CHEMISTRY

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR CHEMISTRY

METALLURGY

Example

1. All ores are minerals while all minerals are not ores because :

A. minerals are complex compounds

B. the minerals are obtained from mines

C. the metal cannot be extracted economically from all the minerals

D. all of the above are correct

Answer:

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2. Froth floatation process is used for the concentration of the ore of :

A. difference in specific gravity of ore and Gangue particles

B. electrical conductivity of ore particles

C. partial solubility

D. difference in melting points of ore and gangue particles

Answer:

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3. Bauxite ore is concentrated by

A. CO_2

B. CO

C. SO_2

D. H_2O

Answer:

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4. The ore having two different metal atoms is

A. haematite

B. galena

C. magnetite

D. copper pyrites

Answer:

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5. Metal which can be extracted from all three dolomite, magnesite and caranallite is

A. Na

B. K

C. Mg

D. Ca

Answer:

6. Cyanide process is used for the extraction of :

A. Au

B. Cu

C. Ag

D. Both (1) and (3)

Answer:

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7. Mond's process is used for the purification of

A. Ni

B. Ti

C. Zr

D. Hg

Answer:

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8. The smelting of iron in a blast furance involves all the steps except

A. it produces high temperature

B. t provides different temperature zones proceeded for different reactions

C. it separates the metal from slag easily

D. its height is large

Answer: B

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9. Which one of the following is not a sulphide ore ?

A. copper glance

B. malachite green

C. cuprite

D. Azurite

Answer: A

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10. Which of the following is an oxide ore ?

A. Calamine

B. Zinc blende

C. Zincite

D. Willemite

Answer: C

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Evaluate Yourself 1

1. A naturally occurring substance from which a metal can be profitably extracted is known as

A. ores

B. mineral

C. salts

D. gangue

Answer: A

2. Cryolite is:

A. sodium borofluoride

B. magnesium silicate

C. aluminium

D. sodium aluminium fluoride

Answer: D

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3. The process of heating the ore strongly in excess of air so that the volatile impurities are removed and the ore is changed to oxide is known as

A. leaching

B. roasting

C. calcination

D. froth floatation

Answer: B

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4. Among the following, the incorrect statement is :

A. argentite and cuprite are oxide ares

B. calamine and azurite are carbonates

C. zinc blende and pyrites are sulphides

D. malachite and azurite are minerals of copper

Answer: A

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5. Which of the following is magnetite ?

A. $FeCO_3$

B. Fe_2O_3

C. Fe_3O_4

D. $Fe_2O_3, 3H_2O$

Answer: C

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6. The chief constituent and impurity of the gemstone 'Ruby' respectively are

A. Al_2O_3, Cu

B. Al_2O_3, Cr

C. CrO_3, Cu

D. Cr_2O_3, Al

Answer: B

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Evaluate Yourself 2

1. Copper pyrites are concentrated by

A. gravity method

B. froth floatation process

C. electromagnetic method

D. all of these

Answer: B

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2. Which of the following ores are concentrated by froth floatation ?

A. copper glance

B. Barytes

C. Magnesite

D. Cassiterite

Answer: A

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3. The chemical composition of cyolite mineral is:

A. $FeS + SiO_2$

B. $Cu_2O + Fes$

C. $Cu_2O + Cu_2s$

D. $Cu_2s + Fes$

Answer: D

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4. In the froth floatation process for the purification of minerals the particles float because

A. they are light

B. they are insoluble

C. Froth floatation

D. None of these

Answer: A

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5. The process of zone refining is used for :

A. Si

B. Ge

C. Ga

D. All

Answer: D

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6. Which of the following metals is obtained by leaching its ore with dilute cyanide solution ?

A. Silver

B. Titanium

C. Vandadium

D. Zinc

Answer: A

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7. Electrolytic refining's is ued to purify which of the following metals?

A. Ge and Si

B. Zr and Ti

C. Cu and Zn

D. Zn and Hg

Answer: C

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8. Which is the strongest reducing agent?

A. Rb

B. Na

C. K

D. Mg

Answer: A

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Evaluate Yourself 3

1. In the electrolysis of alumina, cryolite is added to

A. lowers the m.pt. of the mixture

B. makes the fused mixture good conductor of electricity

C. both these

D. none of these

Answer: C

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2. In blast furnace, the hearth is lined with

A. flux

B. slag

C. gangue

D. all these

Answer: A

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3. Benzen is purified by

A. liquation

B. leaching

C. poling

D. distillation

Answer: D

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4. Blister copper is:

A. 98% copper

B. obtained in self reduction process in bessemer converter

C. both 1 and 2

D. none of the above

Answer: C

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5. Which of the following statements is correct?

A. Pig iron is soft and brittle

B. slag floats on the molten iron thus protecting iron from oxidation

C. Molten slag and molten iron are drawn off through the same openings

D. The iron obtained from blast furnace is called cast iron

Answer: B

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6. What type of ores can be concentrated by magnetic separation method ?

A. wolframine

B. haematite

C. cassiterite

D. all of these

Answer: D

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7. In the extraction of chlorine by electrolysis of brine_____.

A. Oxidation of CI^- ion to chlorine gas occurs

B. reduction of CI^- ion to chlorine gas occurs

C. for overall reacation Delta G° has negative value

D. a displacement reaction takes place

Answer: A

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8. Which one of the following reactions is an example of auto-reduction?

A. $Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$

B. $Cu_2O + C \rightarrow 2Cu + CO$

C. $Cu^{2+} + (aq) + Fe(s) \rightarrow Cu(s) + Fe^{2+}(aq)$

D. $Cu_2O + \frac{1}{2}Cu_2S \rightarrow 2Cu + \frac{1}{2}SO_2$

Answer: D

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9. In the metallurgy of aluminium,

A. Al^{3+} is oxidised to Al (s)

B. graphite anode is oxidised to CO and CO_2

C. oxidation state of oxygen changes in the reaction at anode

D. Oxidation state of oxygen changes in the overall reaction involved in the process

Answer: B

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CUQ

1. In the commercial electrochemical process for aluminium extraction, the electrolyte used is

A. Ores

B. Matrix

C. Slag

D. Gangue

Answer: A

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2. Impure tin contains SnO_2 as one of the impurities. Name the specific method employed for converting SnO_2 present in impure metal to tin.

A. Cr

B. Fe

C. Co

D. Cu

Answer: C

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3. Which of the following ore is/are oxide ore (s) ?

A. Sphalerite

B. Calamine

C. Calcite

D. 1 and 2

Answer: C

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4. Carbon-halogen bond is strongest among the following:

A. Siderite

B. Malachite

C. Calamine

D. all the above

Answer: D

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5. Write chemical reactions taking place in the extracion of Aluminium from Bauxite ore .

A. Al

B. Cu

C. Zn

D. Fe

Answer: A

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6. Mathc the column:

Column I

(A) $Ca_2Mg_5\left[(Si_4O_{11})_2\right](OH)_2$

(B) $Mg_3(OH)_4[Si_2O_5]$

(C) $Ca_3Si_3O_9$ (D) $LiAl\left[(SiO_3)_2\right]$

Column II ltbr. (p) Cyclic silicate (q) Chain silicate

(r) Each tetrachedron share two oxygens with other tetrahedron

(s) Sheet silicate

(r) Each tetradedron share three oxygen atoms per tetrahedron with other tetrahedron.

A. Bauxite

B. Feldspar

C. Kaolinite

D. sphalerite

Answer: C

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7. Which one of the following is not a sulphide ore ?

A. Fool's gold

B. Chalcopyrites

C. cuprite

D. zinc blende

Answer: C

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8. The second most abundant metal in earth's crust is

A. $8.3\ \%$

B. $27.7\ \%$

C. $42.4\ \%$

D. $16.8\ \%$

Answer: A

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9. A mineral consists of an equimolar mixture of the carbonates of two bivalent metals. One metal is present to the extent of 15.0% by weight, $3.0g$ of the mineral on heating lost $1.10g$ of CO_2. The percent by weight of other metal is

A. Zn

B. Fe

C. Cu

D. Zn

Answer: B

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10. Refining of impure copper with zinc impurity is to be done by electrolysis using electrods as-

A. Cr

B. Co

C. Al

D. S

Answer: A

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11. Oxidation state of Fe in Fe_3O_4 is:

A. +2,+4

B. +1, +3

C. +2, +3

D. 0, +2

Answer: C

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12. LPG contains

A. Cu

B. Fe

C. S

D. O

Answer: D

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13. MINERALS

A. Haematite

B. Magnetite

C. sphalarite

D. 1 and 2

Answer: D

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14. Which separation technique is based on difference in the volatility of the of the substances to be separated ?

A. Froth floatation

B. Levigation

C. Leaching

D. all the above

Answer: B

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15. Froth floatation :

A. pine oil

B. fatty acid

C. xanthate

D. all the above

Answer: D

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16. Froth floatation process used for the concentration of sulphide ore :

A. cresols

B. aniline

C. benzene

D. 1 and 2

Answer: D

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17. Name the substance used as depressant in the separation of two sulphide ores in Froth floatation method.

A. PbS and Zns

B. Cu,S, Fes

C. $SiO_2Al_2O_3$

D. CaO, ZnO

Answer: A

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18. The ore of aluminium is

A. SiO_2

B. Fe_2O_3

C. TiO_2

D. all the above

Answer: D

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19. Ag_2S is soluble in NaCN due to formation of

A. $Na\left[Al(OH)_4\right]$

B. $Na_3\left[Al(H_2O)_6\right]$

C. Na_3AlO_4

D. Na_2AlO_3

Answer: A

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20. Assertion : In the extraction of Ag, complex $Na\left[Ag(CN)_2\right]$ is reacted with Zn.

Reason : Zn is d-block transition metal.

A. $Ag\left[\left(Zn(CN)_2\right]^-\right.$

B. $Ag\left[\left(Zn(CN)_2\right]^{-2}\right.$

C. $Ag, (CN), Zn(CN_4)$

D. $Ag\left[\left(Zn(CN)_4\right]^{-2}\right.$

Answer: D

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21. Calamine is

A. CaO, CO_2

B. ZnO, CO_2

C. ZnO, SO_2

D. ZnO, SiO_2

Answer: B

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22. Sulphide ore is

A. $Na_2S_2O_5$

B. H_2SO_4

C. $H_2S_2O_8$

D. H_2SO_5

Answer: B

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23. Which of the following statement(s) is/are incorrect ?

I. Zinc can be extracted by self-reduction.

II. A depressant prevents certain type of particel of come in the froth .

III. Copper matte contains ZnS and Cu_2S.

IV. The solidified copper obtained from reverberatory furnance has blistered appearance due to evolution of SO_2 during the extraction .

The option containing incorrect statements is

A. Cu_2O, FeO

B. Cu_2S, FeO

C. Cu_2S, FeS

D. CuS, FeS_2

Answer: C

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24. Reduction of Ore

A. Pyrometallurgy

B. Hydrometallurgy

C. Electrometallurgy

D. all the above

Answer: A

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25. The incorrect expression among the following is

A. $\Delta G = \Delta H - T\Delta S$

B. $\Delta G^0 = -nFE$

C. $\Delta G^0 = -RT\ln K$

D. $\Delta G^0 = \frac{\Delta H}{T\Delta S}$

Answer: D

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26. ELLINGHAM DIAGRAM

A. $\Delta_f G^0 V s T$

B. $\Delta G_f^{90} V s \Delta H$

C. $\Delta H^0 V s \Delta S$

D. $\Delta_S V s T$

Answer: A

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27. In Ellingham diagram, the slope of the curve of the formation metal oxide:

A. $Cu \rightarrow Cu_2O$

B. $C \rightarrow CO$

C. $Al \rightarrow Al_2O_3$

D. 1 and 3

Answer: D

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28. The Gibbs energy for the decomposition of Al_2O_3 at $500^\circ C$ is as follows:

$$\frac{2}{3}Al_2O_3 \rightarrow \frac{4}{3}Al + O_2, \Delta_r G = +966kJmol^{-1}$$

The potential difference needed for electrolytic reeduction of Al_2O_3 at $500^\circ C$ is at least:

A. $1073^\circ C$

B. $1350^\circ C$

C. $1473^\circ C$

D. $273^\circ C$

Answer: B

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29. The sign of ΔG for the process of melting of ice at $273K$ and 1 atm pressure is

A. $2Mg + O_2 \rightarrow 2MgO$

B. $4Cu + O_2 \rightarrow 2Cu_2O$

C. $2Zn + O_2 \rightarrow \ + 2ZnO$

D. $2Fe + O_2 \rightarrow 2FeO$

Answer: A

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30. How is limestone used in Fe extraction?

A. 1:1:1

B. 8:4:1

C. 1:4:8

D. 1:2:3

Answer: B

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31. Blister copper is

A. CO_2

B. CO

C. SO_2

D. SO_3

Answer: C

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32. ELECTROLYTIC REDUCTION

A. Beyer's process

B. Hoopes process

C. Hall-Heroult process

D. Mond's process

Answer: C

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33. Hall-Heroult's process is given by :

A. Pt

B. Au

C. Fe

D. Graphite

Answer: D

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34. Observe the following reaction,

$2NO_2(g) + 2OH^-(aq) \rightarrow NO_3^-(aq) + H_2O(l) + NO_2^-(aq)$

in this reaction,

A. + Ve, +Ve

B. + Ve, -Ve

C. - Ve, -Ve

D. -Ve, +Ve

Answer: B

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35. Following reactions take place during extraction of gold

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

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

Zinc in the extraction of gold acts as a/an

A. oxidising agent

B. Reducing agent

C. Both

D. Base

Answer: B

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36. In the correct of the Hall-Heroult process for the extraction of Al, which of the following statements is false ?

A. 0.5kg

B. 1.5Kg

C. 2.5Kg

D. 3.5Kg

Answer: A

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37. The most suitable method for extraction of copper from low grade sulphide ore is

A. Pyrometallurgy

B. Electrometallurgy

C. Hydro metallurgy

D. all the above

Answer: C

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38. Which of the following is not employed for refining of metal ?

A. Distillation

B. poling

C. Liquating

D. all the above

Answer: D

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39. Metal with low melting point containing impurities of high melting point can be purified by

A. liquation

B. zone refining

C. distillation

D. crystallisation

Answer: C

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40. Block tin is not purified by

A. liquation

B. distillation

C. crystallisation

D. zone refining

Answer: A

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41. In the electrolytic refining of zinc,

A. impure copper

B. pure copper

C. platinum

D. graphite

Answer: B

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42. The process of zone refining is used for :

A. Ga

B. In

C. B

D. all the above

Answer: D

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43. Assertion : van Arkel method is used for refining of Zinc.

Reason : In this method impure is evaporated to obtain the pure metal as distillate .

A. Nitrogen

B. Oxygen

C. Cu

D. 1 and 2

Answer: D

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44. To support tungsten filament in electric bulb, the steel used is

A. 1800K

B. 1200K

C. 1000K

D. 600K

Answer: A

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45. German silver does not contain

A. Cu

B. Zn

C. Ni

D. all rare equal

Answer: C

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46. Which of the following is non-volatile in steam ?

A. Al

B. Cu

C. Pt

D. Au

Answer: B

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47. Which metal is used in amalgams ?

A. Cu

B. Ag

C. Au

D. Al

Answer: D

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48. Aluminium metal is generally used for the extraction of chromium and manganese from their oxide ores. Explain.

A. Cr

B. Mn

C. Na

D. 1 and 2

Answer: D

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49. The ratio of copper and zinc in an alloy is $5:3$. If the weight of the copper in the alloy is 30.5 grams, find the weight of zinc in the alloy.

A. Zn

B. Sn

C. Ni

D. Al

Answer: C

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50. Soft iron is used for making electromagnet because it

A. Anchors

B. Bolts

C. Agricultural implements

D. all the above

Answer: D

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51. Soft iron is used in many electrical machines for:

A. Nickel steel

B. Chrome steel

C. Tungstun steel

D. Manganese steel

Answer: B

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Exercise 1 Class Work Introduction

1. The most abundant metal in the earth's crust is

A. Calcium

B. Aluminium

C. Iron

D. Magnesium

Answer: B

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2. The metal that occurs in the native state as well as in the combined form is

A. Silver

B. Magnesium

C. Aluminium

D. Maganese

Answer: A

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3. Pick up the correct statement

A. All ores are minerals

B. All mineral are ores

C. A mineral cannot be ore

D. An ore cannot be a mineral

Answer: A

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4. The element with maximum cosmic abundance is

A. Helium

B. Hydrogen

C. Nitrogen

D. Oxygen

Answer: B

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5. Malachit is ore of

A. Iron

B. Zinc

C. Copper

D. Mercury

Answer: C

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6. Which of the following is an ore of aluminium ?

A. Dolomite

B. Azurite

C. Bauxite

D. Malachite

Answer: C

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Exercise 1 Class Work Concentration Of Ores

1. The process of removing lighter gangue particles by washing in a current if water is called:

A. Levigation

B. Liquidation

C. Leaching

D. Cupellation

Answer: A

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2. Which method is used for purification of Bauxite ore ?

A. Levigation

B. Leaching

C. Electrolysis

D. Magnetic seperation

Answer: B

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3. In the froth floatation 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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4. Froth floatation process for the concentration of ores is an illustration of the pratical application of _____.

A. Adsorption

B. Absorption

C. Coagulation

D. Sedimentation

Answer: A

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5. Which of the following is used as a foaming agent in froth floatation process ?

A. Pine oil

B. Amyl xanthate

C. $CuSO_4$

D. KCN

Answer: A

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6. Wolframite is separated from cassiterite by:

A. Froth floatation method

B. Levigation

C. Electromagnetic separation method

D. Electrostatic separation method

Answer: C

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7. Name the metal M which is extracted on the basis of following reactions :

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

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

A. Cu

B. Au

C. Hg

D. Ni

Answer: B

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8. Which of the following benefication processes is used for the mineral $Al_2O_3.2H_2O$?

A. Froth floatation

B. Leaching

C. Liquating

D. Magnetic separation

Answer: B

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Exercise 1 Class Work Extraction Of Metals

1. The process in which the ore is heated in excess of air below its metling point is known as

A. Roasting

B. Calcination

C. Reduction

D. Distillation

Answer: A

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2. In roasting

A. moisture is removed

B. no metal impurities are removed

C. ore becomes porous

D. all of the above

Answer: D

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3. The role of calcination in metallurgical operation is

A. To remove moisture

B. To decompose carbonate

C. To derive off organic matter

D. All of the above

Answer: D

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4. In roasting the ores are generally converted into

A. Metal oxides

B. Hydrated metal oxides

C. Metals

D. None of these

Answer: A

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5. The most common method of extraction of metals from oxide ores involve

A. Reduction with carbon

B. Electrolytic method

C. Reduction with aluminium

D. Reduction with hydrogen

Answer: A

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6. Slag is a product of:

A. flux and coke

B. coke and metal oxide

C. flux and impurities

D. metal and flux

Answer: C

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7. Which of the following metal can not be extracted by smelting process

A. Pb

B. Fe

C. Zn

D. Al

Answer: D

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8. The reducing agent used in thermite process is

A. Magnesium

B. Chromium

C. Aluminium

D. Iron

Answer: C

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

A. Sodium hydroxide

B. Potassium cyanide

C. Potassium cyanate

D. Sodium thiosulphate

Answer: B

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10. The slag obtained during the extraction of copper from coper pyrites is composed mainly of

A. Au_2S

B. $FeSiO_3$

C. $CuSiO_3$

D. SiO_2

Answer: B

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11. The metal which can be extracted from pyrolusite ore is:

A. An acidic flux is needed

B. A basic flux is needed

C. Both acidc and basic fluxes are needed

D. Neither of them needed

Answer: B

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12. Which metal can not obtained by electrolysis of their aqueous salt solution ?

A. Ca

B. Mg

C. Cr

D. Al

Answer: C

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13. Which one of the following reactions is an example for calcination process ?

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

B. $2Zn + O_2 \rightarrow 2ZnO$

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

D. $MgCO_3 \rightarrow MgO + CO_2$

Answer: D

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14. Which of the following elements is extracted commercially by the electrolysis of an aqueous solution of its compound ?

A. Chlorine

B. Bromine

C. Sodium

D. Aluminium

Answer: A

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15. In the extractionof iron, slag is produced. Slag is

A. CO

B. $FeSiO_3$

C. $MgSiO_3$

D. $CaSiO_3$

Answer: D

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16. Thomas slag is

A. Calcium silicate

B. Calcium phosephate

C. Barium phosephate

D. Strontium phosphate

Answer: B

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17. ΔG^{Θ} vs T plot in Ellingham diagram slopes downward for the reaction .

A. $Mg + \frac{1}{2}O_2 \rightarrow MgO$

B. $2Ag + \frac{1}{2}O_2 \rightarrow 2Ag_2O$

C. $C + \frac{1}{2}O_2 \rightarrow CO$

D. $CO + \frac{1}{2}O_2 \rightarrow CO_2$

Answer: C

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18. Which has highest melting point ?

A. Pig iron

B. Cast iron

C. Steel

D. Wrought iron

Answer: D

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Exercise 1 Class Refining Of Metals Uses

1. Which method of purification is represented by the following equations

$$Ti + 2I_2 \xrightarrow{523K} TiI_4 \xrightarrow{1700K} Ti + 2I_2$$

A. Cepellation

B. Poling

C. Van Arkel

D. Zone refining

Answer: C

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2. Van Arkel method of purification of metals involves converting the metal to

A. Volatile compound

B. Volatile unstable compound

C. Non-volatile stable compound

D. None of these

Answer: A

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3. Cupellation process is involved in the metallurgy of

A. Cu

B. Ag

C. Al

D. Fe

Answer: B

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4. Copper is refined by

A. Liquation

B. Cupellatin

C. Bessemerisation

D. Poling

Answer: D

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5. During electrorefining of a metal, impure metal is made anode.

A. Silver

B. Copper

C. Aluminium

D. Gold

Answer: C

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6. Zone refining process is used for the

A. Concentration of an ore

B. Reduction of a metal oxide

C. Purification of metal

D. Purification of an ore

Answer: C

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7. The process of zinc plating on iron sheet is known as

A. Cu plating

B. Zn plating

C. Ag plating

D. Tin plating

Answer: B

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8. The process of zone refining is used in the purification of :

A. Si

B. Al

C. Ag

D. Cu

Answer: A

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9. Nickel is purified by thermal decomposition of its

A. Hydride

B. Chloride

C. Azide

D. Carbonyl

Answer: D

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Exercise 1 Home Work Introduction

1. Living organism contains iron in

A. Chlorophyll

B. Haemoglobin

C. Eyes of animals

D. None of these

Answer: B

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2. Most abundant element in the earth's crust by weight is

A. Oxygen

B. Silicon

C. Aluminium

D. Iron

Answer: A

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3. The rocky and siliceous matter associated with an ore is called:

A. Slag

B. Mineral

C. Matrix or Gangue

D. Flux

Answer: C

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4. Minerals from which metals are extracted conveniently and economically are called ____.

A. Ores

B. Minerals

C. Gangue

D. None of the above

Answer: A

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5. Which one of the following elements does not exist in the native form ?

A. Au

B. Pt

C. Fe

D. S

Answer: C

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6. Which ore contains both iron and copper?

A. Cuprite

B. Chalcocite

C. Chalcophyrite

D. Malachite

Answer: C

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Exercise 1 Home Work Concentration Of Ores

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 the these

Answer: B

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2. Which of the following concentration processes will you use when the gangue is light ?

A. Gravity separatin

B. Magnetic separation

C. Froth floatation

D. None of these

Answer: A

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3. Gravity separation process may be used for the concentration of:

A. Chalcopyrite

B. Bauxite

C. Haematite

D. Calamine

Answer: C

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4. Copper pyrites are concentrated by

A. Froth floatation process

B. Gravity separation

C. Distillation

D. Fractionation

Answer: A

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5. Which of the following is used as a depression in froth floatation process ?

A. Amyl xanthate

B. Pine oil

C. Copper sulphate

D. Potassium cyanide

Answer: D

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6. Roasting is done in

A. Oxide ores

B. Silicate ores

C. Sulphide ores

D. Carbonate ores

Answer: C

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7. Cassiterite is concentrated by

A. Levigation

B. Electromagnetic separation

C. Floatatoin

D. Liquefaction

Answer: B

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8. Bauxide ore is made up of $Al_2O_3 + SiO_2 + TiO_2 + Fe_2O_3$. This ore is treated with conc. $NaOH$ solution at $500K$ and 35 bar pressure for a few hours and filtered hot. In the filtrate, the species present are

A. $NaAl(OH)_4$ only

B. $NaAl(OH)_4$ and Na_2SiO_3

C. $Na_2Ti(OH)_6$ only

D. Na_2SiO_3 only

Answer: B

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Exercise 1 Home Work Extraction Of Metals

1. Heating pyrites in air to remove sulphur dioxide is known as

A. Calcination

B. Fluxing

C. Smelting

D. Roasting

Answer: D

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2. Calcination and roasting are generally carried out in

A. Reverbratory furnace

B. Open heart furnace

C. Blast furnace

D. Muffle Furnace

Answer: A

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3. Roasting is carried out in case of:

A. Galena

B. Iron pyrites

C. Copper glance

D. All

Answer: D

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4. An ore after levigation is found to have basic impurities. Which of the following can be used as flux during smelting ?

A. H_2SO_4

B. $CaCO_3$

C. SiO_2

D. Both CaO and SiO_2

Answer: C

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5. Which of the following processes involves smelting ?

A. $ZnCO_3 \xrightarrow{\text{Heat}} 3Fe + 3CO$

B. $Fe_2O_3 + 3C \xrightarrow{\text{Heat}} 3Fe + 3CO$

C. $2PbS + 3O_2 \xrightarrow{\text{Heat}} 3PbO + 2SO_2$

D. $Al_2O_3.2H_2O \xrightarrow{\text{Heat}} Al_2O_3 + 2H_2O$

Answer: B

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6. The substance which is added to ore in order to remove impurities during smelting is called

A. Slag

B. Gangue

C. Flux

D. Matrix

Answer: C

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7. The process of bringing the metal or its ore into solution by the action of a suitable chemical reagent followed by

extraction of the metal either by electrolysis or by a suitable precipitating agent, is called

A. Electrometallurgy

B. Hydrometallurgy

C. Electro refining

D. Zone refining

Answer: B

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8. The extraction of which of the following metals involves bassemerisation?

A. Fe

B. Ag

C. Al

D. Cu

Answer: D

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9. Which of the following statements is correct regrading the slag obtained during the extraction of a metal like copper or iron?

A. The slag is lighter and has lower melting point

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

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

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

Answer: A

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10. Which is the strongest reducing agent?

A. Rb

B. Mg

C. Cr

D. K

Answer: A

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11. The process in which the ore is heated in excess of air below its metling point is known as

A. Leaching

B. Roasting

C. Smelting

D. Calcination

Answer: D

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12. Which of the following metals are extracted by electrolytic reduction?

A. Fe

B. Cu

C. Ag

D. Al

Answer: D

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13. Cryolite is:

A. Na_3AlF_6 and is used in the electrolysis of alumina for decreasing electrical conductivity

B. Na_3AlF_6 and is used in the electrolysis of alumina for lowering the melting point of alumina

C. Na_3AlF_6 and is used in the electrolytic purification of alumina

D. Na_3AlF_6 and is used in the electrolysis of alumina

Answer: B

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14. The least stable oxide at room temperature is

A. ZnO

B. CuO

C. Sb_2O_3

D. Ag_2O

Answer: D

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15. The oxidation state of Fe in Fe_3O_8 is

A. C

B. Al

C. electrolytic reduction

D. Cu

Answer: A

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16. The iron obtained from the blast furnace is called:

A. pig iron

B. cast iron

C. wrought iron

D. steel

Answer: A

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17. Which of the following elements contitutes a major impurity in pig iron ?

A. Graphite

B. Oxygen

C. Sulphur

D. Silicon

Answer: A

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18. In the course of a chemical reaction an oxidant -

A. aluminium oxide is very stable

B. reducing agent contaminates

C. the process pollutes the environment

D. aluminium oxide is unstable

Answer: A

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19. Electrolytic reduction of alumina to aluminium by Hall-Heroult process is carried out:

A. in the presence of NaCl

B. in the presence of fluorite

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

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

Answer: D

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Exercise 1 Home Work Refining Of Metals And Uses

1. Which of the following is not employed for refining of metal ?

A. Poling

B. Leaching

C. Electrolysis

D. Liquation

Answer: B

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2. Purification of Silicon element used in semiconductors is done by _____.

A. Zone refining

B. Heating

C. Froth floatation

D. Heating in vaccum

Answer: A

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3. The method of zone refining of metals is based on the principle of :

A. greater solubility of the impurities in the molten state than in the solid

B. greater solubility of pure metal than that of the impurity

C. higher melting point of the impurity than that of the pure metal

D. greater noble character of the solid metal than that of the impurity

Answer: A

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4. Vapour phase refining of nickel is carried out using

A. I_2

B. Cl_3

C. HCl

D. CO

Answer: D

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5. Mond's process is used for

A. Ni

B. Al

C. Fe

D. Cu

Answer: A

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Exercise 2 Class Work

1. An important oxide ore if iron is

A. Sidherite

B. Haematite

C. Pyrites

D. Bauxite

Answer: B

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2. The formula of azurite is :

A. $CuCO_3.Cu(OH)_2$

B. $2CuCO_3.Cu(OH)_2$

C. $CuCO_2.Cu(OH)_2$

D. $CuSO_4.Cu(OH)_2$

Answer: B

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3. The ore having two different metal atoms is

A. haematite

B. galena

C. magnetite

D. copper pyrites

Answer: D

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4. Select the incorrect statement

A. oxygen is the most abundant element in the earth's cast

B. aluminium is the most abundant metal in the earth's crust

C. Iron is the most abundant transition metal in the earth's crust

D. Silicon is fourth most abundant element in the earth's crust

Answer: D

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5. Which of the following pair consists of ore of the same metal ?

A. Bauxite, Limonite

B. Haematite, magnetite

C. Galena, Cerusite

D. Both 2 and 3

Answer: D

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6. The ore having two different metal atoms is

A. carnallite

B. magnetite

C. calamine

D. haematite

Answer: A

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7. Which of the following statements is wrong

A. Calcination and roasting is done in a reverberatory furnace

B. all ores are minerals

C. all minerals are ores

D. iron ores are concentrated by gravity process and clectromagnetic process

Answer: C

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Exercise 2 Concentration Of Ores

1. Electrolyte reduction method is used in the extraction of

A. highly electronegative elements

B. Highly electropositive elements

C. transition metals

D. noble metals

Answer: B

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2. The process of converting hydrated alumina into anhydrous alumina is called

A. Roasting

B. Smelting

C. Dressing

D. Calcination

Answer: D

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3. Consider the following statements :

Roasting is carried out to :

1. Convert sulphide into oxide

2. Melt the ore

3. Remove moisture, water of hydration and expel organic matter

4. Remove sulphur and arsenic in the form of volatile oxides

Out of these statements :

A. i, ii and iv

B. i, ii and iii

C. ii, iii and iv

D. i, ii and iv

Answer: A

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4. In the froth flotation process for benefication of ore, the ore particles float because

A. they are light

B. their surface is not wetted by water

C. they bear electrostatic charge

D. they are insoluble

Answer: B

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Exercise 2 Extraction Of Metals

1. Which of the following processes involves smelting ?

A. $ZnCO_3 \xrightarrow{\text{heat}} ZnO + CO_2$

B. $FeO_3 + CO \xrightarrow{\text{heat}} 2FeO + CO_2$

$FeO + CO \xrightarrow{\text{heat}} 2Fe + CO_2$

C. $Al_2O_2.2H_2O \xrightarrow{\text{heat}} Al_2O_3 + 3H_2O$

D. $2PbS + 3O_2 \xrightarrow{\text{heat}} 2PbO + 2SO_2$

Answer: B

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2. Identify X and Y in the following reactions .

$PbS \xrightarrow[\text{in air}]{Heat} (X)$

$(X) + PbS \xrightarrow{Y} pb + SO_2.$

A. A

B. B

C. both (a) and (b)

D. none of these

Answer: B

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3. Heating mixture of $Cu_2O$and Cu_2S will give

A. $Cu + SO_2$

B. $Cu + SO_3$

C. CuO+Cus

D. Cu_2SO_3

Answer: A

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4. Extraction of zinc from zinc blende is achieved by:

A. electrolytic reduction

B. roasting followed by reduction with carbon

C. roasting followed by reduction with another metal

D. roasting followed by self reduction

Answer: B

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5. Which of the following is correctly matched?

A. Two metals which are extracted by auto- reduction process-Cu, Pb

B. Two metals which are extracted by leaching method- Al Ag

C. Two metals which are extracted by electrolysis of their fused salts - Na, Al

D. Two metals which are extracted from their oxide ores - Sn, Pb

Answer: D

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6. How is cas iron different from pig iron ?

A. Cast iron is pure iron while pig iron is imure

B. Cast iron has lower carbon content than pig iron. Cast iron is harder and has casting property

C. pig iron is extremetly hard while cast iron is soft and malleable

D. pig iron contains many impurities like S, P, Sietc., while cast iron is free from these impurities

Answer: B

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7. Carbon reduction process is used for the extraction of

A. Fe

B. Cu

C. Ag

D. Sn

Answer: A

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8. When ZnS and PbS minearls are present together, then NaCN is added to separate them in the froth floatation process as a depressant, because :

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

B. ZnS forms soluble complex, $Na_2Zn(CN)_4$

C. PbS forms soluble complex, $Na_2Zn(CN)_4$

D. both (1) and (2)

Answer: B

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

(A)

$$Zn(s) + \frac{1}{2}O_2(g) \rightarrow ZnO(s), \Delta G^\Theta = -360kJmol^{-1}$$

(B) $C(s) + \frac{1}{2}O_2(g) \rightarrow OO(g), \Delta G^\Theta = -460kJmol^{-1}$

Choose the correct statement at $1000^\circ C$

A. Zinc can be oxidised by CO

B. Zinc oxide can be reduced by C

C. Both statements (A) and (B) are true

D. Both statements (A) and (B) are false

Answer: B

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10. The smelting of iron in a blast furnace involves, which of the following process(es)?

A. combustion

B. reduction

C. slag formation

D. sublimation

Answer: D

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11. The maximum temperature $1550^{\circ}C$ is obtained in the _____ region of the blast furnace used in the the extraction of iron.

A. reduction

B. fusion

C. combustion

D. slag formation

Answer: C

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12. In the commercial electrochemical process for aluminium extraction, the electrolyte used is

A. $Al(OH)_3$ in NaOH

B. an aqueous solution of $Al_2(SO_4)_4$

C. a molten mixture of Al_2O_3 and Na_3AIF_6

D. a molten mixture of Al_2O_3 and $Al(OH)_3$,

Answer: C

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13. What is the effect of adding a catalyst on

(a) Activation energy (Ea), and

(b) Gibbs energy (ΔG) of a reaction?

A. > 1

B. 1

C. < 0

D. 0

Answer: D

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14. निम्नलिखित में से कोनसा कथन सही है----

A. The rate of reaction cannot be understood from Ellinghamn diagram

B. During the formation of metal oxide ΔS becomes negative and ΔG becomes positive resulting in positive slope

C. There is an abrupt change in the slope of Ellingham line when change in phase $(s \rightarrow l)$ or $(l \rightarrow g)$ takes place

D. all the above

Answer: D

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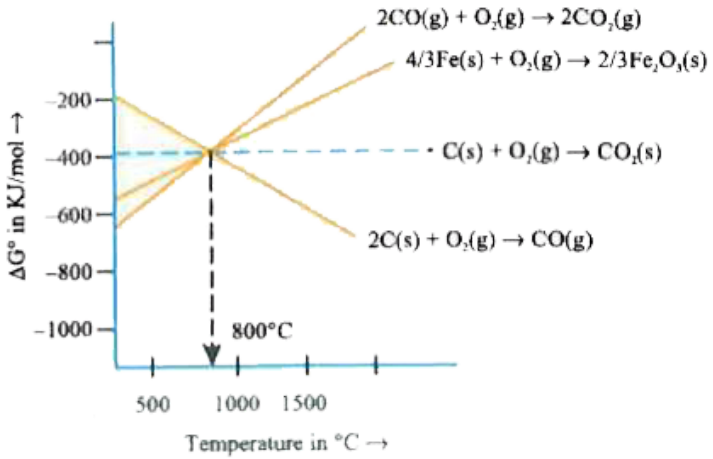
15. Correct statements form the graph



I) Above 1073K, ΔG^0 for the formation of Fe_2O_3 is less negative than ΔG^0 for the formation of CO from carbon

II) Above 1073K, Carbon can reduce Fe_2O_3

III) Below 1073K, CO can reduce Fe_2O_3

IV) In blast furnace, reduction of Fe_2O_3 occurs in different temperature ranges with below 1073K by CO (or) above 1073K by carbon

A. Only I

B. I, II only

C. I, II, III only

D. All

Answer: D

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Exercise 2 Refining Of Metals And Uses

1. The metal for which, its property of formation of volatile complex is taken into accoutn for its purificaiton is:

A. cobalt

B. nickel

C. vanadium

D. iron

Answer: B

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2. Zone refining is based on the principle that

A. impurities of low boliling metals can be separated by distillation

B. different components of a mixture are differently adsorbed on an adsorbent

C. impurities are more soluble in molten metal than in solid metal

D. vapours of volatile compound can be decomposed in pure metal

Answer: C

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3. Which method of purification is represented by the following equation.

$$Ni + 4CO \xrightarrow[\Delta]{70^\circ C} Ni(CO_4) \xrightarrow[\Delta]{180^\circ C} Ni + 4CO$$

A. Van Arkel process

B. Zone refining

C. Cupellation

D. Mond's process

Answer: D

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4. During the process of electrolyic refining of copper some metals present as impurity settle as anode mud. These are

A. Sn and Ag

B. Ag and Au

C. Ph and Zn

D. Fe and Ni

Answer: B

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5. poling process is used for

A. for the removal of Cu_2O from Cu

B. for the removal of Fe_2O_3 from Al

C. for the removal of Fe_2O_3 from Fe

D. all of the above

Answer: A

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6. Which one of the following is not an ore of aluminium ?

A. Mangalium

B. Duralumin

C. German silver

D. Aluminium bronze

Answer: C

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Exercise Ii Home Work

1. Cassiterite is an ore of

A. Mn

B. Ni

C. Sb

D. Sn

Answer: D

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2. Galena is an ore of

A. Pb

B. Hg

C. Sn

D. Zn

Answer: A

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3. The metal always found in the free state is

A. Au

B. Ag

C. Cu

D. Na

Answer: A

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4. Pyrolusite is

A. Oxide

B. Sulphide ore

C. Carbide ore

D. Not an ore

Answer: A

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5. Among the following, the incorrect statement is :

A. argentite and cuprite are oxide ores

B. calamine and azurite are carbonates

C. zinc blende and pyrites are sulphides

D. malachite and azurite are minerals of copper

Answer: A

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6. The chief impurity present in bauxite is

A. SiO_2

B. K_2SO_4

C. Fe_2O_3

D. NaF

Answer: C

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7. Which of the following minerals does not contain aluminium ?

A. Cryolite

B. Mica

C. Feldspar

D. Fluorspar

Answer: D

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8. A mineral is called an ore if :

A. The metal present in the ore is costly

B. a metal can be extracted from it

C. a metal can be extracted conveniently and cconomically from it

D. a metal cannot be extracted from it

Answer: C

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9. the common impurities present in bauxite are

A. Fe_2O_3 and CuO

B. Fe_2O_3 and PbO

C. Fe_2O_3 and SiO_2

D. SiO_2 and CuO

Answer: C

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Exercise Ii Concentration Ofores

1. Froth floatation process is used for the concentration of

A. Oxide ores

B. Sulphide ores

C. CHloride ores

D. Amalgams

Answer: B

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2. In metallurgical processes the flux used for removing acidic impurities is

A. Silica

B. Sodium chloride

C. Lime stone

D. Sodium carbonate

Answer: C

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3. (g) An ore of tin containing $FeCrO_4$ is concentrated by ____.

A. Magnetic separation

B. Froth floatation

C. Electrostatic method

D. Gravity separation

Answer: A

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4. Noble metal(s) which are commerically extracted by cyanide process is(are) :

A. Silver

B. Copper

C. Iron

D. Sodium/Aluminium

Answer: A

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5. Which one of the following ores is not concentrated by froth floatation process ?

A. Copper pyrites

B. Pentlandita

C. Pyrolusite

D. Zinc blende

Answer: C

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6. Extraction of gold and silver involves leaching the metal with CN^- ion. The metal is recovered by :

A. roasting of metal complex

B. calcination followed by roasting

C. thermal decomposition of metal complex

D. displacement of metal by some other metal from the complex ion

Answer: D

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Exercise Ii Extraction Of Metals

1. In the extraction of copper from copper pyrites, iron is removed as :

A. $FeSO_4$

B. $FeSiO_3$

C. Fe_3O_4

D. Fe_2O_3

Answer: B

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2. Which of the following has lowest percentage of carbon?

A. Cast iron

B. Wrought iron

C. Steel

D. All have same percentage

Answer: B

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3. The function of fluorspar in the electrolytic reduction of alumnia dissolved in fused cryotile (Na_3AlF_6) is:

A. as a catalyst

B. to lower the temperature of melt and to make the fused mixture very conducting

C. to decrease the rate of oxidation of carbon anode

D. none of the above

Answer: B

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4. Wrought iron is the purest form of iron. Write a reation used for the preparation of wrought iron from cast iron. How can the impurities of sulphur, silicon and phosphorus be removed from cast iron?

A. carbon which reduces the impurities

B. water which dissolves the impurities

C. limestone which changes impurities into oxides and pass into slag on heating

D. Iron oxide which reacts with impurities on heating by forming slag

Answer: C

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5. Belgian process is used for the extraction of

A. alkali metals

B. alkaline earth metals

C. aluminium

D. all of these

Answer: D

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6. Which of the following reactions occurs during calcination ?

A. $CaCO_3 \rightarrow CaO + CO_2$

B. $4FeS_2 + 11O_2 \rightarrow 2Fe_2O_3 + 8SO_2$

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

D. $Cu_2S + 2CuO \rightarrow 4Cu + SO_2$

Answer: A

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7. According to Ellingham diagram the oxidation reaction of carbon and carbon monoxide may be used to reduce which one of the following oxides at the lowest temperature?

A. Al_2O_3

B. Cu_2O

C. MgO

D. ZnO

Answer: B

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8. The chemical reaction involved in the corrosion of iron metal is that of:

A. $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

B. $2Al + Fe_2O_3 \rightarrow 2Fe + Al_2O_3$

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

D. $FeO + SiO_2 \rightarrow FeSiO_3$

Answer: C

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9. When copper pyrites is roasted in excess of air, a mixture of $CuO + FeO$ is formed. FeO is present as impurity. This can be removed as slag during reduction of CuO. The flux added to form slag is

A. silica, which is an acidic flux

B. limestone, which is a basic flux

C. SiO_2, which is a basic flux

D. CaO, which is a basic flux

Answer: A

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10. Roasting of copper pyrites is done:

A. to remove moisture and volatile impurities

B. to oxidise free sulphur

C. lo decompose pyrites into Cu_2S and FeS

D. all of the above

Answer: D

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11. Extraction of zinc from zinc blende is achieved by:

A. electrolytic reduction

B. roasting followed by reduction with carbon

C. roasting followed by reduction with another metal

D. roasting followed by self reduction

Answer: B

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12. In which of the following pair of metals, both are commercially extracted from their respective ores by carbon reduction method ?

A. Zn, Cu

B. Fe, Cu

C. Sn, Zn

D. Al, Ag

Answer: C

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13. What type of ores can be concentrated by magnetic separation method ?

A. wolframite

B. haematite

C. cassiterite

D. all of these

Answer: D

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14. In Goldschmidt aluminothermic process, thermite mixture contains:

A. 3 parts Fe, O, and 2 parts Al

B. 3 parts Al, O, and 4 parts Al

C. 1 part Fe, O, and 1 part Al

D. 3 parts FeO, and 1 part Al

Answer: D

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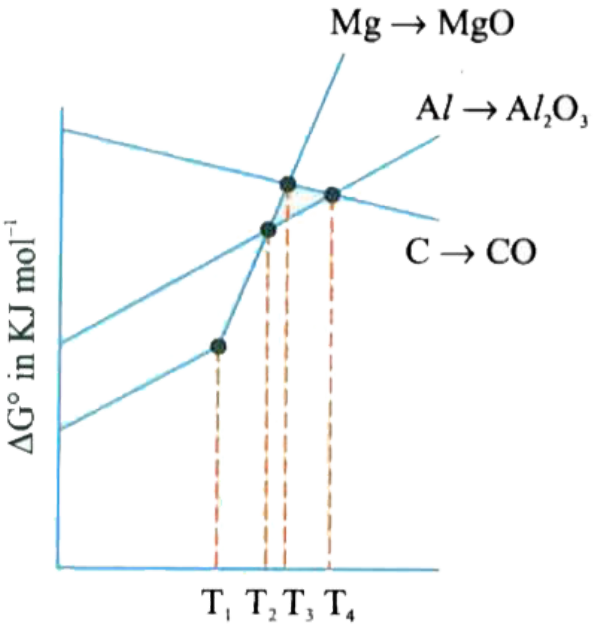
15. Ellingham diagram is given below for the formation of some oxides. Then select the correct combination



A. Below

$$T_2 Al_2O_3 + 3Mg \rightarrow 3MgO + 2Al, \Delta G = -ve$$

B. Below

$$T_3MgO + CO \rightarrow CO_2 + Mg, \Delta G = -ve$$

C. Below

$$T_3MgO + CO \rightarrow CO_2 + Mg, \Delta G = -ve$$

D. all of the above

Answer: A

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Exercise Ii Refining Of Metals And Uses

1. The common metal present in german silver, bell metal and brass is

A. Cu

B. Mg

C. Al

D. Zn

Answer: A

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2. Which method of purification is represented by the following equations

$$Ti + 2I_2 \xrightarrow{523K} TiI_4 \xrightarrow{1700K} Ti + 2I_2$$

A. Cupellation

B. poling

C. Van Arkel process

D. zone refining

Answer: C

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3. German silver is an alloy of copper and:

A. Brass

B. Bronze

C. German silver

D. Invar

Answer: D

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4. Blister copper is

A. bessemerisation

B. roasting

C. poling

D. refining

Answer: C

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5. In the electrolytic refining of zinc,

A. graphite is at the anode

B. the impure metal is at the cathod

C. the metal ion gets reduced at the anode

D. acidified zinc sulphate is the electrolyte

Answer: D

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Exercise Iii

1. Sulphide ores of metals are usually concentrated by both floatation process. Which of the following sulphide ores

offers an exception and is concentrated by chemical leaching ?

A. Gelena

B. Argentite

C. Copper pyrites

D. Sphalerite

Answer: B

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2. Among the metals $Cr, Fe, Mn, Ti, Ba,$ and $Mg,$ the one that cannot be obtained by reduction of metal oxide by aluminium is

A. Cr

B. Fe

C. Ba

D. Mg

Answer: D

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3. Which of the following is/are manufactured by the electrolysis of their fused salts?

A. Na

B. Mg

C. Al

D. Fe

Answer: D

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4. The method not used in metallurgy to refine impure metal is :

A. Mond's process

B. Van Arkel process

C. Amalgamation process

D. Liquidation process

Answer: C

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5. Auto-reduction process is used for the extraction of :

A. Cu

B. Hg

C. PbS forms soluble complex, $Na_2Zn(CN)_4$

D. All of these

Answer: D

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

A. NaCN

B. NaCN in presence of O_2

C. NaCl

D. $AgNO_3$

Answer: B

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7. Blister copper is

A. Impure copper

B. Copper alloy

C. Pure copper

D. Copper having 2% impurity

Answer: D

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8. Which of the following is not correct ?

A. Al reacts with NaOH and liberates H,

B. $AICI_3$ is a Lew is acid

C. Al is used in the manufacture of electrical cables

D. NaOH is used during Hall's process of purification of bauxite

Answer: D

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9. One of the consituents of German silver is

A. Cu+Sn+Ni

B. Cu+Sn

C. Cu+Zn

D. Cu+Zn+Ni

Answer: D

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10. Corundum is

A. Al_2O_3

B. $NaNO_3$

C. B_4C

D. Na_3AIF_6

Answer: A

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11. Purest form of iron is

A. Wrought iron

B. Steel

C. White cast iron

D. grey cast iron

Answer: A

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12. Flux used in the smelting of copper arc is:

A. decrease the solubility of impurities

B. increase the fusion temperature of the roasted ore

C. convert impurities into slag

D. all of the above

Answer: C

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13. Which metal is refined by Mond's process?

A. zinc

B. blister copper

C. sodium

D. silver

Answer: B

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14. The form of iron obtained from blast furnace is:

A. pig iron

B. cast iron

C. wrought iron

D. steel

Answer: A

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15. Aluminium is extracted from Alumina (Al_2O_3) by electrolysis of a molten mixture of

A. $Al_2O_3 + HF + NaAIF_4$

B. $Al_2O_3 + CaF_2 + NaAIF_4$

C. $Al_2O_3 + Na_3AIF_6 + CaF_2$

D. $Al_2O_3 + KF + Na_3AIF_6$

Answer: C

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16. In the exteraction of copper from its sulphide ore, the metal is fanally obtained by the reduction of caprous oxide with

A. copper (I) sulphide (Cu_2S)

B. sulphur dioxide (SO_2)

C. iron sulphide

D. carbon monoxide

Answer: A

17. Identify the alloy containing a non metal as a constituent in it

A. invar

B. steel

C. bell metal

D. bronze

Answer: B

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18. Which ore of the following is a mineral of iron ?

A. Malachite

B. steel

C. bell metal

D. magnetite

Answer: D

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19. Which one of the following is not a sulphide ore ?

A. magnetite

B. iron pyrite

C. copper glance

D. sphalerite

Answer: A

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20. High purity copper is obtained by

A. liquation

B. vapour phase refining

C. distillation

D. zone refining

Answer: D

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21. Roasting of sulphides gives the gas X as a by product. This is a colourless gas with choking smell of burnt sulphur and causes great damage to repiratory organs as a result of acid rain. Its aqueous solution is acidic, acts as reducing agent and its acid has never been isolated. The gas X is :-

A. SO_2

B. CO_2

C. SO_3

D. H_2S

Answer: A

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22. The process of zone refining is used in the purification of :

A. Al

B. Ge

C. Cu

D. H_2S

Answer: B

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23. Amongest the following , how many ores can be concentrated by froth flotation process :

Galena, sphalerit, cassiterite, calamine, chalcocite, haematite, argentite.

A. gravity separation

B. froth flatation

C. magnetic separation

D. hydraulic washing

Answer: B

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24. Which method of purification is represented by the following equations

$$Ti + 2I_2 \xrightarrow{523K} TiI_4 \xrightarrow{1700K} Ti + 2I_2$$

A. distillation

B. liquation

C. hall-heroult method

D. van Arkel method

Answer: D

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25. The statement that is not correct is

A. a furnace lined with Haematite is used to convert cast iron to wrought iron

B. collectors enhance the wettability of mineral particles during froth floatation

C. in vapour phase refining, metal should form a volatile compound

D. copper from its low grade ores is extracted by hydrometallurgy

Answer: B

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26. 'Metals are usually not found as nitrates in their ores". Out of the following two (I and II) reasons which is//are true for the above obervation?

I.Metal nitrates are highly unstable.

II. Metal nitrates are highly soluble in water.

A. I is false but II is true

B. I is true but II is false

C. I and II are true

D. I and II are false

Answer: A

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27. Cryolite is

A. Na_3AlF_6 and is used in the electrolysis of alumina for lowering the melting point of alumina only

B. Na_3AlF_6 and is used in the electrolytic refining of alumina

C. Na_3AlF_6 and is used in the electrolysis of alumina for decreasing electrical conductivity

D. Na_3AlF_6 and is used in the electrolysis of alumina for lowering the melting point and increasing electrical conductivity of alumina

Answer: D

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28. Copper Matte is extracted from copper pyrites ore by heating it in blast furnace. The method is based on the principle that:

A. iron has less affinity for oxygen than sulphur at high temperature

B. sulphur has less affinity for oxygen at high temperature

C. copper has more affinity for oxygen than sulphur at high temperature

D. copper has less affinity for oxygen than sulphur at high temperature

Answer: D

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29. In the exteraction of copper from its sulphide ore, the metal is fanally obtained by the reduction of caprous oxide with

A. carbon monoxide

B. copper (1) sulphide

C. sulphur dioxide

D. Iron sulphide

Answer: B

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30. 'Metals are usually not found as nitrates in their ores". Out of the following two (I and II) reasons which is//are true for the above obervation?

I.Metal nitrates are highly unstable.

II. Metal nitrates are highly soluble in water.

A. a and b are false

B. a is false but b is true

C. a is true but b is false

D. a and b are true

Answer: B

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31. Match the following

Column - I	Column - II
a) Cyanide process	(i) Ultra pure 'Ge'
b) Froth floatation process	(ii) Dressing of ZnS
c) Electrolytic reduction	(iii) Extraction of Al
d) Zone refining	(iv) Extraction of Au
	v) Purificatin of Ni

	a	b	c	d
(1)	iv	ii	iii	i
(2)	ii	iii	i	iv
(3)	i	ii	iii	iv
(4)	iii	iv	ii	i

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Exercise 4

1. Zone refining is based on the principle that

A. impurities of low boiling metals can be separated by distillation

B. different components of a mixture are differently adsorbed on an adsorbent

C. impurities are more soluble in molten metal than in solid metal

D. vapours of volatile compound can be decomposed in pure metal

Answer: C

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2. Extraction of gold and silver involves leaching the metal with CN^- ion. The metal is recovered by

A. roasting of metal complex

B. calcination followed by roasting

C. thermal decomposition of metal complex

D. displacement of metal by some other metal from the complex ion

Answer: D

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3. In the extraction of Cu from its sulphide ore, the metal is formed by reduction of Cu_2O with

A. Cu_2S

B. FeS

C. CO

D. SO_2

Answer: A

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4. When copper ore is mixed with silica in a reverberatory furnace, copper matte is produced. The copper matter

contains_____

A. Sulphides of copper (II) and iron (II)

B. sulphides ofCopper (I) and iron (II)

C. sulphides of copper (II) and iron (III)

D. sulphides of copper (I) and iron (III)

Answer: B

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5. Electrolytic refining's is ued to purify which of the following metals?

A. Ge and Si

B. Zr and Ti

C. Cu and Zn

D. Zn and Hg

Answer: C

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6. In the extraction of chlorine by electrolysis of brine_____.

A. oxidation of Cl^- ion to chlorine gas occurs

B. reduction of Clion to chlorine gas occurs

C. for overall reaction ΔG^0 has negative value

D. a displacement reaction takes place

Answer: A

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7. Which one of the following reactions is an example of auto-reduction?

A. $Fe_3O_4 + 4CO \rightarrow 3Fe + 4CO_2$

B. $Cu_2O + C \rightarrow 2Cu + CO$

C. $Cu^{2+}(aq) + Fe(s) \rightarrow Cu(s) + Fe^{2+}(aq)$

D. $Cu_2O + \frac{1}{2}Cu_2S \rightarrow 3Cu + \frac{1}{2}SO_2$

Answer: D

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8. In the metallurgy of aluminium,

A. Al^{3+} is oxidised to Al(s)

B. graphite anode is oxidised to CO and CO_2

C. oxidation state of oxygen changes in the reaction at anode

D. oxidation state of oxygen changes in the overall reaction involved in the process

Answer: B

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Exercise 4 Matching Type

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

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

(1) I-(c), II(a), III-(d), IV-(b)

(2) I-(d), II(b), III-(c), IV-(a)

(3) I-(c), II(b), III-(d), IV-(a)

(4) I-(d), II(a), III-(c), IV-(b)

A. 1-(c), II(a), III-d), IV-(b)

B. 1-(d), II(b), III-(C), IV-a)

C. I-(C), II(6), III-(d), IV-a)

D. I-(d), Il(a), III-(C), IV-(b)

Answer: B

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2. Match List-I with List-II and select the correct answer using the codes given below

List - I	List - II
A. Mond's process	1. Purification of silver
B. Van Arkel process	2. Purificatin of zinc
C. Cupellation	3. Purificatin of nickel
D. Distillation	4. Purificiation of titanium

	A	B	C	D
(1)	1	2	3	4
(2)	3	4	2	1
(3)	3	4	1	2
(4)	3	2	1	4

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3. Match List-I with List-II and select the correct answer using the codes given below

List-I	List - II
A. Cinnabar	I. Zinc
B. Cassiterite	II. Aluminium
C. Bauxite	III. Tin
D. Calamine	IV. Mercury

	A	B	C	D
(1)	4	3	2	1
(2)	1	2	3	4
(3)	2	3	4	1
(4)	3	4	1	2

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4. match the following

List - I	List - II
A. Feldspar	1. $Ag_3.SbS_3$
B. Asbestos	2. $Al_2O_3.H_2O$
C. Pyrargyrite	3. $MgSO_4.H_2O$
D. Diaspore	4. $KAlSi_3O_8$
	5. $CaMg_3(SiO_3)_4$

	A	B	C	D
(1)	4	5	2	1
(2)	4	5	1	2
(3)	4	1	3	2
(4)	2	5	4	1

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5. Match List-I with List-II and select the correct answer using the codes given below

List -I	List - II
A. Cyanide process	1. Ultra pure Ge
B. Floatation process	2. Pine oil
C. Electrolytic reduction	3. Extraction of Al
D. Zone refining	4. Extraction of Au

	A	B	C	D
(1)	3	1	4	2
(2)	4	2	3	1
(3)	3	2	4	1
(4)	4	1	3	2

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Statement Type Questoins

1. Assertion: All minerals are ore.

Reason: Ores are minerals from which metal can be extracted conveniently and economically.

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: D

2. Metals of high purity are obtained by zone refining.

Impurities are more soluble in melt in pure metal.

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: A

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3. (A) Au,Pt,Ag etc are found in free state

(R) The metals which are noble and chemically less reactive are found in free state

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: A

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4. (A) Roasting is a process in which the ore is heate in presence of air

(R) Concentration of sulphide ore is done by calcinaiton

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: C

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5. During the electrolysis of aqueous sodium chloride the cathodic reaction is

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: C

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6. The ore that is concentrated by froth floatation process is

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: C

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7. Assertion: Ag and Au are extracted by leaching the ores with a dilute solution of $NaCN$.

Reason: Impurities associated with these ores dissolve in $NaCN$.

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: C

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8. (A) Alumina has hgih condutivity

(R) The mixture of alumia and cryolite is used for electrolytic reduction in order to extract aluminium

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: D

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9. What is the percentage of carbon in pig iron and cast iron ?

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: B

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10. Steel contains more carbon than wrought iron

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: B

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11. Aluminium metal is generally used for the extraction of chromium and manganese from their oxide ores. Explain.

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: A

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12. Statement-1:Electrolytic reduction of alumina to aluminium by Hall-Heroult process is carried in the presence of cryolite.

Statement-2:Cryolite contains aluminium.

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: A

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13. In Froth floatation process for, pine oil functions oil functions as:

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: C

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14. Silver is refined by cupellation process, the process removes the impurity of:

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: A

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15. Statement-1:Magnesia and quick lime are used as basic flux.

Statement-2:MgO and CaO can withstand very high temperatures.

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: A

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16. The ore that is concentrated by froth floatation process is

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: C

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17. Assertion : Nickel can be purified by Mond process.

Reason : $Ni(CO)_4$ is a volatile compound which deomposed at $460K$ to give pure Ni.

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: A

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18. Zinc is used to protect corrosion of iron because

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: C

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19. Cinnabar (HgS) and galena (PbS) on roasting give their respective metals but zinc blende does not. Explain.

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: A

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20. Statement-1: Silicones are used as high class industrial insulators.

Statement-2: Silicones are large covalent solids so bad conductors of electricity.

A. S-I and S-II are true and S-II explains S-I

B. S-I and S-II are true and S-II does not explains S-I

C. S-I is true S-II is false

D. S-I is false S-II is true

Answer: B

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