct explanation of I

B. Both in and II are correct and li is not correct explanation of l

C. is true but II is false

D. is false but II is true

**Answer: C**

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**7.** The electrolyte used for the electrolytic refining of Tin is

A. Tin sulphate acidified with $H_2S_4$

B. Molten tin sulphate

C. Hydrofluoro slilicic and containing $SnSO_4$ acidified with $H_2SO_4$

D. Aqueous stannoes chloride with HCl

**Answer: C**

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**8.** An ore contains PbS, ZnS, and FeS2, During separation of the three by froth flotation, the role of $CuSO_4$

A. To make Zns wettable by froth

B. To depress the flotation of $FeS_2$

C. To react with excess NaCN

D. To stabilize ZnS in froth

**Answer: A**

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**9.** An ore is subjected to roasting on doing so, agus A is liberate and the metal is obtained in state. Il gas turns acidified dichromate paper green the one is

A. Casiterite

B. Copper glance

C. Malachite

D. Sphalerite

**Answer: B**

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**10.** Consider the following reaction at $1000^\circ C$

$Zn_{(s)} + \frac{1}{2}O_{2(g)} \rightarrow ZnO \quad \Delta G^\circ = -3690 KJ/\text{mol}$

$C + \frac{1}{2}O_2 \rightarrow CO(g) \quad \Delta G^\circ = 460 KJ/\text{mol}$

Choose the correct statement.

A. Zinc can be oxidised by

B. ZnO can be reduced by graphite

C. Botha and h are true

D. Botha and b are false

**Answer: B**

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**11.** Which metals) is (are)non- volatile?

A. Cu

B. Zn

C. Pb

D. Cd

**Answer: B::D**

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**12.** In which of the following processes, calcium silicate slag is formed. Extraction of

A. Tin from casierile

B. Copper from copper pyrite

C. Zinc from Zinc blende

D. Iron from hematite

**Answer: A::D**

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**13.** In metallurgy, ane may be dissolved in water and the element may be displaced from solution using mother cheap element An E mple for this

A. Solution of Cd + Zn metal

B. Sea water containing $Br_2 + Cl_2$

C. Solution of $Fe + Cu$ metal

D. Solution of Zn+Ag metal

**Answer: A::B**

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**14.** Refining of Tin can be done by

A. Cupellation

B. Liquation

C. poling

D. Electrorefining

**Answer: B::C::D**

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**15.** Metals which can be extracted by smelting process is/are

A. Sn

B. Cu

C. Zn

D. Al

**Answer: A::B**

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## Practice Sheet Single Or More Than One Option Questions

**1.** During bessemerisation of copper, the reaction taking place in the bessemer conventor is

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

B. $Cu_2O + Fes \rightarrow Cu_2S + FeO$

C. $FeO + SiO_2 \rightarrow FeSiO_3$

D. None of these

**Answer: A::C**

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## Practice Sheet 2 Passage I

**1.** Copper is the most moble of first row transition meals and occurs in small deposits in several countries ares of copper include chalcanthite $(CuSO_45H_2O)$, afecamie $(CuCHOH)_3)$, cuprite$(Cu_2O)$ Copper glance $(Cu_2S)$ and rolachite $\left(Cu_2(OH)_2CO_3\right)$. However, 80% of the world copper production comes from the ore chalcopyrite $(CuFeS_2)$. The extraction of copper from chalopyrite in polves partial roasting, removal of Iron self-reduction.

Partial Roasting of chalcopyrite produces

A. $Cu_2S$ and $FeO$

B. $Cu_2O$ and $FeO$

C. $CuS$ and $Fe_2O_3$

D. $Cu_2 \rightarrow$ and $Fe_2O_3$

**Answer: A**

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Practice Sheet 2 Passage I

**1.** Copper is the most moble of first row transition meals and occurs in small deposits in several countries ares of copper include chalcanthite $(CuSO_45H_2O)$, afecamie $(CuCHOH)_3)$, cuprite$(Cu_2O)$ Copper glance $(Cu_2S)$ and rolachite $(Cu_2(OH)_2CO_3)$. However, 80% of the world copper production comes from the ore chalcopyrite $(CuFeS_2)$. The extraction of copper from chalopyrite in polves partial roasting, removal of Iron self-reduction.

Iron is removed from chalcopyrite as

A. FeO

B. $FeS$

C. $Fe_2O_3$

D. $FeSiO_3$

**Answer: D**

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## Practice Sheet 2 Passage I

**1.** Copper is the most moble of first row transition meals and occurs in small deposits in several countries ares of copper include chalcanthite $(CuSO_45H_2O)$, afecamie $(CuCHOH)_3)$, cuprite$(Cu_2O)$ Copper glance $(Cu_2S)$ and rolachite $(Cu_2(OH)_2CO_3)$. However, 80% of the world copper production comes from the ore chalcopyrite $(CuFeS_2)$. The extraction of copper from chalopyrite in polves partial roasting, removal of Iron self-reduction.

In sell reduction the reducing species is

A. S

B. $O^{-2}$

C. $S^{-2}$

D. $SO_2$

**Answer: C**

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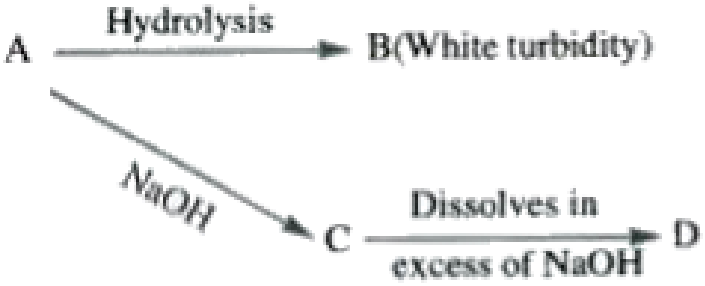
Practice Sheet 2 Passage Ii




**1.**

Transparent glassy solid strongly reducing, purple of cassius reduces and gives chromyl chloride test.

A is

A. $SnCl_2$

B. $Sn(OH)Cl$

C. $Sn(OH)_2$

D. $Na_2SnO_2$

**Answer: A**

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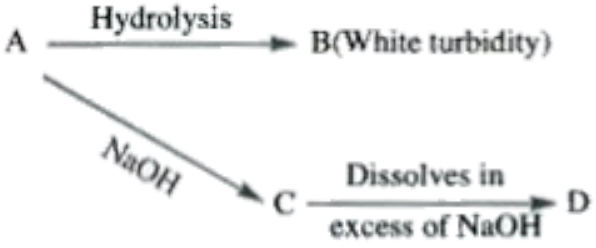
## Practice Sheet 2 Passage Ii




**1.**

Transparent glassy solid strongly reducing, purple of cassius reduces and gives chromyl chloride test.

B is

A. $SnCl_2$

B. $Sn(OH)Cl$

C. $Sn(OH)_2$

D. $Na_2SnO_2$

**Answer: B**

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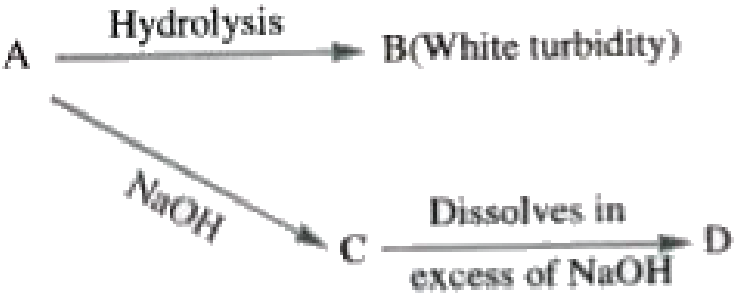


**2.**

Transparent glassy solid strongly reducing, purple of cassius reduces and gives chromyl chloride test.

C is

A. $SnCl_2$

B. $Sn(OH)Cl$

C. $Sn(OH)_2$

D. $Na_2SnO_2$

**Answer: C**

Watch Video Solution

Practice Sheet 2 Match The Following Questions

| COLUMN - I | COLUMN - II |
| --- | --- |
| A) Froth flotation | p) Pb ore |
| B) Self reduction | q) Cu ore |
| C) Roasting | r) Fe ore |
| D) Pyrometallurgy | s) Sn ore |
| | t) Zn ore |

1.

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## Practice Sheet 2 Match The Following Questions

| COLUMN - I | COLUMN - II |
| --- | --- |
| A) Iron and copper | p) Poling |
| B) Zirconium and Titranium | q) Besse merisation |
| C) Lead and Tin | r) Van-Arkel |
| D) Copper and Tin | s) Liquation |

1.

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## Practice Sheet 2 Integer Answer Type Questions

**1.** $Ag_2S + NaCN + Zn \rightarrow Ag + W$

In W the corrdination number of Z in

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**2.** Howmany metals are present in the ore chalcopyrite, from which 80% of the world's copper production comes.

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**3.** In the Auto oxidation taking place in Bessemer converter during the extraction of copper. The change in oxidation state of sulphur in this process is

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**4.** In chlorination roasting Tin ore is converted into its halide. In this process how many moles of chloride is required

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**5.** Howmany metals are commercially extracted by pyrometallurgy from the given metals?( Cu, Fe, Sn, Au, K, Na )

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**6.** Find the number of metals which are commercially reduced by self-reduction from the gives metals Ag, Cr, Mn, Sn, Zn, Fe

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## Practice Sheet 3 Single Or More Than One Option Questions

**1.** Hydrometallurgy is useful in the extraction of

A. Sn

B. Al

C. Hg

D. Ag

**Answer: D**

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**2.** Complex formation or cyanide method is used for the extraction of

A. Cu

B. Fe

C. Hg

D. Ag

**Answer: D**

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**3.** In the extraction of lead from its or galena am inportant element recovered is

A. Au

B. Ag

C. Cr

D. C

**Answer: B**

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**4.** In the cyanide extraction process of silver from argentite ore, the oxidising and reducing agents used as

A. $O_2$ and $CO$ respectively

B. $O_2$ and $Zn$ dust respetively

C. $HNO_3$ and Zn dust respectivey

D. $HNO_3$ and $CO$ respectively

**Answer: B**

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**5.** Powdered silver ore is rated with NaCN solution and all bubled through the mixture to give

A. $AgCN$

B. Ag

C. $Ag(CN)_2$

D. $Na[Ag(CN)_2]$

**Answer: D**

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**6.** Ag' obtained from angenerous leadis purified by

A. Distillation

B. Forth floatation

C. Cupellation

D. Reaction with KCN

**Answer: C**

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**7.** A Gold is found wally neat ... Mineral

A. Mica

B. Feldspar

C. Quartz

D. Glena

**Answer: C**

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**8.** From gold amalgam, sled may be recovered by

A. Additon of Zn metal

B. Electrolytic refining

C. Distillation

D. Dissolving Hg in $HNO_3$

**Answer: C**

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**9.** Gold extracted using

A. Amalgamation process

B. Carbon reduction process

C. Oxidation process

D. Electrolytic process

**Answer: A**

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**10.** Roasted gold ore $+CN^- + H_2O \xrightarrow{O_2} [x] + OH, [x] + Zn \rightarrow [y] + Au[x]$ and $|y|$ are

A. $x = [Au(CN)_2]^-$ $y = [Zn(CN)_4]^{-2}$

B. $x = [Au(CN)_4]^{-3}$ $y = [Zn(CN_4)]^{-2}$

C. $x = [Au(CN)_2]^-$ $y = [Zn(CN)_6]^{-4}$

D. $x = [Au(CN)_4]^{-3}$ $y = [Zn(CN)_6]^{-2}$

**Answer: A**

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**11.** In the extraction of which of the following metal's amalgamation process is used?

A. Ag

B. Au

C. Cu

D. Fe

**Answer: A::B**

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**12.** Which of the folloing is ore extracted from sulphide ores?

A. Cu

B. Ag

C. Pb

D. Zn

**Answer: A::B::C::D**

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**13.** Ag is extracted by

A. Capellation method

B. Parke's process

C. Pattinson's process

D. None of these

**Answer: A::B::C**

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**14.** Which metal occurs in Freestate?

A. Ag

B. Au

C. Pt

D. Cu

**Answer: A::B::C::D**

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**15.** Which out of the following metals can be obtained by clectolysis of the aqueous solution of their

A. Ag

B. Mg

C. Au

D. Na

**Answer: A::C**

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**16.** Silver containing lead as an impurity is not purified by

A. Poling

B. Cupellation

C. Levigation

D. Pistillation

**Answer: A::C**

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## Practice Sheet 3 Passage I

**1.** Gold dissolves in cyanide solution the presence of air to form $\left[Au(CN)_3\right]$ which is stable in a cons solution.

$$Au_{(s)} + CN^-_{(s)} + O_2 + H_2O_2 \Leftrightarrow \left[Au(CN)_2\right]^-_{(aq)} + OH^-_{(aq)}$$

Aquaregia a 3 : 1 mixture of conc. HC and $HNO_3$ was developed by the alchemists as a means to dissolve gold. The process is actually a Redox reaction.

$$Au_{(s)} + NO_{3(aq)} + Cl^- \Leftrightarrow AuCl^-_{4(aq)} + NO_{2(g)}$$

Gold is too noble to react with $HNO_3$ However gold does react with a waregia becuase the complex $AuCl^-_4$ forms

$$Au^{+3}_{(aq)} + 3e^- \rightarrow Au_{(s)} \, E^{\theta} = 15V \rightarrow I$$

$$AuCl^-_{4(aq)} + 3e^- \rightarrow Au_{(s)} + 4Cl^-_{(q)} \, E^0 = 1V \rightarrow 2$$

How many grams, approximately of NACN are needed to extract 20g of gold from are?

A. 20 g

B. $6.5g$

C. $10g$

D. $8g$

**Answer: C**

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**2.** Gold dissolves in cyanide solution the presence of air to form $\left[Au(CN)_3\right]$ which is stable in a cons solution.

$$Au_{(s)} + CN^-_{(s)} + O_2 + H_2O_2 \Leftrightarrow \left[Au(CN)_2\right]^-_{(aq)} + OH^-_{(aq)}$$

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$$Au^{+3}_{(aq)} + 3e^- \rightarrow Au_{(s)}\, E^\theta = 15V \rightarrow I$$

$$AuCl^-_{4(aq)} + 3e^- \rightarrow Au_{(s)} + 4Cl^-_{(q)}\, E^0 = 1V \rightarrow 2$$

Calculate the formation constant approximately, of Auct at $25^\circ C$

A. $10^5$

B. $10^{25}$

C. $10^{12}$

D. $10^{42}$

**Answer: B**

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**3.** Gold dissolves in cyanide solution the presence of air to form $\left[Au(CN)_3\right]$ which is stable in a cons solution.

$$Au_{(s)} + CN^-_{(s)} + O_2 + H_2O_2 \Leftrightarrow \left[Au(CN)_2\right]^-_{(aq)} + OH^-_{(aq)}$$

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The function of HC is to provide C what is the purpose of the Cr in the above reaction select your choice from the following.

A. It is an oxidising agent

B. It is a reducing agent

C. It is a complexing agent

D. It is a catalyst

**Answer: C**

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## Practice Sheet 3 Passage Ii

**1.** Much of the world supply of planinam group metal Le, desived from the residues recovered from the electrolytic retining of copper and nickyl. The residues when heated with aquaria the sold, and pd go in to solution. This is filtered off and to the filiate on adding Ferrous sphate solution gold is preciated the platinum and palladium remain in solution.

The solubility of the gold platinum and palladium in aquaregia is due to the formation of

A. $AuCl, PtCl_2, PdCl_2$

B. $AuCl_3, PtCl_4, PdCl_4$

C. $HAuCl_4, H_2PtCl_6, H_2PdCl_4$

D. $HAuCl_4, H_2PtCl_4, H_2PdCl_4$

**Answer: C**

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**2.** Much of the world supply of planinam group metal Le, desived from the residues recovered from the electrolytic retining of copper and nickyl. The residues when heated with aquaria the sold, and pd go in to solution. This is filtered off and to the filiate on adding Ferrous sphate solution gold is preciated the platinum and palladium remain in solution.

The role of Ferrous sulphate in the recipitation of gold is

A. Oxidation

B. Reductant

C. Complex agent

D. Substituent

**Answer: B**

Watch Video Solution

**3.** Much of the world supply of planinam group metal Le, desived from the residues recovered from the electrolytic retining of copper and nickyl. The residues when heated with aquaria the sold, and pd go in to solution. This is filtered off and to the filiate on adding Ferrous sphate solution gold is preciated the platinum and palladium remain in solution.

The structures of compounds of Pt and Pd remained in the solution are

A. Square planar and square planar

B. Square planar and Tetrahedral

C. Tetrahedral and Square planar

D. Octahedral and Square planar

**Answer: D**

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## Practice Sheet 3 Match The Following Questions

1.

| COLUMN - I | COLUMN - II |
|---|---|
| A) Soluble in a conc.$NH_3$Solution | p) $Ag_2S$ |
| B) Soluble in excess KCN solution | q) $Cu(OH)_2$ |
| C) Soluble in excess hypo solution | r) AgBr |
| D) Soluble in conc.HCl | s) AgCl |

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2.

| COLUMN - I | COLUMN - II |
|---|---|
| A) Mond's process | i) Purification of Ge |
| B) Von Arkel method | ii) Purification of Ni |
| C) Zone refining | iii) Extraction of Au |
| D) Polling | iv) Purification of Ti |
| E) Cupellation | v) Refining of Ag |
| F) Cyanide process | vi) Purification of Cu |

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## Practice Sheet 3 Integer Answer Type Questions

**1.** How many of the following are silver ores

(a) Chlorargirite (b) Argentitei

(c) Pyrargirite (d) Azurite

(e) Calamine

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**2.** Roasted gold ore $+CN^- + H_2O + \xrightarrow{O_2} x + OH^-$, What is the oxidation at 'Au' is complex 'x

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**3.** How many cyanide ions are involved in the following chemical equation

$Au + CN^- + H_2O + O_2 \rightarrow \left[Au(CN)_2\right]^- + OH^-$

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**4.** How many metals are commercially extracted by electrometallurgy from the given metals? Al, Mg, Na, K, A, Hg. Ti, Th, Zt, B

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**5.** How many of the following are oxide ores. Calamine, Cuprite, Zincite, Chalcocite, Haematite, Bauxite, Magnetite, Caesiterite.

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**6.** How many metals are commercially extracted by hydro metallurgy from the given metals

Ag, Mn, In, Cr, Pb, Au

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## Practice Sheet 4 Single Or More Than One Option Questions

**1.** In Costner's process the correct anodic reaction and the type of reaction occurs at anode is

A. $OH^- \rightarrow H_2 + O_2$ Reduction

B. $4OH^- \rightarrow 2H_2O + I_2 + 4e^-$ Oxidation

C. $2OH^- \rightarrow H_2 + O_2$ Oxidation

D. None

**Answer: B**

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**2.** The substance added to NaCl in Down's process to lower the melting point of NaCl is

A. NaCl

B. $K_2CO_3$

C. $CaCl_3$

D. $AlCl_3$

**Answer: C**

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**3.** Sea Water contains magnesium in the form of

A. Carbonate

B. Chloride

C. Sulphate

D. Both b and c

**Answer: D**

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**4.** $Al_2O_3 \rightarrow AlN \rightarrow A(OH)_3 \rightarrow Al_2O_3$. The sequence of these products involved in

A. Bayer's process

B. Serpecks process

C. Hall's process

D. Hope's process

**Answer: B**

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**5.** In the purification of bauxite by Hall's process

A. The bauxite one is heated with concentrated NaOH solution at $150^\circ C$

B. The bauxite ore is heated with $NaHCO_3$

C. The bauxite ore is mixed with coke and heated at $1800^{\circ}C$ in a current of $N_2$

D. The bauxite ore is fused with $Na_2CO_3$

**Answer: D**

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**6.** In Bayer's process before digesting the one with concentrated Sodium hydroxide it must be

A. Dissolved in cryolite

B. Roasted to convert FeO to $Fe_2O_3$

C. Evaperated to remove water

D. Dissolved in $CaF_2$

**Answer: B**

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**7.** Which of the following reagent is used to separate the impurity from red bauxite

A. Conc HCl

B. Conc. $H_2SO_4$

C. NaOH

D. $HNO_3$

**Answer: C**

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**8.** A mixture of $Al_2O_3$ and $Fe_2O_3$ can be separated by using

A. Sodium hydroxide

B. Cold water

C. Ethyl alcohol

D. Boling wate

**Answer: A**

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**9.** Match the following

| | |
|---|---|
| A) Felspar | I) $[Ag_3SbS_3]$ |
| B) Asbestos | II) $Al_2O_3 \cdot H_2O$ |
| C) Pyrargyrite | III) $MgSO_4 \cdot H_2O$ |
| D) Diaspore | IV) $K\,AlSiO_3O_8$ |
| | V) $Ca\,Mg_3(SiO_3)_4$ |

The correct answer is

A. $\begin{matrix} A & B & C & D \\ IV & V & II & I \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ IV & V & I & II \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ IV & I & III & II \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ II & V & IV & I \end{matrix}$

**Answer: B**

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**10.** The formula of 'Spinel' is $AB_2O_4$ where As..... and B is

| | A | B |
|---|---|---|
| a) | IIA element | IIIA element |
| b) | IIIA element | IIA element |
| c) | Transistion metal in +3 state | Transistion metal in +2 state |
| d) | IIA element | Transistion metal in +2 state |

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**11.** The function of adding cryolite in the electrolytic reduction of alumina by Hall Herault process is

A. Dissolve alumina

B. Lower the melting point of alumina

C. Lower the fuel boiling point

D. Increase the electrical conductivity of alumina

**Answer: A::B::C::D**

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**12.** Which is (are) ore) of aluminium

A. Cryolite

B. Bauxite

C. Malachite

D. Cuprite

**Answer: A::B**

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**13.** Which of the following minerals/ores contains magnesium

A. Magnetite

B. Magnesite

C. Asbestos

D. Carnalite

**Answer: B::C::D**

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**14.** Electro metallurgical process (electrolysis of fused electrolytc) is employed to extract

A. Iron

B. Alluninium

C. Silver

D. Sodium

**Answer: B::D**

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**15.** Which of the following statements regarding the metallurgy of magnesium using electrolytic method is not correct

A. Electrolyte is magnesium chloride containing a little of NaCl and NaF

B. Air tight iron pot acts as a cathode

C. Electrolysis is not done in the atmosphere of coal gas

D. Molten magnisium is heavier than the electrolyte

**Answer: C::D**

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**16.** $Ca_3(PO_4)_2$ is

A. Thomas slag

B. Used in cement manufacuring

C. Used to magnufacture of phosphorus fertilizer

D. Used to a refractory material

**Answer: A::B::C**

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## Practice Sheet 4 Passage I

**1.** Sea water contains small quantities of $MgCl_2$ and $MgS_4$ Sea water is treated with slaked limeto precipitate the dissolved salty as $Mg(OH)_2$ The $Mg(OH)_2$ is dissolved in a little quantity of HCI and $MgCl_26H_2O$ is crystallised from solution. The hydrated $MgCl_2$ is heated in a current of dry HCl gas to get anhydrous $MgCl_2$ Pused anhydrous $MgCl_2$ is subjected to electrolysis. Magnesium deposited at cathode.

Which of the following process is used in the extractive metallurgy of magnesium

A. Fused salt electrolysis

B. Self reduction

C. Aqueous solution electrolysis

D. Thermitt reduction

**Answer: A**

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**2.** Sea water contains small quantities of $MgCl_2$ and $MgS_4$ Sea water is treated with slaked limeto precipitate the dissolved salty as $Mg(OH)_2$ The $Mg(OH)_2$ is dissolved in a little quantity of HCI and $MgCl_26H_2O$ is crystallised from solution. The hydrated $MgCl_2$ is heated in a current of dry HCl gas to get anhydrous $MgCl_2$ Pused anhydrous $MgCl_2$ is subjected to electrolysis. Magnesium deposited at cathode.

Magnesium metal is extracted from

A. Carnalite

B. Magnesite

C. Sea water

D. All of these

**Answer: D**

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**3.** Sea water contains small quantities of $MgCl_2$ and $MgS_4$ Sea water is treated with slaked limeto precipitate the dissolved salty as $Mg(OH)_2$ The $Mg(OH)_2$ is dissolved in a little quantity of HCI and $MgCl_26H_2O$ is crystallised from solution. The hydrated $MgCl_2$ is heated in a current of dry HCl gas to get anhydrous $MgCl_2$ Pused anhydrous $MgCl_2$ is subjected to electrolysis. Magnesium deposited at cathode.

In the Hanging method magnesia is a reved by using

A. Si

B. $CaC_2$

C. $FeSi$

D. Coke

**Answer: D**

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## Practice Sheet 4 Passage Ii

**1.** Magnesium is a valuable, light weight metal used as a structural material as well as in all batteries and in chemical synthesis. Although magnesium is plentiful in carth crust, it is ma found in the sea water after sedium. There is about 1.38 of magnesium in every kilogram of water. The process for obtaining magnesium from se water employs all three types of reach le... precipitation acid-hase and redor racions.

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 $H_2SO_4$

**Answer: C**

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**2.** Magnesium is a valuable, light weight metal used as a structural material as well as in all batteries and in chemical synthesis. Although magnesium is plentiful in carth crust, it is ma found in the sea water after sedium. There is about 1.38 of magnesium in every kilogram of water. The process for obtaining magnesium from se water employs all three types of reach le... precipitation acid-hase and redor racions.

Redox reaction takes place in the extraction of Me

A. In the electrolytic cell when fuse $MgCl_2$ is subjected to electrolysis

B. when fused $MgCO_3$ is heated

C. when fused $MgCO_3$is strongly heated

D. none of the above

**Answer: A**

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**3.** Magnesium is a valuable, light weight metal used as a structural material as well as in all batteries and in chemical synthesis. Although magnesium is plentiful in carth crust, it is ma found in the sea water after sedium. There is about 1.38 of magnesium in every kilogram of water. The process for obtaining magnesium from se water employs all three types of reach le... precipitation acid-hase and redor racions.

Electron is an alloy of

A. Magnesium

B. Sodium

C. Alluminium

D. Manganese

**Answer: A**

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## Practice Sheet 4 Match The Following Questions

**1.** Match the following columns

| COLUMN - I | COLUMN - II |
|---|---|
| A) Magnesite | p) Ore of magnesium |
| B) Dolomite | q) Ore of aluminium |
| C) Corundum | r) Oxide ore |
| D) Bauxite | s) Carbonate ore |

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**2.** Match the following columns

| COLUMN - I | COLUMN - II |
|---|---|
| A) Mica | p) $KAlSi_3O_8$ |
| B) Felspar | q) $Al_2O_3 . 2SiO_2 . 2H_2O$ |
| C) Glauber's salt | r) $Na_2SO_4 . 10H_2O$ |
| D) China clay | s) $K_2O . 3Al_2O_3 . 6SiO_2 . 2H_2O$ |

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## Practice Sheet 4 Integer Answer Type Questions

**1.** The formula of Gibsite is $Al_2O_3, xH_2O$ there 'x' is

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**2.** The no of faradays of electricity required for the deposition of 0.9g of Alluninum is 10 F 'x' is

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**3.** During Aluminothermy one mole of $Cr_2O_3$ reduced to Cr. How many no. of the moles of Al required.

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**4.** The ratio of their molecular weights of thomas slag and limestone is nearly.

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**5.** In the hydrated chloride $(MgCl_2xH_2O)$ of Me, the value of x'is

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**6.** The percentage of Zinc in the electron is there is Glauber's salt.

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## Practice Sheet 5 Single Or More Than One Option Questions

**1.** Electrolytic reduction of alumina to aluminium by Hall - Herault process is carried out

A. in the presence of NaCl

B. in the presence of fluorite

C. in the presence of cryolite which forms a melt with lower melting temperature

D. in the presence of cryolite which forms a melt with higher melting temperature

**Answer: C**

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**2.** Native silver metal forms a water soluble complex with a dilute a s wolution of NaCN in the presence of

A. nitrogen

B. Oxygen

C. carbondioxide

D. argon

**Answer: B**

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**3.** Select correct statement

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, lead is removed by parke's or pottinson's process

C. zine forms an alloy with lead from which lead is separated

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

**Answer: C**

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**4.** NaCN is sometimes added in the front loatation process as a depressant when ZnS and PbS minerals are expected because

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

B. ZnS forms soluble complex $Na_2Zn(CN)_4]$ while Phs comes out with froth

C. PbS forms soluble complex $Na_2[Pb(CN)_4]$ while ZnS comes out with froth

D. NaCN is never added in froth floatation process

**Answer: B**

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**5.** Formation of metallie copper from the sulphide ore in the normal thermo-metallurgical process essentially involves which one of the following reaction?

A. $CuS + \frac{3}{2}O_2 \rightarrow CuO + SO_2, CuS + C \rightarrow Cu + CO$

B. $CUS + \frac{3}{2}O_2 \rightarrow CuO + SO_2, 2CuO + CuS \rightarrow 3Cu + SO_2$

C. $CuS + 2O_2 \rightarrow CuSO_4, CuSO_4 \rightarrow 2Cu + 2SO_4$

D. $Cus + \frac{3}{2}O_2 \rightarrow CuO + SO_2, CuO + CO \rightarrow Cu + CO_2$

**Answer: B**

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**6.** In the purification of bauxite by Hall's process

A. The bauxite ore is heated with concentrated NaOH solution at $150^\circ C$

B. The bauxite ore is heated with $NaHCO_3$

C. The bauxite ore is mixed with coke and heated at $1800^\circ C$ in a current of $N_2$

D. The bauxite ore is fused with $Na_2CO_3$

**Answer: D**

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**7.** Zone refining is based on

A. fractional distillation

B. fractional crystallisation

C. chromatographic separation

D. destructive distillation

**Answer: B**

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**8.** Which oxides will not give metal on heating

A. HgO

B. ZnO

C. $Ag_2O$

D. All of these

**Answer: B**

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**9.** Which of the following statement are correct

A. Quenched steel is mild steel

B. Nitriding is heating iron in atmosphere of $N_2$

C. stainless steel is produced by heating wrought iron in only moltes chromium

D. mild steel is obtained by annealing

**Answer: D**

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**10.** Selecting the correct statement if any from the following

A. during zone rofining of silicon the metal is more soluble in the melt than the impurity

B. metals like Fe, Ag, Zn and Hg are extracted/punfied by pyrometallurgy

C. white bauxite ore cannot be concentrated by serpeck's process

D. dolomite, magnesile and graphite are used as retractory materials fumaces

**Answer: B::D**

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**11.** Which of the following is/are correctly matcbed?

A. Cyanide process - extraction of Au

B. Froth floating process - $CuSO_4$

C. Electrolytic reduction - extraction of Cu

D. Zone refining - ultrapure Ge

**Answer: A::B::D**

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**12.** Select the correct statement

A. pressure of $CO_2$ increases rate of rusting

B. silver plating is done with the help of $K\left[Ag(CN)_2\right]$

C. saline water slow down rusting

D. pure metals undergo corrosion faster than impure metals

**Answer: A::B**

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**13.** Stainless steel does not rust because

A. N' present in it does not rust

B. Iron forms a hard chemical compound with 'C' present in it

C. Chromium and nickel combine with Iron

D. Chromium forms an oxide layer that protects Iron from resting

**Answer: B::D**

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**14.** The reaction (s) which does (da) occur in the blast furnace in the extraction of iron from hacmatite are is (are)

A. $Fe_2O_3 + CO \rightarrow 2FeO + CO_2$

B. $FeO + CO \rightarrow Fe + CO_2$

C. $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$

D. $CaO + SiO_2 \rightarrow CaSiO_3$

**Answer: A::B::D**

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**15.** Which of the following statements is incorrect

A. Cassiterite ore of tin contains the impurites of wolframite which are separated by electromagnetic separator

B. Tin metal is obtained by the carbon reduction of black tin

C. In the extraction of lead from galena the roasting and self reduction are carried out in the same furnace at different temperature

D. Reducing agent of hacmatite in blast furnaces coke in upper part and CO in lower part of furnace

**Answer: A::B**

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**16.** Which of the following is a sulphide ore?

A. Galena

B. Argentite

C. Malachite

D. Pyrargyrite

**Answer: A::B::D**

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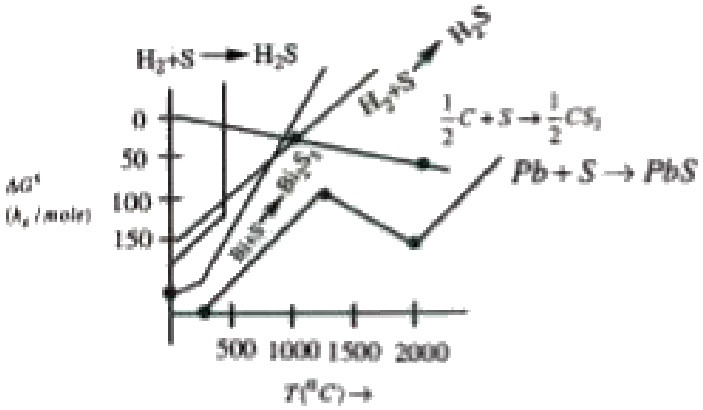
## Practice Sheet 5 Passage Ii

**1.** The Ellingham diagram for a number of metallic sulphide is reproduced below




Formation of which of the sulphides is most spontaneous

A. HgS

B. $Bi_2S_3$

C. Pbs

D. $CS_2$

**Answer: C**

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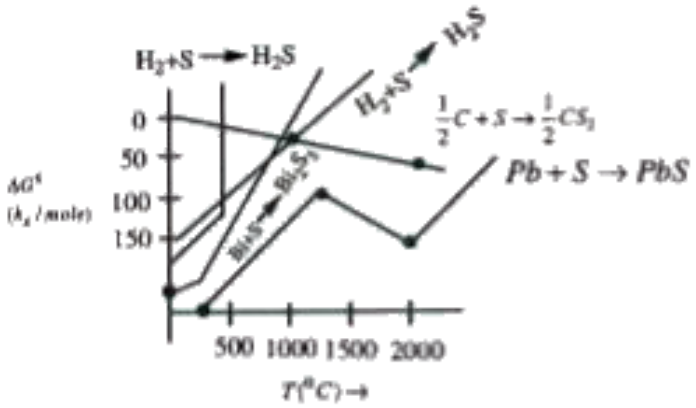
**2.** The Ellingham diagram for a number of metallic sulphide is reproduced below




Which occurs to minimum extent in anture

A. $HgS$

B. $H_2S$

C. $Bi_2S_3$

D. $CS_2$

**Answer: D**

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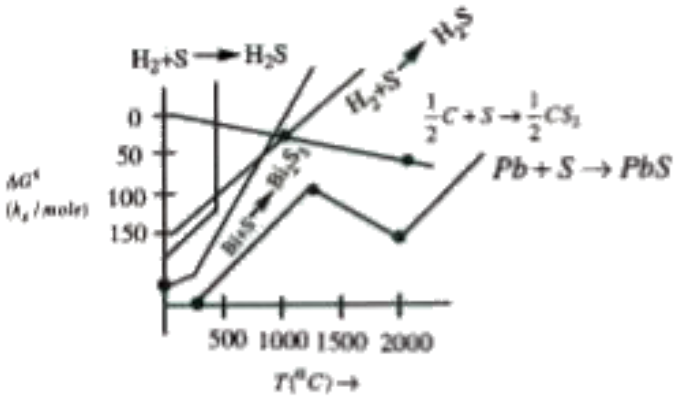
**3.** The Ellingham diagram for a number of metallic sulphide is reproduced below




Which of the following sulpliides can be reduced to metal by $H_2$ at about 1000 K?

A. $CS_2$

B. $PbS$

C. $Bi_2S_3$

D. all of these

**Answer: C**

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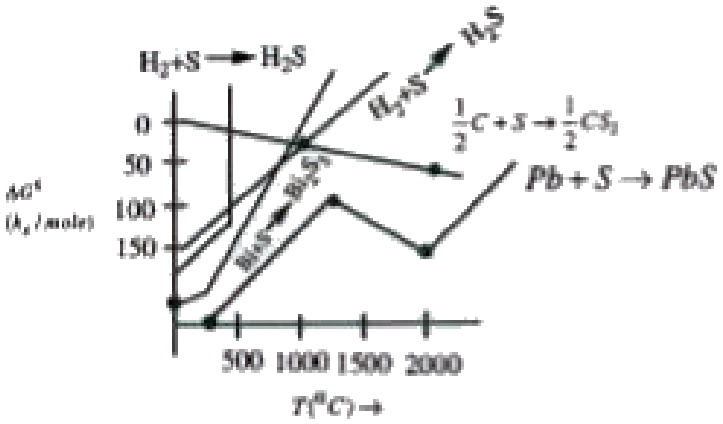
**4.** The Ellingham diagram for a number of metallic sulphide is reproduced below




Partial roasting of chalcopyrite produces

A. $Cu_2S$ and $FeO$

B. $Cu_2O$ and $FeO$

C. $CuS$ and $Fe_2O_3$

D. $Cu_2S$ and $Fe_2O_3$

**Answer: A**

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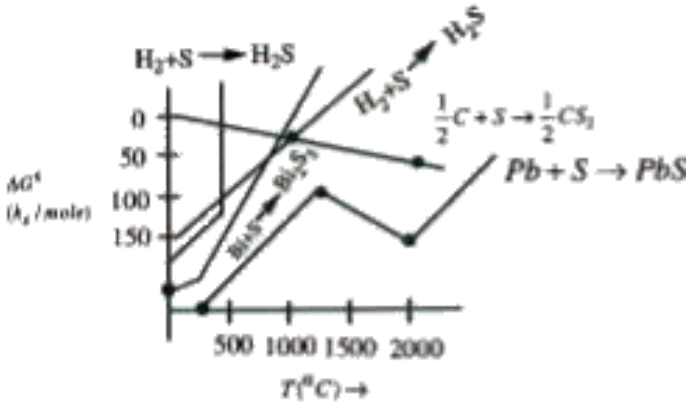
**5.** The Ellingham diagram for a number of metallic sulphide is reproduced below




Iron is removed from chalcopyrite

A. FeO

B. FeS

C. $Fe_2O_3$

D. $FeSiO_3$

**Answer: D**

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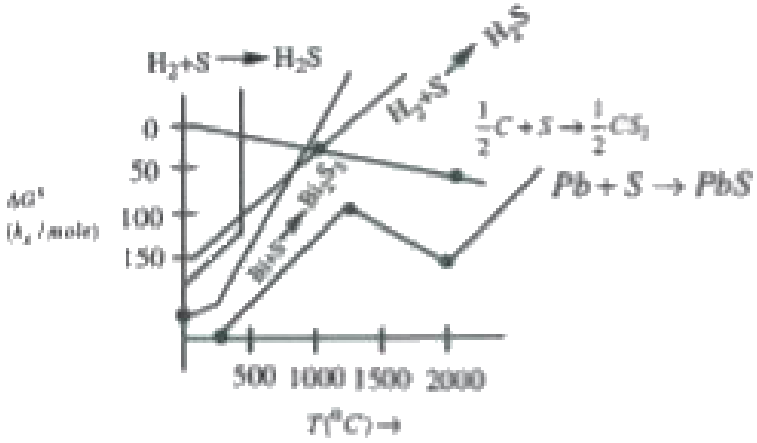
**6.** The Ellingham diagram for a number of metallic sulphide is reproduced below




In self reduction the reduction species is

A. O

B. $O^{2-}$

C. $S^{2-}$

D. $SO_2$

**Answer: C**

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## Practice Sheet 5 Match The Following Questions

**1.** Match the following columns

| COLUMN - I | COLUMN - II |
|---|---|
| A) Extracted by electrolytic | p) Pb |
| B) Metal dissolved in acids and bases | q) Mg |
| C) Metal used as reducing agent in the extraction of Cr and Mn from their oxides | r) Cu |
| D) Metal extracted by self reduction | s) Al |

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**2.**

| COLUMN - I | COLUMN - II |
|---|---|
| A) Haematite | p) slag formation during both roasting smelting and bessemersation |
| B) Copper pyrites | q) Reduction by carbon monoxide (mainly) as well as carbon at different temperatures |
| C) Carnallite | r) Electrolytic reduction |
| D) Bauxite | s) Electrolytic refining |
| | t) Leaching |

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## Practice Sheet 5 Integer Answer Type Questions

**1.** In Goldschmidt aluminothmic process, thermite mixture contains x-parts of $Fe_2O_3$ and one part of aluminium x is

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**2.** $Au + CN^- + H_2 + O_2 \rightarrow \left[Au(CN)_2 + OH\right]^-$. How many $CN^-$ ions are involved in the above balanced equation? (per mole of Au)

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**3.** Among the calamine, cuprite,zincite, chalcocite, heamatite, bauite , magnatite, Cassiterite. The number of oxide ores?

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**4.** Which of the following are used in aluminium extraction? Cryolite feldspar, carbon, ferrosilicon, iron, Nal, Calcium carbide, nitrogen gas,

NaOH.

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**5.** X% of C is present in steel X is

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**6.** How many coordination isomeric $\left(Pt(NH_3)_2CI_2\right)$ exists with +2 state of Pt

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## Problems

**1.** In moist air copper corrodes to produce a green layer on the surface. What is that layer ?

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**2.** Why is the reduction of a metal oxide if the metal formed is in liquid state at the temperature of reduction?

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**3.** The Value of $\Delta G^{\circ}$ for the formation of $Cr_2O_3$ is $-540\text{KJ mol}^{-1}$ and that of $Al_2O_3$ is $-827\text{KJ mol}^{-1}$. Is the reduction of $Cr_2O_3$ possible with Al ?

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**4.** Reduction of metal sulphides directly with carbon is not possible. Why?

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**5.** Eventhough reduction of magnesia with aluminium is thermodynamically feasible, in practice aluminium is not used in the metallurgy of magnesium. Why?

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**6.** Aluminium containing alumina as impurity can be refined by poling or not. Why?

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**7.** The choice of a reducing agent in the extraction of a particular case depends on thermodynamic factor. Explain.

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**8.** Hydrogen is a common reductant of organic chemicals, but it is not widely used in metallurgy. Substantiate.

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**9.** Out of coke and carbonmonoxide, which is a better reducing agent for iron oxide?

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**10.** Both coke and lime stone are used in smelting of iron ore. Why?

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**11.** In the Auto oxidation taking place in Bessemer converter during the extraction of copper. The change in oxidation state of sulphur in this process is

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**12.** During the smelting of roasted copper pyrites in blast furnace, why $Cu_2S$ formed but not $FeS$?

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**13.** Out of C and CO, which is a better reducing agent for ZnO ?

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**14.** How is a mixture of oxides of Aland Fe separated ?

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**15.** Aluminium vessels should not be washed with materials containing washing soda because

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**16.** Graphite rods are frequently replaced in Hall-Heroult's process of extracting aluminium metal. Why ?

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**17.** Write the composition of brass and german silver ?

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## Exercise 7 1 1

**1.** What is an ore?

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## Exercise 7 1 4

**1.** In the metallurgy of Zinc, the Zine dust obtained from roasting and reduction of ZnS contains same It is removed by

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**2.** Write any two minerals of Cu.

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**3.** What is the primary product of Bessemerisation of Matte?

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**4.** Write an equation for the reaction between silver glance and NaCN solution.

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**5.** What is steel? Write its uses.

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## Exercise 7 2

**1.** Metal sulphides occur mainly in rocks, but metal halides occur in lakes and sea. Why ?

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**2.** Roasting of the sulphide ore is partially done in the metallurgical operation of copper. Explain.

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**3.** Egg shells on treating with dilute mineral acids give brisk effervenceses. Why?

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**4.** What criterion is followed for the selection of the stationary phase in chromatography ?

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**5.** Which metals are extracted by auto-reduction process?

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**6.** Why copper pyrites roasted partially during the extraction of copper?

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**7.** $Ag$ and $Cu$ are below hydrogen in activity series, yet they are found in combined state. Why?

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**8.** $CO$ is more effective reducing agent than coke below 983 K, but above 983 K the reverse is true. Why?

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**9.** How the following metals are refined:

(a) Copper with cuprous oxide as impurity, (b) Copper with zinc, silver and gold as impurities and (c) Silver with lead impurity

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**10.** When heamatite is burnt in air with coke and lime at $2000^{\circ} C$, steel is produced along with a bi-product 'X'. 'X' is useful as building material. Discuss.

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**11.** Why is the extraction of copper form pyries more difficult then that from its oxide ore through reduction?

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**12.** How is leaching carried out in the case of low grade copper ores?

Watch Video Solution

**13.** Hydrogen is a common reductant of organic chemicals, but it is not widely used in metallurgy. Substantiate.

Watch Video Solution

**14.** Copper can be extracted by hydrometallurgy but not Zinc -explain.

Watch Video Solution

**15.** Alkali metals are

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**16.** Is it true that under certain conditions, Mg can reduce $SiO_2$ and Si canreduce MgO? What are those conditions?

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**17.** Name the metal M, which is extracted based on the following equation

$$4M + 8CN^- + 2H_2O + O_2 \rightarrow 4\left[M(CN)_2\right]^- + 4OH^-$$

$2\left[M(CN)_2\right]^- + Zn \rightarrow \left[Zn(CN)_4\right]^2 + 2M$

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**18.** In the extraction of Fe, what is the advantage of difference in temperatures of blast furnace ?

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**19.** Metal oxide is easily reduced if the metal is in molten state at the temperature of reduction. Explain.

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**20.** What are the compositions of gem stones, ruby and sapphire?

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**21.** Active metals are not extracted by the electrolysis or aqueous electrolytes. Explain.

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**22.** $\Delta G_f^\circ$ values for the formation of $CuO$, $CO$ and $H_2O$ are respectively $-129.7$, $-137.2$ and $-237.2 kJ mol^{-1}$ respectively. In between carbon and hydrogen, which is good reductant for reduction of the metal oxide. Why?

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**23.** Anhydrous aluminium chloride fumes in air. Give reasons.

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