CHEMISTRY

BOOKS - BRILLIANT PUBLICATION

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

Level I Homework

1. A mineral is called ore if:

A. the metal present in the mineral is costly

B. a metal can be extracted from it

C. a metal can be extracted profitably from it

D. a metal can be extracted by tedious process

Answer:

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2. The impurities present in the mineral are called:

A. flux

B. gangue

C. alloy

D. slag

Answer:

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3. The most abundant metal in the earth crust is:

A. Iron

B. Calcium

C. Sodium

D. Aluminium

Answer:

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4. Kaolinite is a silicate ore of:

A. Al

B. Fe

C. Zn

D. Cu

Answer:

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5. Gravity separation is based on:

A. different solubilities of ore and gangue

B. different densities of ore and gangue

C. different lusture of ore and gangue

D. different electrical conductivity of ore and gangue

Answer:

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6. Which of the following statement is false?

A. During roasting moisture is removed

B. During calcination ore as well as gangue is oxidised

C. During roasting ore is heated just below the melting point of ore

D. Calcination is carried out in reverberatory furnace

Answer:

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7. Which one of the following statements is wrong?

A. A. Ellingham diagram normally consists of plots of $\Delta_r G^\circ$ Vs T for formation of oxides of elements

B. B. In Ellingham diagram there is a point in a curve below which ΔG is -ve and above this point the oxide of element decompose on its own

C. C. Ellingham diagram is restricted to oxides of elements

D. D. The temperature corresponding to the turning points on $\Delta_f G^\circ$ Vs T graph in Ellingham diagram will be either melting point or boiling point

Answer:

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8. At 500-800 K, lower temperature range in the blast furnace, which of the following reaction is not occured?

A. $3Fe_2O_3 + CO \rightarrow 2Fe_3O_4 + CO_2$

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

C. $FeO + C \rightarrow Fe + CO$

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

Answer:

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9. The iron obtained from blast furnace contains about

A. 0.5% carbon

B. 4% carbon

C. 1.5% carbon

D. 0.15% carbon

Answer:

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10. In Ellingham diagram the graph of $\Delta_f G^\circ$ Vs T for-the formation of oxide of copper is almost at the top. So it is quite to reduce oxide ore of Cu at any temperature by : A. Carbon, B. Carbon monoxide, C. Silver, D. Mercury

A. A. Carbon

B. B. Carbon monoxide

C. C. Silver

D. D. Mercury

Answer:

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11. During the extraction copper by bessemersiation, bessemer converter is lined inside with

A. lime stone

B. calcined dolomite

C. silica

D. bone ash

Answer:

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12. Aluminium is extracted by

A. Halls' process

B. Hall-Heroult's process

C. Bayer's process

D. Hoop's process

Answer:

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13. In Hail-Heroult's process of extraction of Al, purified Al_2O_3 is mixed with Na_3AlF_6 and CaF_2 in order to

A. decrease conductivity and increase the melting point

B. prevent loss of heat from electrolyte by radiation

C. increase the conductivity and decrease the melting point

D. decrease the fluidity of electrolyte

Answer:

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14. Which of the following metal can be extracted by hydrometallurgy?

A. Cu

B. Ag

C. Au

D. All

Answer:

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15. During the extraction of chlorine gas by the electrolysis of brine solution, at the end of electrolysis the electrolyte solution become-

A. A. acidic

B. B. basic

C. C. neutral

D. D. acidic or basic

Answer:

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16. In the extraction of gold and silver by cyanide process, scrap zinc/zinc shavings used, is act as

A. Oxidising agent

B. emulsifying agent

C. reducing agent

D. flux

Answer:

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17. Distillation is used for the refining of

A. metals having low melting point

B. metals having high melting point

C. volatile metals

D. metals having low melting point and high boiling point

Answer:

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18. Liquation is expecially best method for the refining of impure

A. Fe

B. Sn

C. Au

D. Ti

Answer:

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19. During electrorefining, anode used is made of

A. thick block of impure metal

B. thin sheet of pure metal which is to be refined

C. graphite rods

D. platinum rod

Answer:

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20. Which of the following metal can be refined by distillation as well as electrolysis?

A. Al

B. Cu

C. Zn

D. Sn

Answer:

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21. Which is false about zone refining?

A. A. it is especially used for the refining of metals used in semi conducting devices

B. B. it is based on the principle that the impurities are more soluble in the melt than in the solid state of the metal

C. C. Impure silicon, germanium, boron etc are refined by this method

D. D. During zone refining impurities move to the opposite direction of moving heater

Answer:

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22. Both Mond's process and van Arkel process are called:

A. A. vapour phase refining

B. B. fractional crystallising

C. C. fractional freezing

D. D. All

Answer:

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23. Lanthanoid metals are refined by:

A. A. Zone refining

B. B. van Arkel method

C. C. Mond's process

D. D. Column chromatography

Answer:

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24. Match the following:

List-I	List-II
I) Aluminium foil	a) Alloy of Cu and Zn
II) Copper	b) Railway sleepers
iii) Zinc	c) Steam pipes
iv) Cast iron	d) Wrappers for chocolates
v) Brass	e) Battery

A. $I \to d, ii \to b, iii \to c, iv \to a, v \to a$

B. $I \to c, ii \to d, iii \to e, iv \to b, v \to a$

C. $I \to d, ii \to c, iiii \to e, iv \to b, v \to a$

D. $I \to a, ii \to b, iii \to e, iv \to c, v \to d$

Answer:

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Level I Homework Assertion Reason

1. Assertion: Dressing of ore is an essential step in metal extraction

Reason: Dressing of ore is done to improve the physical appearance of ore

A. If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

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2. Assertion: If pure haematite is used as an ore for iron extraction, there is no need of roasting

Reason: In the extraction of iron, final product in roasting is Fe_2O_3

A. If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

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3. Assertion: In the extraction of Ag, the complex $Na[Ag(CN)_2]$ is treated with Zn.

Reason: Zn is a d block metal

A. If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

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4. Assertion: Through out electrorefining process, the concentration of electrolyte remains constant.

Reason: At a particular instant as much the metal atom from anode

gets dissolved into electrolyte, the same number of metal ions get deposited at the cathode.

A. If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

5. Assertion: All amalgams are alloys.

Reason: All alloys are not amalgams

A. If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

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Level Ii

1. Which of the following statements are true?

i) Elements which are least reactive occur in free state or native state

ii) Earthly or undesired materials present along with ore are called gangue

iii) Among metals, aluminium is the most abundant in the earth crust

iv) All ores are minerals but all minerals are not ores

v) Gemstone "Ruby" is the impure form of Al_2O_3 containing impurity : Co

vi) The set of d-block elements Cu, Ag, Au mostly occur as sulphide ore

A. All are true

B. All except V are true

C. All except (v) and (vi) are true

D. All except VI are true

Answer:

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2. Which is not a carbonate ore?

A. Siderite

B. Azurite

C. Calamine

D. Pyrolusite

Answer:

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3. Gravity separation or Levigation is most commonly used ore concentration method for

A. Sulphide ore

B. Oxide ore

C. Sulphate ore

D. Halide ore

Answer:

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4. A mixture of chromite and cassiterite can be successfully separated by:

A. A. Gravity separation

B. B. Hydraulic washing

C. C. Magnetic separation

D. D. Tabling

Answer:

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5. Which of the following is false?

A. A. Floatation process is used for removing gangue from sulphide ore

B. B. Aniline or cresol is used as stabilizer in floataion process

C. C. In floatation process, the role of collector is to increase interfacial tension between oil and sulphide ore

D. D. Argentite is a sulphide ore, however floatation process is not a best separation method

Answer:

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6. In the leaching of impure bauxite, precipitation of aluminium hydroxide by hydrolysis is not advisable because,

A. A. Precipitation may not quantitative

B. B. It will difficult to convert aluminium hydroxide into anhydrous alumina

C. C. Silicic acid is also precipitated which in turn converted into SiO_2

D. D. Alumina obtained will be hydrated which cannot be made anhydrous

Answer:

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7. Which of the following statements are wrong?

i) Calcination is mainly used for carbonate ore to get its oxide

ii) Hydrated ore and hydroxides become anhydrous by calcination

iii) Impurities like S, As and Sb are removed in the form of elemental vapours by calcination

iv) Roasting is an endothermic process

v) Roasting is mainly applicable for sulphide ore to get its oxide

vi) Some times as a result of roasting, higher oxidation state oxide gets converted into lower oxidation state oxide.

A. only iv is wrong

B. only vi is wrong

C. iii, iv and vi are wrong

D. iv and vi are wrong

Answer:

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8. Roasting and calcination are usually carried out in,

A. blast furnace

B. muffle furnace

C. reverberatory furnace

D. retorts

Answer:

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9. Which of the following statements is wrong?

A. A. smelting is the process where in an oxide is added to concentrated ore to combine with other impurities

B. B. During roasting, reduction of ore into metal must to takes place

C. C. SiO_2, P_2O_5 etc are used as acidic fluxes during smelting.

D. D. FeO, CaO, MnO etc are basic flux used during smelting.

Answer:

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10. Select the correct statement:

A. In the decomposition of an oxide of metal into oxygen and metal in vapour phase, entropy increases

B. Decomposition of an oxide is endothermic change

C. To make $\Delta_r G^\circ$ - ve temperature should be high enough so that $T\Delta S^\circ > \Delta H^\circ$

D. All are correct statements

Answer:

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11. Which of the following statements about Ellingham diagram are true?

i) Ellingham diagram normally consists of plots of $\Delta_f G^\circ$ Vs T for

formation of oxides of elements

(ii) Each plot will be straight lines at all temperatures

iii) There is a point in a curve below which ΔG is -ve and above this point the oxide decompose its own

iv) Ellingham diagram is restricted to metal oxides

v) Ellingham diagram does not say about kinetics of the reduction process

vi) Ellingham diagram presumes that the reactants and products are in equilibrium

A. A. All are true

B. AII except iv are true

C. C. All except iv and vi are true

D. D. All except iv are true

Answer:

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12. The materials which are added along with the calcinated iron ore into the blast furnace in the extraction of iron from haematite ore are

A. A. Coke and silica

B. B. Coke and borax

C. C. Coke and lime stone

D. D. Lime stone and silica

Answer:

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13. Which of the following statements is false?

A. The most impure iron obtained from blast furnace is called pig iron

B. Cast iron is prepared by melting pig iron with scrap iron and coke

C. The blast furnace used for the extraction of iron is lined inside with calcined dolomite

D. Wrought iron or malleable iron, the purest form of commercial iron is produced by puddling process

Answer:

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14. From copper pyrite, copper is extracted in two stages. In the reverberatory furnace which of the following reaction not occur?

A. A. $2CuFeS_2 + 4O_2 \rightarrow Cu_2S + 2FeO + 3SO_2$

B. B. $FeO + SiO_2 \rightarrow FeSiO_3$

C. C. $Cu_2O + FeS \rightarrow Cu_2S + FeO$

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

Answer:

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15. During the extraction copper by bessemersiation, bessemer converter is lined inside with

A. CaO

B. SiO_2

C. FeO

D. MgO

Answer:

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16. In the extraction of zinc, during roasting the temperature is kept above 850°C and air current must be controlled because:-

A. A. Impurities present will be oxidised and interfere in the reduction

B. B. Zinc sulphide will converted in to $ZnSO_4$ which converts back into ZnS during carbon reduction

C. C. In fact roasting is done in controlled supply of air

D. D. Since the roasting is exothermic, temperature inside the converter is to be controlled

Answer:

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17. In thermite reduction Al is chosen as reducing agent because,

A. A. aluminium has low melting point

B. B. aluminium has low density

C. C. aluminium has very high affinity for oxygen and formation of Al_2O_3 is endothermic

D. D. aluminium has very high affinity for oxygen and formation of Al_2O_3 is highly exothermic

Answer:

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18. In thermite reduction, ignition mixture consists of

A. A. Fe_2O_3 and $KClO_3$

B. B. Mg powder and Fe_2O_3

C. C. Magnesium powder and $KClO_3$

D. D. $KClO_3$ and BaO_2

Answer:

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19. In hydrometallurgy, sometimes a flux is added,

A. A. to keep the charge in liquid state

B. B. to increase the conductivity

C. C. to increase the melting point

D. D. to remove impurities as slag

Answer:

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20. In the proces of extraction of gold,

Roasted ore + $CN^- + H_2O \xrightarrow{O_2} [X] + OH^-$

$[X] + Zn \rightarrow [Y] + Au$

[X] and [Y] respectively are:

A. $X = [Au(CN)_2]^-, Y = [Zn(CN)_4]^{2-}$

B. $X = [Au(CN)_4]^{3-}, Y = [Zn(CN)_4]^{2-}$

C. $X = [Au(CN)_2]^-, Y = [Zn(CN)_6]^{3-}$

D. $X = [Au(CN)_4]^-, Y = [Zn(CN)_4]^{2-}$

Answer:

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21. In the extraction of Al by Hall-Heroult's process, electrolyte contains Na^+, Ca^{2+} and Al^{3+}. However only Al is discharged at cathode because,

A. Al^{3+} ions have higher oxidation potential and discharge potential than Na^{+} and Ca^{2+}

B. Al^{3+} ions have higher reduction potential and lower discharge potential than Na^{+} and Ca^{2+}

C. Al^{3+} ions have high reduction potential and discharge potential than Na^{+} and Ca^{2+}

D. Al^{3+} ions have lower reduction potential and discharge potential than Na^{+} and Ca^{2+}

Answer:

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22. Which is not true about electrolysis of "brine solution"?

A. A. It is one of the method used for large scale production of chlorine

B. B. The ΔG^0 for the reaction +ve

C. C. Resultant electrolytic solution will be acidic in nature

D. D. The external emf required is less than 2.2 eV

Answer:

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23. Hoop's processes is used for the refining of:

A. Impure copper

B. Impure aluminium

C. Impure zinc

D. Impure silver

Answer:

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24. In the electrorefining of impure aluminium, molten $AICI_3$ is not used as electrolyte because : Its melting point is very high, pure aluminium formed dissolved into molten $AlCl_3$, it sublimes easily and is poor conductor due to covalent in nature, both 1 and 2

A. Its melting point is very high

B. pure aluminium formed dissolved into molten $AlCl_3$

C. X sublimes easily and is poor conductor due to covalent in nature

D. both 1 and 2

Answer:

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25. Which of the following statement is false?

A. A. Impure zinc can be refined by distillation

B. B. Impure zinc can be refined by electro refining

C. C. Zone refining is used for the refining of Boron, Silicon, Germanium, Gallium etc

D. D. In the electro refining of impure copper, the electrolyte used is dil. H_2SO_4

Answer:

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26. Lanthanoid metals can be separated by:

A. A. Chromatography

B. B. Distillation

C. C. liquation

D. D. All of the above

Answer:

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27. Which of the following is incorrectly matched:

A. A. Magnalium - Containing magnesium and aluminium and used for making balances

B. B. Bell metal- Containing Cu and Tin

C. C. Dutch metal - Alloy of Cu and Sn

D. D. Constantain - Alloy of Cu and Ni

Answer:

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Level Ii Assertion Reason

1. Assertion: If pure haematite is used as an ore for iron extraction, there is no need of roasting

Reason: In the extraction of iron, final product in roasting is Fe_2O_3

A. If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

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2. Is it ture under certain conditions Mg can reduce Al_2O_3 and Al can reduce MgO? What are the conditions?

A. If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

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3. Assertion: Elements present in anode mud of an electrolytic refining process has higher oxidation potential as compared to that of metal to be refined.

Reason: Impurities having higher oxidation potential as compared to metal to be refined get reduced during electro refining.

A. If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

4. Assertion: Carbon is a good reducing agent for oxides, while poor reducing agent for sulphide.

Reason: The slope of $\Delta_f G^\circ$ Vs T line of CO_2 is positive and of CS_2 is negative.

A. A.If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

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5. Assertion: Oxides of highly electro positive metals cannot be reduced by carbon.

Reason: Highly electro positive metals react with carbon to form carbides.

A. If both Assertion & Reason are true and the Reason is the correct explanation of the Assertion

B. If both Assertion and reason are true but the Reason is not the correct explanation of the Assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statements

Answer:

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Level I

1. Which is not a mineral of aluminium?

A. Corundum

B. Anhydrite

C. Diaspore

D. Bauxite

Answer: B

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

A. Na

B. K

C. Mg

D. Ca

Answer: C

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3. The method of concentrating the ore which makes use of the difference in density between ore and impurities is called

A. leaching

B. liquation

C. levigation

D. magnetic separation

Answer: C

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4. In metallurgy, flux is a substance used to convert

A. soluble impurities to insoluble impurities

B. infusible impurities to fusible material

C. fusible impurities to infusible impurities

D. mineral into silicate

Answer: B

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5. Electrolytic refining is used to purify which of the following metals?

A. Cu and Zn

B. Ge and Si

C. Zr and Ti

D. Zn and Hg

Answer: A

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6. Wolframite ore is separated from tin stone ore by the process, called

A. calcination

B. electromagnetic separation

C. roasting

D. smelting

Answer: B

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7. During electrolytic refining of copper, some metals present as inpurity settle as 'anode mud'. These are -

A. Fe and Ni

B. Ag and Au

C. Pb and Zn

D. Se and Ag

Answer: B

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

A. carbon monoxide

B. copper (I) sulphide

C. sulphur dioxide

D. iron (II) sulphide

Answer: B

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9. Beneficiation means

A. to treat the metal oxide with carbon monoxide

B. to concentrate or remove impurities from an ore

C. to derive benefits from the ore

D. to heat the ore in presence of oxygen

Answer: B

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10. Which one of the following ores is best concentrated by froth floatation method?

A. Magnetite

B. Malachite

C. Galena

D. Cassiterite

Answer: C

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11. In the isolation of metals, calcination process usually results in the formation of

A. metal carbonate

B. metal oxide

C. metal sulphide

D. metal hydroxide

Answer: B

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12. Iron ore is reduced to iron by reaction with

A. calcium carbonate

B. carbon

C. carbon monoxide

D. carbon dioxide

Answer: C

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13. Calcination is used in metallurgy for removal of

A. water and sulphide

B. CO_2 and H_2S

C. H_2O and H_2S

D. water and CO_2

Answer: D

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14. In order to refine 'blister copper'it is melted in a furnace and is stirred with green logs of wood. The purpose is

A. to expel the dissolved gases in blister copper

B. to bring the impurities to surface and oxidize them

C. to increase the carbon content of copper

D. to reduce the metallic oxide impurities with hydrocarbon gases liberated from the wood.

Answer: D

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15. Commercially, aluminium is obtained from purified aluminium oxide by

A. electrolysis of aqueous $Al_2(SO_4)_3$

B. electrolysis of aqueous $KAI(SO_4)_2$

C. electrolysis of a fused mixture of Al_2O_3 and Na_3AlF_6

D. reduction with coke at high temperatures

Answer: C

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16. The form of iron obtained from blast furnace is

A. steel

B. cast iron

C. pig iron

D. wrought iron

Answer: C

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17. Which one of the following ores is known as malachite?

A. Cu_2O

B. Cu_2S

C. $CuFeS_2$

D. $Cu(OH)_2.CuCO_3$

Answer: D

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18. Which of the following statements is correct?

A. Anthracite and chalcocite are both ores of copper

B. Anthracite and chalcocite are both sulphide ores

C. Both German silver and horn silver have zero percent silver content

D. Malachite and azurite are both basic copper carbonate

Answer: D

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19. 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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20. Sulphide ores are common for the metals

A. Ag, Cu and Pb

B. Ag, Cu and Sn

C. Ag, Mg and Pb

D. Al, Cu and Pb

Answer: A

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21. Which of the following metals can be obtained by thermal decomposition of their oxides at attainable temperatures? Silver, Mercury, Gold, All of these

A. Silver

B. Mercury

C. Gold

D. All of these

Answer: D

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22. For obtaining high purity metals, which of the following methods of refining is preferred?

A. Poling

B. Liquation

C. Zone refining

D. Electrolytic method

Answer: C

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23. The reaction $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$ in the metallurgical process of zinc is called

A. roasting

B. smelting

C. cupellation

D. calcination

Answer: A

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24. Chemical reduction is not suitable for converting

A. zinc oxide into zinc

B. lead oxide into lead the dood

C. bauxite into aluminium

D. haematite into iron

Answer: C

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25. Ellingham diagram can be drawn for which of the following?

A. Sulphides

B. Oxides

C. Halides

D. All of these

Answer: D

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

A. in the presence of NaCl

B. in the presence of fluorite

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

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

Answer: C

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

A. volatile stable compound

B. non-volatile stable compound

C. volatile unstable compound

D. non-volatile unstable compound

Answer: A

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28. Which of the following does not contain Mg?

A. Magnetite

B. Magnesite

C. Asbestos

D. Carnallite

Answer: A

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29. When a metal is to be extracted from its ore, if the gangue associated with the ore is silica, then

A. a basic flux is needed

B. an acidic flux is needed

C. both (A) and (B)

D. neither of them is needed

Answer: A

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30. Extraction of silver form 'Ag_2 ~S' by the use of soidum cyanide is an example of

A. Roasting

B. Hydrometallurgy

C. Electrometallurgy

D. Smelting

Answer: B

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31. Which of the following processes involve the roasting process?

A. $ZnCO_3 \rightarrow ZnO + CO_2$

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

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

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

Answer: C

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32. Magnetic separation is used for increasing concentration of the:

A. Hom silver

B. Calcite

C. Haematite

D. Magnesite

Answer: C

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33. Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?

A. CO_2 is more volatile than CS_2

B. Metal sulphides are thermodynamically more stable than CS_2

C. CO_2 is thermodynamically more stable than CS_2

D. Metal sulphides are less stable than the corresponding oxides

Answer: B

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34. By which process Hg and Sn are extracted, respectively?

A. Carbon reduction, self-reduction

B. Self-reduction, carbon reduction

C. Electrolytic reduction, cyanide process

D. Cyanide process, electrolytic reduction

Answer: B

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35. Extraction of Ag from commercial lead is possible by of

A. Parke’s process

B. Clarke's process

C. Mc-Arthur Forest process

D. Electrolytic process

Answer: A

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36. Spelter is

A. Impure zinc

B. Impure iron

C. Pure zinc

D. Impure aluminium

Answer: A

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37. Before introducing FeO in blast furnace, it is converted to Fe_2O_3 by roasting so that

A. It may not be removed as slag with silica

B. Oresence of it may increase the melting point of charge

C. It may not evaporate in the furnace.

D. None of the above

Answer: A

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38. Which method is not correct for refining of crude metals?

A. Liquation:tin

B. Zone refining: silicon

C. Electrolytic refining: blister copper

D. Mond's process : aluminium

Answer: D

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39. Which of the following reactions taking place in the blast furnace during extraction ofiron is endothermic?

A. $CaCO_3 \rightarrow CaO + CO_2$

B. $2C + O_2 \rightarrow 2CO$

C. $C + O_2 \rightarrow CO_2$

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

Answer: A

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40. Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?

A. CO_2 is more volatile than CS_2

B. Metal sulphides are thermodynamically more stable than CS_2

C. Metal sulphides are less stable than the corresponding oxides

D. CO_2 is thermodynamically more stable than CS_2

Answer: B

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41. The incorrect statement is

A. Calamine and siderite are carbonates

B. Argentite and cuprite are oxides

C. Zinc blende and iron pyrites are sulphides

D. Malachite and azurite are ores of copper

Answer: B

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42. The process of isolation of metals by dissolving the ore in a suitable chemical regent followed by precipitation of the metal by a more electropositive metal is called

A. Electrometallurgy

B. Hydrometallurgy

C. Electro refining

D. Zone refining

Answer: B

Watch Video Solution

43. Thermite reduction is not used for commercial extraction of the respective metal from which of the following oxides?

A. Mn_3O_4

B. TiO_2

C. Fe_2O_3

D. Cr_2O_3

Answer: C

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

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

B. greater solubility of the impurity in the molten metal than in the solid

C. greater mobility of the pure metal than that of impurity

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

Answer: B

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45. Which method is not correct for refining of crude metals?

A. Distillation,zinc and mercury

B. Liquation: tin

C. van Arkel: Zirconium in

D. Mond process: lead

Answer: D

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46. Magistral is the burnt pyrites containing

A. sulphates of iron and copper

B. sulphates and oxides of iron and copper

C. oxides of iron and copper

D. sulphides of silver and lead

Answer: B

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47. Gold is extracted by hydrometallurgical process based on its property

A. of being electropositive

B. of being less reactive

C. to form complexes which are water soluble

D. to form salts which are water soluble

Answer: C

Watch Video Solution

48. The final step for the extraction of copper from copper pyrites in Bessemer converter involves the reaction (1) Cu_2S + 2FeO → 2Cu + 2Fe +SO_2 (2) Cu_2S + 2Cu2_ O → 6Cu+SO2 (3) 4Cu_2 O +Fe S → 8Cu + 2FeSO4 (4) 2Cu_2 O + FeS → 4Cu + Fe + SO2

A. $Cu_2S + 2FeO \rightarrow 2Cu + 2Fe + SO_2$

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

C. $4Cu_2O + FeS \rightarrow 8Cu + 2FeSO_4$

D. $2Cu_2O + FeS \rightarrow 4Cu + Fe + SO_2$

Answer: B

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49. Which of the following statement is incorrect?

A. Pure aluminium oxide is obtained by heating aluminium hydroxide

B. Cryolite lowers down the melting point of bauxite in electrolytic cell for extraction of aluminium

C. Carbonate ores are converted into oxides by roasting in air

D. Mercury cannot be produced by roasting the cinnabar ore in air

Answer: C

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50. The chief impurity present in red bauxite is (1) SiO2 (2) Fe_2 O_3 (3) K2SO4 (4) NaF

A. SiO_2

B. Fe_2O_3

C. K_2SO_4

D. NaF

Answer: B

Watch Video Solution

Level Ii

1. Extraction of gold and silver involves leaching the metal with CN^- ion. The metal is recovered by (1) Displacement of metal by some other metal from the complex ion (2) Roasting of metal complex (3) Calcination followed by roasting (4) Thermal decomposition of metal complex

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

B. roasting of metal complex

C. calcination followed by roasting

D. thermal decomposition of metal complex

Answer: A

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

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

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

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

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

Answer: C

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3. In the modern blast furance, the charge consists of a mixture of

A. iron pyrites + bituminous coal

B. hydrated iron oxide + dolomite + coke

C. calcined iron oxides + limestone + coke

D. calcined iron oxides + lime + anthracite coal

Answer: C

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4. "Native silver metal forms a, water soluble complex with a dilute aqueous solntion of NaCN in the presence of

A. nitrogen

B. oxygen

C. carbon dioxide

D. argon

Answer: B

Watch Video Solution

5. Among the following groups of oxides, the group containing oxides that cannot be reduced by carbon to give the respective metals is

A. Cu_2O, K_2O

B. PbO, Fe_3O_4

C. Fe_2O_3, ZnO

D. CaO, K_2O

Answer: D

Watch Video Solution

6. In the cyanide extraction process of silver from argentite ore, the oxidising and reducing agents are

A. O_2 and CO respectively

B. O_2 and Zn respectively

C. HNO_3 and Zn dust respectively

D. HNO_3 and CO respectively

Answer: B

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7. The statement that is NOT correct is that (1) A furnace lined with haematite is used to convert cast iron to wrought iron. (2) Collectors enhance the wettability of mineral particles during froth floatation. (3) In vapour phase refining, metal should form a volatile compound. (4) Copper from its low-grade ores is extracted by hydrometallurgy.

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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8. Which step is not involved in hydrometallurgical process?

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

B. $CuFeS_2 + 2H_2SO_4 \rightarrow CuSO_4 + FeSO_4 + 2H_2S$

C. $CuSO_4 + Fe \rightarrow FeSO_4 + Cu$

D. $CuCO_3 + H_2SO_4 \rightarrow CuSO_4 + H_2O + CO_2$

Answer: A

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

A. BeO and Al_2O_3

B. ZnO and Fe_2O_3

C. CaO and Cr_2O_3

D. BaO and U_3O_8

Answer: B

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10. Carbon can reduce ferric oxide to iron at a temperature above 983 K because

A. carbon monoxide formed is thermodynamically less stable than ferric oxide

B. carbon has a higher affinity towards oxygen than iron

C. free energy change for the formation of carbon dioxide is less negative than that for ferric oxide

D. iron has a higher affinity towards oxygen than carbon

Answer: B

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11. Consider the following reaction, $(Ag + Pb)$ alloy $\xrightarrow{\text{Melt and add zinc}} (Ag + Pb + Zn)\text{melt} \xrightarrow{\text{Cool}} \frac{\text{Layer X}}{\text{Layer Y}}$

Select the correct statement(s) based on above scheme. (1) Layer X contains zinc and silver (2) Layer Y contains lead and silver but amount of silver in this layer is smaller than in the layer X (3) X and Y are immiscible layers (4) All of the above are correct statements

A. Layer X contains zinc and silver

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

C. X and Y are immiscible layers

D. All of the above are correct statements

Answer: D

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12. Consider the following metallurgical processes in

1. Heating impure metal with CO and distilling the resulting volatile carbonyl boiling point $43^\circ C$ and finally decomposing at 150° to $200^\circ C$ to get the pure metal.

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

III. Electrolysing the molten electrolyte containing approximately equal amounts of the metal chloride and $CaCl_2$ to obtain the metal.

The processes used for obtaining sodium, nickel and copper are respectively

A. I, II and III

B. II, III and I

C. III, I and II

D. II, I and III

Answer: C

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13. During the concentration of sulphide ores by froth floatation process, the separation of sphalerite and galena is achieved by which of the following substances used as depressant?

A. Potassium xanthate

B. Sodium cyanide

C. Copper sulphate

D. Pine oil

Answer: B

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14. Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?

A. Metal sulphides are thermodynamically more stable than CS_2

B. CO_2 is thermodynamically more stable than CS_2

C. Metal sulphides are less stable than the corresponding oxides

D. CO_2 is more volatile than CS_2

Answer: C

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15. Identify M and N in the following reaction.

Copper glance $\xrightarrow{\text{controlled heating}} M + SO_2 \uparrow$

$M \xrightarrow{N} Cu + SO_2 \uparrow$

A. $M = Cu_2O$, N=Self reduction

B. $M = Cu_2O + Cu_2S$, N=self reduction

C. $M = Cu_2O$, N=carbon reduction

D. $M = Cu_2O$, N =Electrolytic reduction

Answer: B

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16. Which method of purification is represented by the equations. $Ti(s) + 2I_2(g) \xrightarrow{523K} TiI_4(g) \xrightarrow{1700K} Ti(s) + 2I_2(g)$: Cupellation, Poling, van Arkel, Zone refining

A. Zone refining

B. Cupellation

C. Poling

D. van Arkel

Answer: D

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17. In the context of the Hall-Heroult process for the extraction of Al, which of the following statement is false?

A. Al_2O_3 is mixed with CaF_2 which lowers the melting point of the mixture and brings conductivity.

B. Al^{+3} is reduced at the cathode to form Al.

C. Na_3AlF_6 serves as the electrolyte

D. CO and CO_2 are produced in this process.

Answer: C

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18. Which of the following statements is correct?

A. Slag is carefully chosen to combine with the flux present in the ore to produce easily fusible gangue to carry away the impurities.

B. Gangues are carefully chosen to combine with the slag present in the ore to produce easily fusible flux to carry away the impurities.

C. Gangues are carefully chosen to combine with flux present in the ore to produce easily fusible slag to carry away the impurities.

D. Fluxes are carefully chosen to combine with the gangue present in the ore to produce easily fusible slag to carry away the impurities.

Answer: D

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19. Froth floatation method is successful in separating impurities from ores because (1) The pure ore is soluble in water containing additives like pine oil, cresylic acid, etc. (2) The pure ore is lighter than water containing additives like pine oil, cresylic acid, etc. (3) The impurities are soluble in water containing additives like pine oil, cresylic acid, etc. (4) The pure ore is not easily wetted by water as by pine oil, cresylic acid, etc.

A. the pure ore is soluble in water containing additives like pine oil, cresylic acid, etc.

B. the pure ore is lighter than water containing additives like pine oil, cresylic acid, etc.

C. the impurities are soluble in water containing additives like pine oil, cresylic acid, etc.

D. the pure ore is not easily wetted by water as by pine oil, cresylic acid, etc.

Answer: D

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20. The final step for the extraction of copper from copper pyrites in Bessemer converter involves the reaction (1) Cu_2S + 2FeO → 2Cu + 2Fe +SO_2 (2) Cu_2S + 2Cu2_ O → 6Cu+SO2 (3) 4Cu_2 O +Fe S → 8Cu + 2FeSO4 (4) 2Cu_2 O + FeS → 4Cu + Fe + SO2

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

B. $4Cu_2S + FeS \rightarrow 8Cu + FeSO_4$

C. $2Cu_2O + FeS \rightarrow 4Cu + Fe + SO_2$

D. $Cu_2S + 2FeO \rightarrow 2Cu + 2FeCO + SO_2$

Answer: A

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

A. Cathode Anode
A. Pure Zn Pure Cu

B. Cathode Anode
B. Impure sample Pure Cu

C. Cathode Anode
C. Impure Zn Impure sample

D. Cathode Anode
D. Pure Cu Impure sample

Answer: D

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22. Which of the following combination represents the correct matching of metals with the most commonly employed ores for their extraction? .

A. Fe Haematite, Zn Sphalerite, Cu Copper pyrites, Al Bauxite

B. Fe Iron pyrites, Zn Zincite, Cu Cuprite, Al Clay

C. Fe Siderite, Zn Calamine, Cu Malachite, Al Aluminium phosphate

D. Fe Chalcocite, Zn Magnetite, Cu Copper glance, Al Bauxite

Answer: A

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23. $\Delta G^{\circ}\ 'Vs.\ T$ plot in the Ellingham's diagram slopes downward for the reaction : $Mg + 2O_2 \rightarrow MgO$, $2Ag + \frac{1}{2}O_2 \rightarrow Ag_2O$, $C + \frac{1}{2}O_2 \rightarrow CO$, $CO + \frac{1}{2}O_2 \rightarrow CO_2$

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

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

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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24. Bauxite ore consists of $Al_2O_3, SiO_2, TiO_2, Fe_2O_3$. This ore is treated with conc. $NaOH$ solution at 500 K and 35 bar pressure for a few hours and filtered out. In the filtrate, the species present are

A. $NaAl(OH)_4$ only

B. $Na_2Ti(OH)_6$ only

C. $NaAl(OH)_4$ and Na_2SiO_3 both

D. Na_2SiO_3 only

Answer: C

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25. When copper pyrites is roasted, the flux added to form slag is

A. SiO_2, 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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26. Four metals and their methods of refinement are given

i) Ni, Cu, Zr, Ga

ii) Electrolysis, Van Arkel process, Zone refining, Mond's process

Choose the right method for each:

A. Ni: Electrolysis, Cu: Van Arkel process, Zr: Zone refining, Ga: Mond's process

B. Ni: Mond's process, Cu: Electrolysis, Zr: Van Arkel process, Ga: Zone refining

C. Ni: Mond's process, Cu: Van Arkel process, Zr: Zone refining, Ga: Electrolysis

D. Ni : Electrolysis, Cu: Zone refining, Zr: Van Arkel process, Ga: Mond's process

Answer: B

27. Carbon reduction process is not commercially applicable for which of the following set of oxides to extract the respective metal?

$I)ZnO \quad II)Fe_2O_3 \quad III)Al_2O_3 \quad IV)SnO_2 \quad V)MgO$

A. ZnO, Fe_2O_3, SnO_2

B. ZnO, SnO_2

C. MgO, Al_2O_3

D. MgO, SnO_2, Al_2O_3

Answer: C

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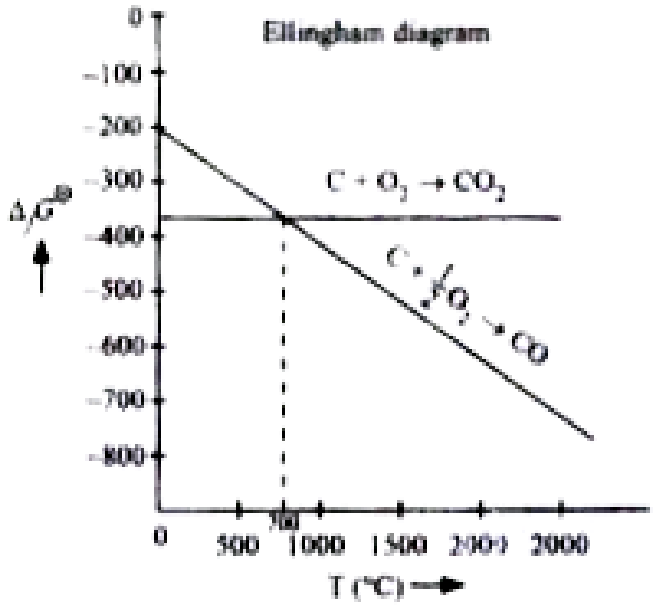
28. Which of the following is incorrect on the basis of the given Ellingham diagram for carbon?



A. Up to $710^\circ C$, the reaction of formation of CO_2 is energetically more favourable, but above $710^\circ C$ the formation of CO is preferred.

B. In principle, carbon can be used to reduce any metal oxide at a sufficiently high temperature.

C.

$$\Delta S[C_{(s)} + 1/2O_{2(g)} \rightarrow CO_{(g)}] < \Delta S[C_{(s)} + O_2 \rightarrow CO_{2(g)}]$$

D. Carbon reduces many oxides at elevated temperature because $\Delta_f G^{\Theta}$ vs temperature line has a negative slope.

Answer: C

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

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

T_1 and T_2 are

A. $100^\circ C, 50^\circ C$

B. $50^\circ C, 100^\circ C$

C. $50^\circ C, 220^\circ C$

D. $230^\circ C, 50^\circ C$

Answer: C

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30. Following reaction is not involved in Thermite process

A. $3Mn_3O_4 + 8Al \rightarrow 9Mn + 4Al_2O_3$

B. $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$

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

D. $B_2O_3 + 2Al \rightarrow 2B + Al_2O_3$

Answer: C

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31. Consider the following steps

$CuS \xrightarrow{\text{roast in air}} (A) \xrightarrow{\text{roast without air}} (B)$Which is not the correct statement?

A. It is self-reduction

B. It involves disproportionation $Cu_2S \rightarrow Cu + CuS$

C. (A) is a mixture of CuO and CuS and (B) is a mixture of Cu and SO_2

D. All are incorrect statements

Answer: B

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32. NaCN is sometimes added in the froth flotation process as a depressant when ZnS and PbS minerals are expected because

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

B. ZnS forms soluble complex $Na_2\left[Zn(CN)_4\right]$ while PbS forms froth

C. PbS forms soluble complex $Na_2\left[Pb(CN)_4\right]$ while ZnS forms froth

D. $NaCN$ is never added in froth flotation process

Answer: B

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33. At what approximate 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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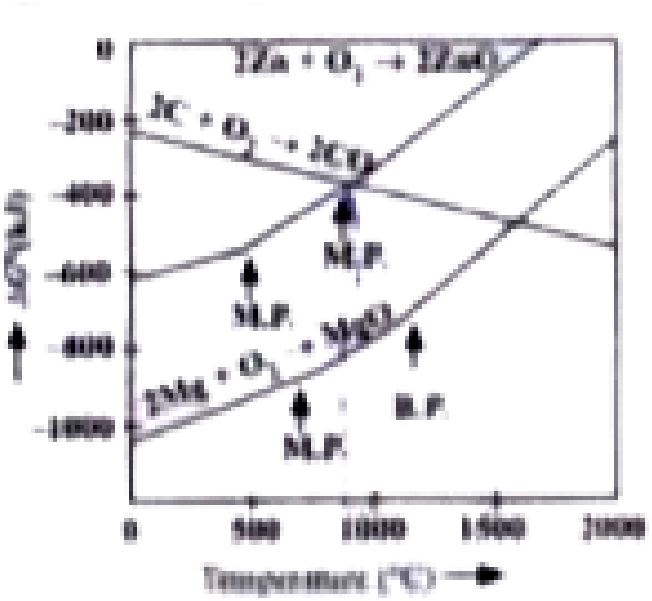
34.



At this temperature $\Delta_f G^{\Theta}$ of the reaction is $ZnO + C + Zn + CO$

A. $-ve$

B. $+ve$

C. Zero

D. Nothing can be said

Answer: C

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

$ZnO + C \rightarrow Zn + CO$

A. $< 1000^\circ C$

B. $> 1100^\circ C$

C. $< 500^\circ C$

D. $> 500^\circ C$ but $< 1000^\circ C$

Answer: B

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36. The principal reaction(s) in the zone of heat absorption of blast furnace employed in the metallurgy of iron is/are

A. $C + O_2 \rightarrow CO_2$

B. $2C + O_2 \rightarrow 2CO$

C. $2CO + O_2 \rightarrow 2CO_2$

D. $CaCO_3 \xrightarrow{-CO_2} CaO \xrightarrow{SiO_2} CaSiO_3$

Answer: D

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37. Which of the following statements regarding the metallurgy of aluminium by electrolytic method is not correct?

A. Electrolyte is Al_3O_3 dissolved in Na_3AlF_6 containing a little of CaF_2

B. Anode consists of a number of graphite rods which are periodically replaced

C. Aluminium being heavier than electrolyte floats over the surface of the latter

D. Bauxite ore is purified before carrying out the electrolysis

Answer: C

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38. The impure zinc contains impurities such as cadmium, arsenic, iron and lead. From this, zinc may be recovered by

A. distillation at 500 K

B. distillation at 1170K - 1270 K followed by rapid chilling

C. distillation at 3100 K

D. solvent extraction method

Answer: B

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39. In zone refining method, the molten zone.

A. contains impurities

B. contains purified metal only

C. contains more impurity than the original metal

D. moves to either side

Answer: C

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40. The metal that cannot be obtained by electrolysis of the aqueous solution of its salts is:

A. Cr

B. Ag

C. Ca

D. Cu

Answer: C

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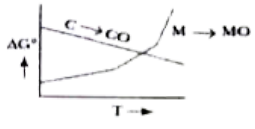
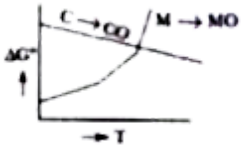
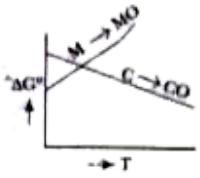
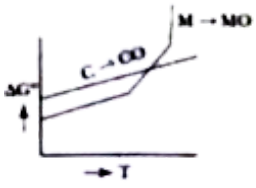
41. Which of the following curves assures that the metal obtained by carbon reduction is in the vapour state?

A. 

B. 

C. 

D. 

Answer: B

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42. Which of the following characteristics of steel are developed by the tempering process?

A. Steel becomes hard and brittle

B. Steel becomes soft

C. Steel remains hard but brittleness disappears

D. Only the surface layer becomes hard

Answer: C

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43. Which of the following statements is correct regarding self reduction?

A. Partial roasting and self reduction occur together

B. First self reduction occurs followed by partial roasting

C. First partial roasting occurs followed by self reduction

D. Partial roasting is done in the reverberatory furnace first, and then self reduction is done in the blast furnace

Answer: C

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44. Which of the following activities is not related to poling?

A. Metallic impurities having higher oxidation potential than the metal to be refined are oxidized first.

B. Non-volatile oxides are removed in the form of scum.

C. Metallic impurities having lower oxidation potential than the metal to be refined settle down at the bottom of the furnace.

D. Green poles of wood are used as stirrers.

Answer: C

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45. Carbon reduction cannot be employed for the extraction of Al from Al_2O_3 because

A. the temperature requirement is very high $(\sim 2000^\circ C)$.

B. Al obtained in the vapour state is very difficult to handle.

C. Al forms its carbide (Al_2C_3) and a lot of it gets wasted.

D. All of these

Answer: D

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46. Oxidation states of the metal in the minerals haematite and magnetite, respectively, are

A. II, III in haematite and III in magnetite

B. II, III in haematite and II in magnetite.

C. II in haematite and II and III in magnetite.

D. III in haematite and II and III in magnetite.

Answer: D

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47. Roasted copper pyrite is on smelting with sand produces

A. $FeSiO_3$ as fusible slag and Cu_2S as matte

B. $CaSiO_3$ as infusible slag and Cu_2O as matte matter the

C. $Ca(PO_4)_2$ as fusible slag and Cu_2S as matte

D. $Fe_3(PO_4)_2$ as infusible slag and Cu_2S as matte

Answer: A

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Level Ii Assertion Reason Type

1. Assertion : Aluminium cannot be extracted by reducing alumina with carbon.

Reason : Aluminium has more affinity for oxygen than carbon.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: A

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2. Assertion , Silver ores and native gold have to be leached with metal cyanides.

Reason : Silver and gold do not form complex ion with cyanide ion.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: C

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3. Assertion : Levigation is used for the separation of oxide ores from impurities.

Reason : Ore particles are removed by washing in a current of water.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: C

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4. Assertion : PbS when heated with air undergoes self-reduction.

Reason : The PbO that is formed on heating PbS reacts further with PbS to yield Pb and SO_2

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: A

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5. Assertion : Limestone added in the blast furnace decomposes to give CaO which forms slag in molten state and separates out from iron.

Reason : The iron obtained from the blast furnace contains about 4% carbon and many impurities like S, P, Si, Mn, etc.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: B

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6. Assertion : In electrolytic refining of metal, impure metal is made cathode while a strip of pure metal is used as anode.

Reason : The pure metal gets deposited at anode as anode mud.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: D

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7. Assertion : Tin is refined by liquation method.

Reason : Tin has low melting point as compared to impurities.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: A

Watch Video Solution

8. Assertion : Zone refining method is used to produce pure metals which are used as semiconductors.

Reason : Semiconductors are used in highly pure form.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: B

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9. Assertion : Nickel is purified by reacting it with CO.

Reason : Impurities present, form a volatile complex.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: C

Watch Video Solution

10. Assertion : Reduction of a metal oxide is easier if the metal formed is in liquid state at the temperature of reduction.

Reason : The entropy is higher if the metal is in liquid state.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: A

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11. Assertion : Zirconium can be purified by Van Arkel method.

Reason : ZrI_4, is volatile and decomposes at 1800 K.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: A

Watch Video Solution

12. Assertion : Hydrometallurgy involves dissolving the ore in a suitable reagent followed by precipitation by a more electropositive metal.

Reason : Copper is extracted by hydrometallurgy from low grade ore.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: C

Watch Video Solution

13. Assertion : During the reduction of ZnO to Zn, $C$is more efficient than CO.

Reason : The standard free energy of formation of CO_2 from CO is always higher than that of ZnO.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: B

Watch Video Solution

14. Assertion : Carbonate and hydroxide ores are concentrated by froth floatation process.

Reason : In froth floatation process, mineral oil is used because it preferentially wets the gangue particles.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: D

Watch Video Solution

15. Assertion : Aluminothermy is used for extraction of chromium from chromium oxide.

Reason : Alumina has a high melting point.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: B

Watch Video Solution

16. Assertion : Reduction of the metal oxide usually involves heating it with some other substance acting as a reducing agent.

Reason : The reducing agent combines with the oxygen of the metal oxide.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: A

Watch Video Solution

17. Assertion : At temperature above 1073 K (approx.) the C, CO line comes below the Fe, FeO line $\left[\Delta G_{C\ \ CO} < \Delta G_{Fe\ \ FeO}\right]$

Reason : In this range, coke will reduce the FeO and itself get oxidised

to CO. : If both (A) and (R) are correct and (R) is the correct explanation of(A)., If both (A) and (R) are correct, but (R) is not the correct explanation of (A)., If (A) is correct, but (R) is incorrect., If both (A) and (R) are incorrect.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: A

18. Assertion : Iron pyrites is not useful in the extraction of Fe.

Reason : Polluting SO_2 gas is produced during extraction.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: A

Watch Video Solution

19. Assertion : Usually the sulphide ore is converted to oxide before reduction.

Reason : Reduction of oxides occurs easier.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: A

Watch Video Solution

20. Assertion : During calcination, the ore is heated well below its melting point in the limited supply of oxygen.

Reason: The process of calcination is carried out for sulphide ores. (1) If both (A) and (R) are correct and (R) is the correct explanation of(A). (2) If both (A) and (R) are correct, but (R) is not the correct

explanation of (A). (3) If (A) is correct, but (R) is incorrect. (4) If both (A) and (R) are incorrect.

A. If both (A) and (R) are correct and (R) is the correct explanation of(A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If both (A) and (R) are incorrect.

Answer: C

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Level I

1. Which is not a mineral of aluminium?

A. Corundum

B. Anhydrite

C. Diaspore

D. Bauxite

Answer: B

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

A. Na

B. K

C. Mg

D. Ca

Answer: C

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3. The method of concentrating the ore which makes use of the difference in density between ore and impurities is called

A. leaching

B. liquation

C. levigation

D. magnetic separation

Answer: C

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4. In metallurgy, flux is a substance used to convert

A. soluble impurities to insoluble impurities

B. infusible impurities to fusible material

C. fusible impurities to infusible impurities

D. mineral into silicate

Answer: B

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5. Electrolytic refining is used to purify which of the following metals?

A. Cu and Zn

B. Ge and Si

C. Zr and Ti

D. Zn and Hg

Answer: A

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6. Wolframite ore is separated from tin stone ore by the process, called

A. calcination

B. electromagnetic separation

C. roasting

D. smelting

Answer: B

Watch Video Solution

7. During electrolytic refining of copper, some metals present as inpurity settle as 'anode mud'. These are -

A. Fe and Ni

B. Ag and Au

C. Pb and Zn

D. Se and Ag

Answer: B

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

A. carbon monoxide

B. copper (I) sulphide

C. sulphur dioxide

D. iron (II) sulphide

Answer: B

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9. Beneficiation means

A. to treat the metal oxide with carbon monoxide

B. to concentrate or remove impurities from an ore

C. to derive benefits from the ore

D. to heat the ore in presence of oxygen

Answer: B

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10. Which one of the following ores is best concentrated by froth floatation method?

A. Magnetite

B. Malachite

C. Galena

D. Cassiterite

Answer: C

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11. In the isolation of metals, calcination process usually results in the formation of

A. metal carbonate

B. metal oxide

C. metal sulphide

D. metal hydroxide

Answer: B

Watch Video Solution

12. Iron ore is reduced to iron by reaction with

A. calcium carbonate

B. carbon

C. carbon monoxide

D. carbon dioxide

Answer: C

Watch Video Solution

13. Calcination is used in metallurgy for removal of

A. water and sulphide

B. CO_2 and H_2S

C. H_2O and H_2S

D. water and CO_2

Answer: D

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14. In order to refine 'blister copper'it is melted in a furnace and is stirred with green logs of wood. The purpose is

A. to expel the dissolved gases in blister copper

B. to bring the impurities to surface and oxidize them

C. to increase the carbon content of copper

D. to reduce the metallic oxide impurities with hydrocarbon gases liberated from the wood.

Answer: D

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15. Commercially, aluminium is obtained from purified aluminium oxide by

A. electrolysis of aqueous $Al_2(SO_4)_3$

B. electrolysis of aqueous $KAI(SO_4)_2$

C. electrolysis of a fused mixture of Al_2O_3 and Na_3AlF_6

D. reduction with coke at high temperatures

Answer: C

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16. The form of iron obtained from blast furnace is

A. steel

B. cast iron

C. pig iron

D. wrought iron

Answer: C

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17. Which one of the following ores is known as malachite?

A. Cu_2O

B. Cu_2S

C. $CuFeS_2$

D. $Cu(OH)_2.CuCO_3$

Answer: D

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18. Which of the following statements is correct?

A. Anthracite and chalcocite are both ores of copper

B. Anthracite and chalcocite are both sulphide ores

C. Both German silver and horn silver have zero percent silver content

D. Malachite and azurite are both basic copper carbonate

Answer: D

Watch Video Solution

19. 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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20. Sulphide ores are common for the metals

A. Ag, Cu and Pb

B. Ag, Cu and Sn

C. Ag, Mg and Pb

D. Al, Cu and Pb

Answer: A

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21. Which of the following metals can be obtained by thermal decomposition of their oxides at attainable temperatures? Silver, Mercury, Gold, All of these

A. Silver

B. Mercury

C. Gold

D. All of these

Answer: D

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22. For obtaining high purity metals, which of the following methods of refining is preferred?

A. Poling

B. Liquation

C. Zone refining

D. Electrolytic method

Answer: C

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23. The reaction $2ZnS + 3O_2 \rightarrow 2ZnO + 2SO_2$ in the metallurgical process of zinc is called

A. roasting

B. smelting

C. cupellation

D. calcination

Answer: A

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24. Chemical reduction is not suitable for converting

A. zinc oxide into zinc

B. lead oxide into lead

C. bauxite into aluminium

D. haematite into iron

Answer: C

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25. Ellingham diagram can be drawn for which of the following?

A. Sulphides

B. Oxides

C. Halides

D. All of these

Answer: D

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

A. in the presence of NaCI

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

A. volatile stable compound

B. non-volatile stable compound

C. volatile unstable compound

D. non-volatile unstable compound

Answer: A

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28. Which of the following does not contain Mg?

A. Magnetite

B. Magnesite

C. Asbestos

D. Camallite

Answer: A

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29. When a metal is to be extracted from its ore, if the gangue associated with the ore is silica, then

A. a basic flux is needed

B. an acidic flux is needed

C. both(A) and (B)

D. neither of them is needed

Answer: A

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30. Extraction of silver form 'Ag_2 ~S' by the use of soidum cyanide is an example of

A. Roasting

B. Hydrometallurgy

C. Electrometallurgy

D. Smelting

Answer: B

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31. Which of the following processes involve the roasting process?

A. $ZnCO_3 \rightarrow ZnO + CO_2$

B. $Fe_3O_3 + 3C \rightarrow 2Fe + 3CO$

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

D. $Al_2O_{3.2}H_2O \rightarrow Al_2O_3 + 2H_2O$

Answer: C

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32. Magnetic separation is used for increasing concentration of the:

A. Hom silver

B. Calcite

C. Haematite

D. Magnesite

Answer: C

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33. Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?

A. CO_2 is more volatile than CS_2

B. Metal sulphides are thermodynamically more stable than CS_2

C. CO_3 is thermodynamically more stable than CS_2

D. Metal sulphides are less stable than the corresponding oxides

Answer: B

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34. By which process Hg and Sn are extracted, respectively?

A. Carbon reduction, self-reduction

B. Self-reduction, carbon reduction

C. Electrolytic reduction, cyanide process

D. Cyanide process, electrolytic reduction

Answer: B

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35. Extraction of Ag from commercial lead is possible by of

A. Parke's process

B. Clarke's process

C. Mc-Arthur Forest process

D. Electrolytic process

Answer: A

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36. Spelter is

A. Impure zinc

B. Impure iron

C. Pure zinc

D. Impure aluminium

Answer: A

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37. Before introducing FeO in blast furnace, it is converted to Fe_2O_3 by roasting so that

A. It may not be removed as slag with silica

B. Oresence of it may increase the melting point of charge

C. It may not evaporate in the furnace

D. None of the above

Answer: A

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38. Which method is not correct for refining of crude metals?

A. Liquation: tin

B. Zone refining: silicon

C. Electrolytic refining: blister copper

D. Mond's process : aluminium

Answer: D

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39. Which of the following reactions taking place in the blast furnace during extraction ofiron is endothermic?

A. $CaCO_3 \rightarrow CaO + CO_2$

B. $2C + O_2 \rightarrow 2CO$

C. $C + O_2 \rightarrow CO_2$

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

Answer: A

Watch Video Solution

40. Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?

A. CO_2 is more volatile than CS_2

B. Metal sulphides are thermodynamically more stable than CS_2

C. Metal sulphides are less stable than the corresponding oxides

D. CO_2 is thermodynamically more stable than CS_2

Answer: B

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41. The incorrect statement is

A. Calamine and siderite are carbonates

B. Argentite and cuprite are oxides

C. Zinc blende and iron pyrites are sulphides

D. Malachite and azurite are ores of copper

Answer: B

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42. The process of isolation of metals by dissolving the ore in a suitable chemical regent followed by precipitation of the metal by a more electropositive metal is called

A. Electrometallurgy

B. Hydrometallurgy

C. Electro refining

D. Zone refining

Answer: B

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43. Thermite reduction is not used for commercial extraction of the respective metal from which of the following oxides?

A. Mn_3O_4

B. TiO_2

C. Fe_3O_3

D. Cr_2O_3

Answer: C

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

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

B. greater solubility of the impurity in the molten metal than in the solid

C. greater mobility of the pure metal than that of impurity

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

Answer: B

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45. Which method is not correct for refining of crude metals?

A. Distillation : zinc and mercury

B. Liquation: tin

C. van Arkel : Zirconium

D. Mond process: lead

Answer: D

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46. Magistral is the burnt pyrites containing

A. sulphates of iron and copper

B. sulphates and oxides of iron and copper

C. oxides of iron and copper

D. sulphides of silver and lead

Answer: B

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47. Gold is extracted by hydrometallurgical process based on its property

A. of being electropositive

B. of being less reactive

C. to form complexes which are water soluble

D. to form salts which are water soluble

Answer: C

Watch Video Solution

48. The final step for the extraction of copper from copper pyrites in Bessemer converter involves the reaction (1) Cu_2S + 2FeO → 2Cu + 2Fe +SO_2 (2) Cu_2S + 2Cu2_ O → 6Cu+SO2 (3) 4Cu_2 O +Fe S → 8Cu + 2FeSO4 (4) 2Cu_2 O + FeS → 4Cu + Fe + SO2

A. $Cu_2S + 2FeO \rightarrow 2Cu + 2Fe + SO_2$

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

C. $4Cu_2O + FeS \rightarrow 8Cu + 2FeSO_4$

D. $2Cu_2O + FeS \rightarrow 4Cu + Fe + SO_2$

Answer: B

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49. Which of the following statement is incorrect?

A. Pure aluminium oxide is obtained by heating aluminium hydroxide

B. Cryolite lowers down the melting point of bauxite in electrolytic cell for extraction of aluminium

C. Carbonate ores are converted into oxides by roasting in air

D. Mercury cannot be produced by roasting the cinnabar ore in air

Answer: C

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50. The chief impurity present in red bauxite is (1) SiO2 (2) Fe_2 O_3 (3) K2SO4 (4) NaF

A. SiO_2

B. Fe_2O_3

C. K_2SO_4

D. NaF

Answer: B

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Level Ii

1. Extraction of gold and silver involves leaching the metal with CN^- ion. The metal is recovered by (1) Displacement of metal by some other metal from the complex ion (2) Roasting of metal complex (3) Calcination followed by roasting (4) Thermal decomposition of metal complex

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

B. roasting of metal complex

C. calcination followed by roasting

D. thermal decomposition of metal complex

Answer: A

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

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

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

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

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

Answer: C

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3. In the modern blast furance, the charge consists of a mixture of

A. iron pyrites + bituminous coal

B. hydrated iron oxide +dolomite + coke

C. calcined iron oxides + limestone + coke

D. calcined iron oxides +lime + anthracite coal

Answer: C

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4. "Native silver metal forms a, water soluble complex with a dilute aqueous solntion of NaCN in the presence of

A. nitrogen

B. oxygen

C. carbon dioxide

D. argon

Answer: B

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5. Among the following groups of oxides, the group containing oxides that cannot be reduced by carbon to give the respective metals is

A. Cu_3O, K_2O

B. PbO, Fe_3O_4

C. Fe_2O_3, ZnO

D. CaO, K_2O

Answer: D

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6. In the cyanide extraction process of silver from argentite ore, the oxidising and reducing agents are

A. O_2 and CO respectively

B. O_2 and Zn respectively

C. HNO_3 and Zn dust respectively

D. HNO_3 and CO respectively

Answer: B

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7. The statement that is NOT correct is that (1) A furnace lined with haematite is used to convert cast iron to wrought iron. (2) Collectors enhance the wettability of mineral particles during froth floatation. (3) In vapour phase refining, metal should form a volatile compound. (4) Copper from its low-grade ores is extracted by hydrometallurgy.

A. a furnace lined with haematite is used to convert cast 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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8. Which step is not involved in hydrometallurgical process?

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

B. $CuFeS_2 + 2H_2SO_4 \rightarrow CuSO_4 + FeSO_4 + 2H_2S$

C. $CuSO_4 + Fe \rightarrow FeSO_4 + Cu$

D. $CuCO_3 + H_2SO_4 \rightarrow CuSO_4 + H_2O + CO_2$

Answer: A

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

A. BeO and Al_2O_3

B. ZnO and Fe_3O_3

C. CaO and Cr_2O_3

D. BaO and U_3O_8

Answer: B

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10. Carbon can reduce ferric oxide to iron at a temperature above 983 K because

A. carbon monoxide formed is thermodynamically less stable than ferric oxide

B. carbon has a higher affinity towards oxygen than iron

C. free energy change for the formation of carbon dioxide is less negative than that for ferric oxide

D. iron has a higher affinity towards oxygen than carbon

Answer: B

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11. Consider the following reaction, $(Ag + Pb)$ alloy $\xrightarrow{\text{Melt and add zinc}} (Ag + Pb + Zn)\text{melt} \xrightarrow{\text{Cool}} \frac{\text{Layer X}}{\text{Layer Y}}$

Select the correct statement(s) based on above scheme. (1) Layer X contains zinc and silver (2) Layer Y contains lead and silver but amount of silver in this layer is smaller than in the layer X (3) X and Y are immiscible layers (4) All of the above are correct statements

A. Layer X contains zinc and silver

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

C. X and Y are immiscible layers

D. All of the above are correct statements

Answer: D

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12. Consider the following metallurgical processes in

1. Heating impure metal with CO and distilling the resulting volatile carbonyl boiling point $43^\circ C$ and finally decomposing at 150° to $200^\circ C$ to get the pure metal.

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

III. Electrolysing the molten electrolyte containing approximately equal amounts of the metal chloride and $CaCl_2$ to obtain the metal.

The processes used for obtaining sodium, nickel and copper are respectively

A. I, II and III

B. II,III and I

C. III, I and II

D. II,I and III

Answer: C

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13. During the concentration of sulphide ores by froth floatation process, the separation of sphalerite and galena is achieved by which of the following substances used as depressant?

A. Potassium xanthate

B. Sodium cyanide

C. Copper sulphate

D. Pine oil

Answer: B

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14. Which of the following factors is of no significance for roasting sulphide ores to the oxides and not subjecting the sulphide ores to carbon reduction directly?

A. Metal sulphides are thermodynamically more stable than CS_2

B. CO_2 is thermodynamically more stable than CS_2

C. Metal sulphides are less stable than the corresponding oxides

D. CO_2 is more volatile than CS_2

Answer: C

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15. Identify M and N in the following reaction.

Copper glance $\xrightarrow{\text{controlled heating}} M + SO_2 \uparrow$

$M \xrightarrow{N} Cu + SO_2 \uparrow$

A. $M + Cu_O$, N = Self reduciton

B. $M = Cu_2O + Cu_2S$, N = only heating

C. $M = Cu_2O$, N = carbon reduction

D. $M = Cu_2O$, $N =$ Electrolytic reduciton

Answer: B

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16. Which method of purification is represented by the equations. $Ti(s) + 2I_2(g) \xrightarrow{523K} TiI_4(g) \xrightarrow{1700K} Ti(s) + 2I_2(g)$: Cupellation, Poling, van Arkel, Zone refining

A. Zone refining

B. Cupellation

C. Poling

D. van arkel

Answer: D

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17. In the context of the Hall-Heroult process for the extraction of Al, which of the following statement is false?

A. Al_2O_3 is mixed with CaF_2 which lowers the melting point of the mixture and brings conductivity.

B. Al^{+3} is reduced at the cathode to form Al.

C. Na_2AlF_6 serves as the electrolyte

D. CO and CO_2 are produced in this process.

Answer: C

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18. Which of the following statements is correct?

A. Slag is carefully chosen to combine with the flux present in the ore to produce easily fusible gangue to carry away the impurities.

B. Gangues are carefully chosen to combine with the slag present in the ore to produce easily fusible flux to carry away the impurities.

C. Gangues are carefully chosen to combine with flux present in the ore to produce easily fusible slagt carry away the impurities.

D. Fluxes are carefully chosen to combine with the gangue present in the ore to produce easily fusiblesla to carry away the impurities.

Answer: D

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19. Froth floatation method is successful in separating impurities from ores because (1) The pure ore is soluble in water containing additives like pine oil, cresylic acid, etc. (2) The pure ore is lighter than water containing additives like pine oil, cresylic acid, etc. (3) The impurities are soluble in water containing additives like pine oil, cresylic acid, etc. (4) The pure ore is not easily wetted by water as by pine oil, cresylic acid, etc.

A. the pure ore is soluble in water containing additives like pine oil, cresylic acid, etc.

B. the pure ore is lighter than water containing additives like pine oil, cresylic acid, etc.

C. the impurities are soluble in water containing additives like pine oil, cresylic acid, etc.

D. the pure ore is not easily wetted by water as by pine oil, cresylic acid, etc.

Answer: D

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20. The final step for the extraction of copper from copper pyrites in Bessemer converter involves the reaction (1) Cu_2S + 2FeO → 2Cu + 2Fe +SO_2 (2) Cu_2S + 2Cu2_ O → 6Cu+SO2 (3) 4Cu_2 O +Fe S → 8Cu + 2FeSO4 (4) 2Cu_2 O + FeS → 4Cu + Fe + SO2

A. $Cu_2 + 2Cu_2O \rightarrow 6Cu + SO_2$

B. $4Cu_2S + FeS \rightarrow 8Cu + FeSO_4$

C. $2Cu_2O + FeS \rightarrow 4Cu + Fe + SO_2.$

D. $Cu_2S + 2FeO \rightarrow 2Cu + 2FeCO + SO_2$

Answer: A

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

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22. Which of the following combination represents the correct matching of metals with the most commonly employed ores for their extraction? .

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23. $\Delta G^{\circ}\ 'Vs.\ T$ plot in the Ellingham's diagram slopes downward for the reaction : $Mg + 2O_2 \rightarrow MgO,\quad 2Ag + \frac{1}{2}O_2 \rightarrow Ag_2O,$ $C + \frac{1}{2}O_2 \rightarrow CO\ , CO + \frac{1}{2}O_2 \rightarrow CO_2$

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

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

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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24. Bauxite ore consists of $Al_2O_3, SiO_2, TiO_2, Fe_2O_3$. This ore is treated with conc. $NaOH$ solution at 500 K and 35 bar pressure for a few hours and filtered out. In the filtrate, the species present are

A. $NaAl(OH)_4$ only

B. $Na_2Ti(OH)_6$ only

C. $NaAl(OH)_4$ and Na_2SiO_3 both

D. Na_2SiO_3 only

Answer: C

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25. When copper pyrites is roasted, the flux added to form slag is

A. SiO_2 which is an acidic flux

B. Limestone, which is a basic flux

C. SiO_2, which is a basic flux

D. Cao, which is basic flux

Answer: A

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26. Four metals and their methods of refinement are given

i) Ni, Cu, Zr, Ga

ii) Electrolysis, Van Arkel process, Zone refining, Mond's process

Choose the right method for each:

A. Ni: Electrolysis, Cu: Van Arkel process, Zr: Zone refining, Ga: Mond's process

B. Ni: Mond's process, Cu: Electrolysis, Zr: Van Arkel process, Ga:Zone refining

C. Ni: Mond's process, Cu: Van Arkel process, Zr: Zone refining, Ga: Electrolysis

D. Ni: Electrolysis, Cu:Zone refining, Zr: Van Arkel process, Ga: Mond's process

Answer: B

27. Carbon reduction process is not commercially applicable for which of the following set of oxides to extract the respective metal?

$I)ZnO \quad II)Fe_2O_3 \quad III)Al_2O_3 \quad IV)SnO_2 \quad V)MgO$

A. ZnO, Fe_2O_3, SnO_2

B. ZnO, SnO

C. MgO, Al_2O_3

D. SnO, Fe_2O_3

Answer: C

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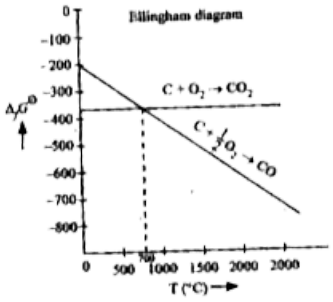
28. Which of the following is incorrect on the basic of the given Ellingham diagram for carbon ?



A. A) Up 710° C, the reaction of formation of CO_2 is energetically more favourable but above 710° the formation of CO is preferred.

B. B) In principle, carbon can be used to reduce any metal oxide at a sufficiently high temperature.

C. C) $\Delta S\left[C_s + 1/2O_{2(g)} \rightarrow CO_g\right] < \Delta S\left[C_s + O_2 \rightarrow CO_{2(g)}\right]$

D. D) Carbon reduces many oxides at elevated temperature because $\Delta_r G^\Theta$ vs temperature line has a negative slope.

Answer: C

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

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

T_1 and T_2 are

A. $100^\circ C, 50^\circ C$

B. $50^\circ C, 100^\circ C$

C. $50^\circ C, 180^\circ C$

D. $230^\circ C, 50^\circ C$

Answer: C

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30. Following reaction is not involved in Thermite process

A. $3Mn_3O_4 + 8AI \rightarrow 9Mn + 4Al_2O_3$

B. $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$

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

D. $B_2O_3 + 2Al \rightarrow 2B + Al_2O_3$

Answer: C

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31. Consider the following steps

$CuS \xrightarrow{\text{roast in air}} (A) \xrightarrow{\text{roast without air}} (B)$Which is not the correct statement?

A. It is self - reduction

B. It involves disproportionation $Cu_2S \rightarrow Cu + CuS$

C. (A) is a mixture of CuO and CuS and (B) is a mixture of Cu and SO_2

D. All are incorrect statements

Answer: B

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32. NaCN is sometimes added in the froth flotation process as a depressant when ZnS and PbS minerals are expected because

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

B. ZnS forms solube complex $Na_2\left[Zn(CN)_4\right]$ while Pbs forms froth

C. PbS forms soluble complex $Na_2\left[Pb(CN)_4\right]$ whicle ZnS forms froth

D. $NaCN$ is never added in froth flotation process

Answer: B

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

A. $1000^\circ C$

B. $15000^\circ C$

C. $500^\circ C$

D. $1200^\circ C$

Answer: A

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34. At 1000 degree celsius temperature $\Delta_f G^\Theta$ of the reaction is $ZnO + C \rightarrow Zn + CO$

A. $-ve$

B. $+ve$

C. zero

D. Nothing can be said

Answer: C

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

$ZnO + C \rightarrow Zn + CO$

A. $< 1000^\circ C$

B. $> 1000^\circ C$

C. $< 500^\circ C$

D. $> 500^\circ C \text{but} < 1000^\circ C$

Answer: B

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36. The principal reaction(s) in the zone of heat absorption of blast furnace employed in the metallurgy of iron is/are

A. $C + O_2 \rightarrow CO_2$

B. $2C + O_2 \rightarrow 2CO$

C. $2CO + O_2 \rightarrow 2CO_2$

D. $CaCO_3 \xrightarrow{-CO_2} CaO \xrightarrow{Sio_2} CaSiO_3$

Answer: D

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37. Which of the following statements regarding the metallurgy of aluminium by electrolytic method is not correct?

A. Electrolyte is Al_2O_3 dissolved in Na_3AlF_6 containing a little of CaF_2

B. Anode consists of a number of graphite rods which are periodically replaced

C. Aluminium being heavier than electrolyte floats over the surface of the latter

D. Bauxite ore is purified before carrying out the electrolysis

Answer: C

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38. The impure zinc contains impurities such as cadmium, arsenic, iron and lead. From this, zinc may be recovered by

A. distillation at 500K

B. distillation at 1170K - 1270 K followed by rapid chilling

C. distillation at 3100K

D. solvent extraction method

Answer: B

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39. In zone refining method, the molten zone.

A. contains impurities

B. contains purified metal only

C. contains more impurity than the original metal

D. moves to either side

Answer: C

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40. The metal that cannot be obtained by electrolysis of the aqueous solution of its salts is:

A. Cr

B. Ag

C. Ca

D. Cu

Answer: C

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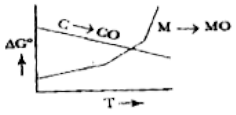
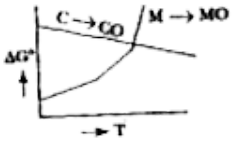
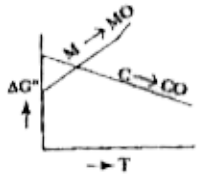
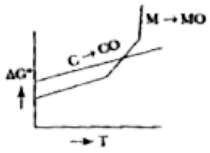
41. Which of the following curves assures that the metal obtained by carbon reduction is in the vapour state?

A. 

B. 

C. 

D. 

Answer: B

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42. Which of the following characteristics of steel are developed by the tempering process?

A. Steel becomes hard and brittle

B. Steel becomes soft

C. Steel remains hard but brittleness disappears

D. Only the surface layer becomes hard

Answer: C

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43. Which of the following statements is correct regarding self reduction?

A. Partial roasting and self reduction occur together

B. First self reduction occurs followed by partial roasting

C. First partial roasting occurs followed by self reduction

D. Partial roasting is done in the reverberatory furnace first, and then selfreduction is done in the blast furnace

Answer: C

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44. Which of the following activities is not related to poling?

A. Metallic impurities having higher oxidation potential than the metal to be refined are oxidized first.

B. Non-volatile oxides are removed in the form of scum.

C. Metallic impurities having lower oxidation potential than the metal to be refined settle down at the bottom of the furnace.

D. Green poles of wood are used as stirrers

Answer: C

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45. Carbon reduction cannot be employed for the extraction of Al from Al_2O_3 because

A. the temperature requirement is very high $(\sim 2000^{\circ} C)$.

B. Al obtained in the vapour state is very difficult to handle.

C. Al forms its carbide (Al_4C_3) and a lot of it gets wasted

D. All of these

Answer: D

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46. Oxidation states of the metal in the minerals haematite and magnetite, respectively, are

A. II, III in haematite and III in magnetite.

B. II, III in laematite and II in magnetite.

C. II in haematite and II and III in magnetite.

D. III in haematite and II and III in magnetite.

Answer: D

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47. Roasted copper pyrite is on smelting with sand produces

A. $FeSiO_3$ as fusible slag and Cu_2S as matte

B. $CaSiO_3$ as infusible slag and Cu_2O as matte

C. $Ca_2(PO_4)_3$ as fusible slag and Cu_2S as matte

D. $Fe_3(PO_4)_2$ as infusible slag and Cu_2S as matte

Answer: A

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Level Iii Single Correct Answer Type

1. The major role of fluorspar (CaF_2), which is added in small quantities in the electrolytic reduction of alumina dissolved in fused cryolite (Na_3AIF_6), is

A. As a catalyst

B. To make the fused mixture very conducitng

C. To increase the temperature of the melt

D. To decrease the rate of oxidation of carbon at the anode

Answer: B

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2. In the proces of extraction of gold,

Roasted ore + $CN^- + H_2O \xrightarrow{O_2} [X] + OH^-$

$[X] + Zn \rightarrow [Y] + Au$

[X] and [Y] respectively are:

A. $X = [Au(CN)_2]^{\ominus}, Y = [Zn(CN)_4]^{2-}$

B. $X = [Au(CN)_2]^{3-}, Y = [Zn(CN)_4]^{2-}$

C. $X = [Au(CN)_2]^{\ominus}, Y = [Zn(CN)_6]^{4-}$

D. $X = [Au(CN)_4]^{\ominus}, Y = [Zn(CN)_4]^{2-}$

Answer: A

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3. Copper is extracted from copper pyrites, $CuFeS_2$.What is matte? How is it formed?

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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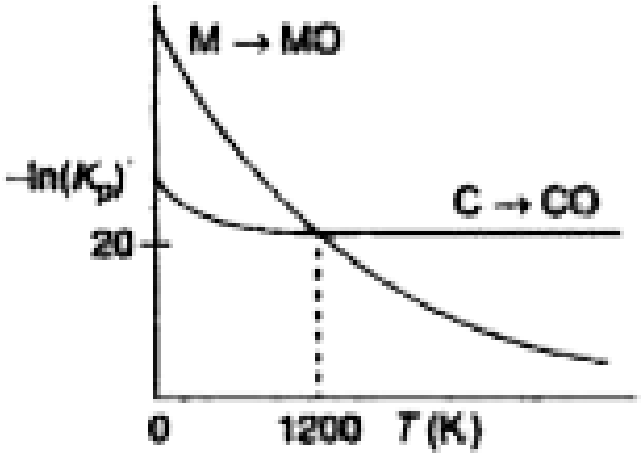
4. The plot shows the variation of - In K_p versus temperature for the two reactions.

$$M(s) + \frac{1}{2}O_2(g) \rightarrow MO(s) \text{ and } C(s) + \frac{1}{2}O_2(g) \rightarrow CO(s)$$



Identify the correct statement ,

A. At $T < 1200K$ oxidation of carbon is unfavourable.

B. Oxisation of carbon is favourable at all temperature.

C. At $T < 1200$ K, the reaction $MO(s) + C(s) \rightarrow M(s) + CO(g)$ is spontaneous.

D. At $T > 1200K$, carbon will reduce MO(s) to M(s) .

Answer: C

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5. Which series of reactions correctly relate to iron and its compounds ?

A. $Fe \xrightarrow{Cl_2 \text{heat}} FeCl_3 \xrightarrow{\text{heat,air}} FeCl_2 \xrightarrow{Zn} Fe$

B. $Fe \xrightarrow{O_2 \text{heat}} Fe_3O_4 \xrightarrow{CO\,.600^\circ C} FeO \xrightarrow{CO.700^\circ C} Fe$

C. $Fe \xrightarrow{dil\,H_2SO_4} FeSO_4 \xrightarrow{H_2SO_4\,.O_2} Fe_2(SO_4)_3 \xrightarrow{\text{heat}} Fe$

D. $Fe \xrightarrow{O_2 \text{heat}} FeO \xrightarrow{dil\,H_2SO_4} FeSO_4 \xrightarrow{\text{heat}} Fe$

Answer: B

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Level Iii Multiple Correct Answer Type

1. Which of the following are oxide ores?

A. Cassiterite

B. Bauxite

C. Cryolite

D. Haematite

Answer: A::B::D

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2. Copper is purified by electro-refining of blister copper. The correct statement(s) about this process is (are)

A. Impure copper strip is used as cathode

B. Acidified aqueous $CuSO_4$ is used as electrolyte

C. Pure copper is deposited at cathode

D. Impurities settle as anode-mud

Answer: B::D

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3. Extraction of metal from the ore cassiterite involves

A. Carbon reduction of an oxide ore

B. Self-reduction of sulphide ore

C. Removal of copper impurity

D. Removal of iron impurity

Answer: A::D

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4. The carbon-based reduction method is NOT used for the extraction of

A. Tin from SnO_2

B. Iron from Fe_2O_3

C. Aluminium from Al_2O_3

D. Magnesium from $MgCO_3$. $CaCO_3$

Answer: C::D

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5. Which of the following are correctly matched?

A. Malachite : $CuCO_3.\ Cu(OH)_2$

B. Chalcopyrite : $CuFeS_2$

C. Copper glance : Cu_2S

D. Azurite : Cu_2O

Answer: A::B::C

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6. Which of the following pairs consists of ore of the same metal?

A. Magnesite, cerussite

B. Chalcocite, copper pyrites

C. Bauxite, corundum

D. Anglesite, cerussite

Answer: B::C::D

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7. For the pyrometallurgical method used for the extraction of copper from sulphide ore, which statements is/are correct?

A. Pyrometallurgy is a dry method

B. It involves concentration by leaching the sulphide ore with dil. H_2SO_4

C. It involves concentration of the sulphide ore by froth flotation process

D. It involves concentration by leaching the ore

Answer: A::C

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8. Select the correct statements:

A. In hydrometallurgy, Zn is used as oxidising agent in the purification of Ag from $\left[Ag(CN)_2\right]^{\ominus}$

B. When pine oil or eucalyptus oil is added into the water, it lowers down the surface tension by which froth is formed

C. Sodium ethylxanthate is used as collector

D. Basic copper carbonate or $PbSO_4$ is concentrated by froth floatation method by using an activator

Answer: B::C::D

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9. H_2 is not widely used as the reducing agent in metallurgical process because

A. Many metals react with H, at elevated temperature forming hydrides

B. There is a risk of explosion from H_2 and O_2 present in the air

C. Reducing power of H_2 does not increase with temperature

D. Reducing power of H_2 increases with temperature

Answer: A::B::C

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10. Extraction of copper from copper pyrites $(CuFeS_2)$ involves

A. crushing followed by concentration of the ore by froth-floatation.

B. removal of iron as slag.

C. self-reduction step to produce 'blister copper 'following evolution of SO_2

D. refining of 'blister copper by carbon reduction.

Answer: A::B::C

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11. Which are the byproducts of iron extraction?

A. Slag

B. Pig iron

C. Wrought iron

D. Blast furnace gas

Answer: A::D

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Level Iii Numerical Type

1. Amongst the following, the total number of ores which cannot be concentrated by froth floatation process is .....

Haematite, bauxite, galena, copper pyrites, sphalerite, cassiterite, calmine, argentite, chalcocite.

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2. Amongst the following, the total number of metals which occur in the native state in the earth's crust is .....

Fe,Zn,Na,Au,Ni,Sb,Sn,Pt,Hg.

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

$$Au + CN^{\ominus} + H_2O + O_2 \rightarrow \left[Au(CN)_2\right]^{\ominus} + \overset{\ominus}{O}H$$

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4. How many of the following metals are commercially purified by Van Arkel method?

Ti,B,Zr,Pb , Hg,Zn,Au,Si,Ge

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5. How many of the following reactions are roasting?

i) $4FeS_2 + 11O_2 \rightarrow 2Fe_2O_3 + 8SO_2$

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

iii) $HgS + O_3 \rightarrow Hg + SO_2$

(iv) $Al_2O_{3.2}H_2O \rightarrow Al_2O_3 + 2H_2O$

(v) $ZnCO_3 \xrightarrow{\Delta} 4ZnO + CO_2 \uparrow$

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6. Amongst the following, how many ores are roasted to convert them into their corresponding metal oxides: alumina, zinc blende, iron pyrites, copper pyrites, galena.

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7. Find the number of basic flux from the given compounds:

$SiO_2, MgO, CaO, FeO, CaCO_3$

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8. Find the number of metals from the given metals which can be commercially purified by zone refining methods:

Si, Ge,Ga,Al,Ti,Zr.

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9. Find the number of metals which are reduced by self-reduction from the given metals:

Fe,Al,Zn,Sn,Pb,Hg,Cu

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Level Iii Matching Column Type

1. Matching Column Type

Column I	Column II
A) Copper	p) Bessemerisation
B) Silver	q) Electrolytic reduction
C) Gold	r) Mac Arthur and Forest process
D) Aluminium	s) Leaching

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2. Matching Column Type

Column I	Column II
A) Chalcopyrite	p) Roasting
B) Silver glace	q) Froth floatation
C) Alumina	r) Purification by electrolysis
D) Wurtzite	s) Leaching process

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3. Matching Column Type

Column I	Column II
a. Silver	p. Fused salt electrolysis
b. Calcium	q. Carbon reduction
c. Zinc	r. Carbon monoxide reduction
d. Iron	s. Amalgamation
e. Copper	t. Self-reduction

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4. Matching Column Type

Column I	Column II
a. $PbS \longrightarrow PbO$	p. Roasting
b. $CaCO_3 \longrightarrow CaO$	q. Calcination
c. $ZnS \longrightarrow Zn$	r. Carbon reduction
d. $Cu_2S \longrightarrow Cu$	s. Self-reduction

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5. Matching Column Type

Column I	Column II
a. Carbonate	p. Siderite
b. Sulphide	q. Malachite
c. Hydroxide	r. Bauxite
d. Oxide	s. Calamine
	t. Argentite

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6. Matching Column Type

Column I	Column II
a. Siderite	p. Carbonate ore
b. Galena	q. Ore of Fe
c. Calamine	r. Carbon reduction for commercial extraction of metal
d. Magnetite	s. Electrolytic refining

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Level Iii Statement Type

1. Statement 1: PbS when heated with air it undergoes self-reduction. Statement 2 : The PbO that is formed on heating PbS reacts further with PbS to yield Pb and SO_2

A. Statement 1 is True, Statement 2 is True, Statement 2 is Correct explanation for Statement 1.

B. Statement 1 is True, Statement 2 is True, Statement 2 is NOT a correct explanation for Statement 1.

C. Statement 1 is True, Statement 2 is False.

D. Statement 1 is False, Statement 2 is True.

Answer: A

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2. Statement 1 : Highly electropositive metals are extracted by electrolysis of their fused salts.

Statement 2 : Highly electropositive metals can not be reduced by chemical reduction methods.

A. Statement 1 is True, Statement 2 is True, Statement 2 is Correct explanation for Statement 1.

B. Statement 1 is True, Statement 2 is True, Statement 2 is NOT a correct explanation for Statement 1.

C. Statement 1 is True, Statement 2 is False.

D. Statement 1 is False, Statement 2 is True.

Answer: A

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3. Statement 1: Limestone added in the blast furnace decomposes to give CaO which forms slag in molten state and separates out from iron.

Statement 2 : The iron obtained from the blast furnace contains about 4% carbon and many impurities like S, P, Si, Mn, etc.

A. Statement 1 is True, Statement 2 is True, Statement 2 is Correct explanation for Statement 1.

B. Statement 1 is True, Statement 2 is True, Statement 2 is NOT a correct explanation for Statement 1.

C. Statement 1 is True, Statement 2 is False.

D. Statement 1 is False, Statement 2 is True.

Answer: B

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4. Assertion : During the reduction of ZnO to Zn, $C$is more efficient than CO.

Reason : The standard free energy of formation of CO_2 from CO is always higher than that of ZnO.

A. Statement 1 is True, Statement 2 is True, Statement 2 is Correct explanation for Statement 1.

B. Statement 1 is True, Statement 2 is True, Statement 2 is NOT a correct explanation for Statement 1.

C. Statement 1 is True, Statement 2 is False.

D. Statement 1 is False, Statement 2 is True.

Answer: B

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5. Assertion : Reduction of the metal oxide usually involves heating it with some other substance acting as a reducing agent.

Reason : The reducing agent combines with the oxygen of the metal oxide.

A. Statement 1 is True, Statement 2 is True, Statement 2 is Correct explanation for Statement 1.

B. Statement 1 is True, Statement 2 is True, Statement 2 is NOT a correct explanation for Statement 1.

C. Statement 1 is True, Statement 2 is False.

D. Statement 1 is False, Statement 2 is True.

Answer: A

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6. Assertion : At temperature above 1073 K (approx.) the C, CO line comes below the Fe, FeO line $\left[\Delta G_{C\ \ CO} < \Delta G_{Fe\ \ FeO}\right]$

Reason : In this range, coke will reduce the FeO and itself get oxidised

to CO. : If both (A) and (R) are correct and (R) is the correct explanation of(A)., If both (A) and (R) are correct, but (R) is not the correct explanation of (A)., If (A) is correct, but (R) is incorrect., If both (A) and (R) are incorrect.

A. Statement 1 is True, Statement 2 is True, Statement 2 is Correct explanation for Statement 1.

B. Statement 1 is True, Statement 2 is True, Statement 2 is NOT a correct explanation for Statement 1.

C. Statement 1 is True, Statement 2 is False.

D. Statement 1 is False, Statement 2 is True.

Answer: B

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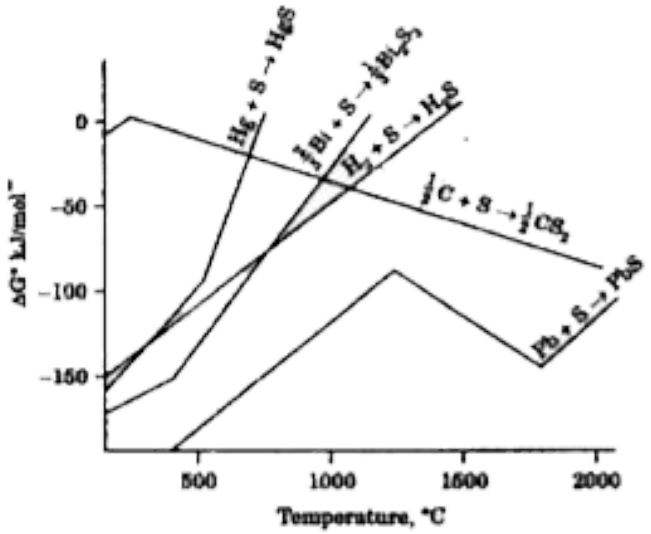
Level Iii Linked Comprehension Type

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_2

C. PbS

D. CS_2

Answer: C

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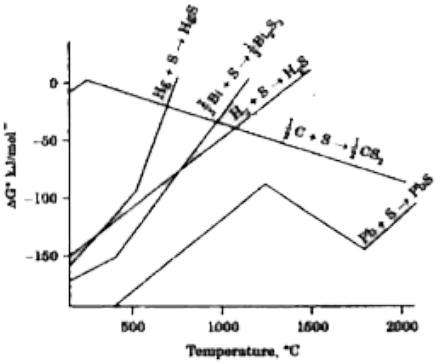
2. The Ellingham diagram for a number of metallic sulphides is shown below.



Which sulphide occurs to minimum extent in nature?

A. A) HgS

B. B) H_2S

C. C) Bi_2S_3

D. D) CS_2

Answer: D

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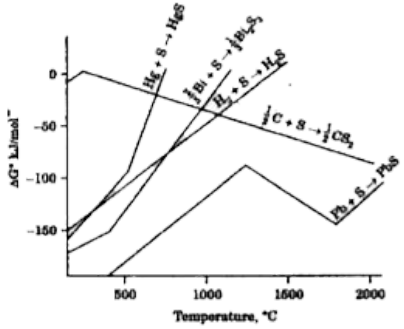
3. The Ellingham diagram for a number of metallic sulphides is shown below.



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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4. How does impure Ni is purified ?

A. Impure $Ni + CO_2 \rightarrow NiCO_3NiO + CO_2Ni$

B. Impure

$$Ni + CONi(CO)_6 \rightarrow \text{gaseous}Ni(g) + CO(g) + Ni(s)\text{pure}$$

C. Impure $Ni + CONi(CO)_4 \rightarrow Ni(s) + CO(s)$

D. Impure $Ni + CO \rightarrow Ni(CO)_4(g) \xrightarrow{\Delta} Ni(s) + CO(g)$

Answer: D

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5. In the purification of Zr and B, which of the following is/are true?

A. $Zr + 2I_2 \rightarrow Zrl_4(g)$ the pure Zr is deposited on W

B. $2B + 2I_2 \rightarrow 2BI_5$(g) the pure B is deposited on W

C. $Zx + 2I_2 \rightarrow ZrI_4(s) ZrI_4$ is reduced to Zrl_2

D. Both (A) and (B) are correct

Answer: D

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6. The heating process for the extraction of elements are quite old but highly acceptable method for the extraction of elements. Because in this process the elements produced is in the highly pure state. Mostly As, Sb, N_2Ni, Zr, B etc are prepared by this principle.

A number of metal sulphide uses which may be roasted first in air to partially convert them to the oxide, and then further roasted in the absence of air, causing self reduction.

A. Cus

B. PbS

C. FeS

D. Sb_2S_3

Answer: C

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7. Copper is most noble of the first row transition metals and occurs in small deposits in several countries.Ores of copper include chalcanthite $(CuSO_4, 5H_2O)$ atacamite $\left(Cu_2Cl(OH)_3\right)$, cuprite (Cu_2O), copper glance (Cu_2S) and malachite $\left(Cu_2(OH)_3CO_3\right)$. However, 80% of the world copper production comes from chalcopyrite $(CuFeS_2)$. The extraction fo copper from chalcopyrite involves partial roasting, removal of iron and self reduction.

Iron is removed from chalcopyrite as

A. Cu and FeO

B. Cu_2O and FeO

C. Cus and Fe_2O_2

D. Cu_2O and Fe_2O_3

Answer: B

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8. Copper is most noble of the first row transition metals and occurs in small deposits in several countries.Ores of copper include chalcanthite $(CuSO_4, 5H_2O)$ atacamite $\left(Cu_2Cl(OH)_3\right)$, cuprite (Cu_2O), copper glance (Cu_2S) and malachite $\left(Cu_2(OH)_3CO_3\right)$. However, 80% of the world copper production comes from chalcopyrite $(CuFeS_2)$. The extraction fo copper from chalcopyrite involves partial roasting, removal of iron and 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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9. Copper is most noble of the first row transition metals and occurs in small deposits in several countries.Ores of copper include chalcanthite $(CuSO_4, 5H_2O)$ atacamite $\left(Cu_2Cl(OH)_3\right)$, cuprite (Cu_2O), copper glance (Cu_2S) and malachite $\left(Cu_2(OH)_3CO_3\right)$. However, 80% of the world copper production comes from chalcopyrite $(CuFeS_2)$. The extraction fo copper from chalcopyrite involves partial roasting, removal of iron and self reduction.

In self reduction , the reducing agent is

A. S

B. O^{-2}

C. S^{2-}

D. SO_2

Answer: C

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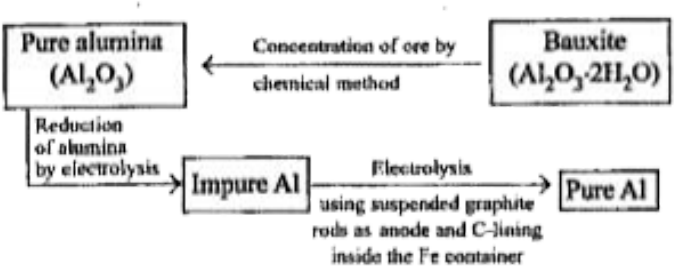
10. Extraction of aluminium be understood by :



Electrolytic reduction Al_2O_3 :

Electrolyte : $Al_2O_3 + \text{Cryolite} + CaF_2$

Carthode : Carbon inside the Fe container

Anode : Graphite rods

Coke powder is spread over the molten electrolyte to

A. Prevent the corrosion of graphite anode

B. Prevent the heat radiation from the surface

C. Prevent the oxidation of molten aluminium by air

D. Both (A) and (B)

Answer: D

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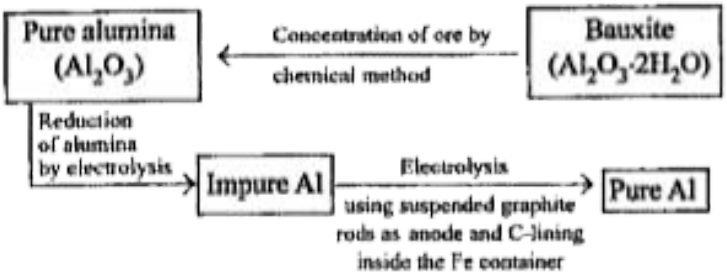
11. Extraction of aluminium be understood by :



Electrolytic reduction Al_2O_3 :

Electrolyte : $Al_2O_3 + \text{Cryolite} + CaF_2$

Carthode : Carbon inside the Fe container

Anode : Graphite rods

The function of fluorspar (CaF_3) is

A. To increase the melting point of eletrolyte

B. To increase electrolytic conductivity power

C. To remove the impurities as slag

D. All of these

Answer: B

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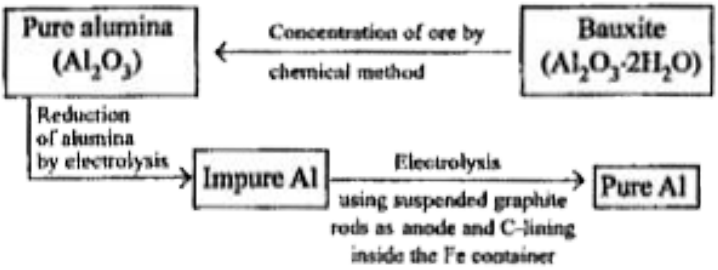
12. Extraction of aluminium be understood by :



Electrolytic reduction Al_2O_3 :

Electrolyte : $Al_2O_3 + \text{Cryolite} + CaF_2$

Carthode : Carbon inside the Fe container

Anode : Graphite rods

The molten electrolytes contain Na^+, Al^{3+}, andCa^{2+} but only Al gets deposited at cathode because,

A. Standard reduction potential of Al is more than that of Na and Ca

B. Standard oxidation potential of Al is more than that of Na and Ca

C. Graphite reacts only with Al^{3+} and not withi Na^+ and Ca^{2+}

D. Discharge potential of Al^{3+} is higher than Na^+ and Ca^{2+}

Answer: A

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