



CHEMISTRY

BOOKS - MTG GUIDE

GENERAL PRINCIPALS AND PROCESSES OF ISOLATION OF ELEMENTS

Illustration

1. What is the role of silica in the extraction of copper?



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2. The extraction of gold by leaching with NaCN involves both oxidation and reduction. Justify giving chemical equations.

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3. Out of C and CO, which is a better reducing agent at the lower temperature range in the blast furnace to extract iron from the oxide ore?

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1. Metals occur in the native form because of their

A. high electronegativity

B. low density

C. low reactivity

D. all of these

Answer: C



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2. Siderite and sphalerite are the ores of the metals

A. Al and Zn

B. Fe and Cu

C. Cu and Zn

D. Fe and Zn

Answer: D



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3. Pick up the incorrect statement

A. Asbestos and willemite are silicate minerals

B. Anglesite and barytes are sulphate minerals.

C. Sylvine and fluorspar are halide minerals

D. Calamine and zincite are the minerals of calcium.

Answer: D



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4. The second most abundant metal in earth's crust among the following is

A. aluminium

B. zinc

C. iron

D. copper

Answer: C



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5. Examples of magnetic ores are

A. wolframite, rutile

B. cassiterite, magnesite

C. willemite, limonite

D. anglesite, magnetite

Answer: A



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6. Impurities present in ore are called

A. matrix

B. flux

C. smog

D. slag

Answer: A



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7. The most abundant ore of iron is

A. haematite

B. limonite

C. magnetite

D. siderite.

Answer: A



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8. The sulphide ore which is red in colour is

A. zinc blende

B. iron pyrites

C. cinnabar

D. galena

Answer: C



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9. The metal found in sediments in ocean floor is

A. Mg

B. Ag

C. Pt

D. Mn

Answer: D



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10. Which of the following statements is correct?

- A. Tinstone is magnetic in nature
- B. Wolframite is non-magnetic in nature
- C. Wolframite is (Fe, Mn) WO_4
- D. Cassiterite and rutile are sulphides of the metals

Answer: C



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11. What is the molecular formula of copper pyrites?

- A. Cu_2S
- B. Cu_2O
- C. $CuCO_3, Cu(OH)_2$

D. $CuFeS_2$

Answer: D



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12. Removal of the unwanted materials (e.g, sand, clays, etc) from the ore is known as

A. metallurgy

B. benefaction

C. concentration

D. both (b) and (c)

Answer: D



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13. The froth floatation process is based on

- A. specific gravity of ore particles
- B. preferential wetting of ore particles by oil
- C. preferential wetting of gangue particles by oil
- D. magnetic properties of gangue.

Answer: B



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14. Hydraulic washing is one of the important procedures of concentration of ores. It is based on

A. magnetic separation

B. separation by using collectors and stabilizers

C. gravity separation

D. digesting the powdered ore with a concentrated solution of NaOH

Answer: C



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15. Roasting process is applied to which of the following ores?

- A. Galena
- B. Iron pyrites
- C. Copper glance
- D. all of these

Answer: D



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16. Gravity separation is based on

- A. preferential wetting of ores and gangue particles
- B. difference in densities of ore particles and impurities
- C. difference in chemical properties of ore particles
- D. none of these

Answer: B



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17. Roasting and smelting are generally carried out in

- A. muffle furnace and blast furnace respectively

B. reverberatory furnace and regenerative furnace
respectively

C. blast furnace and regenerative furnace
respectively

D. reverberatory furnace and blast furnace
respectively.

Answer: D



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18. $H_{2(g)}$ is not widely used as a reducing agent
because

A. H_2 decomposes to atomic hydrogen at higher temperature

B. H_2 isomerises to ortho hydrogen at higher temperature

C. many metals form hydrides at compact temperature

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

Answer: D



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19. PbS can be separated from ZnS by electrostatic separation method. The property utilized in this method is

- A. PbS is a good conductor and ZnS is a poor conductor of electricity
- B. PbS is a bad conductor and ZnS is a good conductor of electricity
- C. both PbS and ZnS are good conductors
- D. both PbS and ZnS are bad conductors.

Answer: A



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20. The methods chiefly used for the extraction of lead and zinc from their ores are respectively

- A. self-reduction and carbon reduction
- B. carbon reduction and self-reduction
- C. cyanide process and carbon reduction
- D. none of these

Answer: A



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21. Copper is extracted from copper pyrites ore by heating in a bessemer converter. The method is based

on the principle that

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

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

C. sulphur has less affinity for oxygen at high temperature

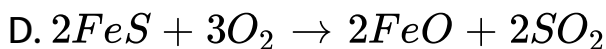
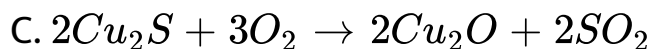
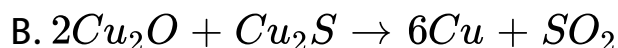
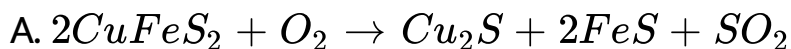
D. copper has less affinity for oxygen than sulphur at high temperature.

Answer: D



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22. In the extraction of copper, the reaction which does not take place in reverberatory furnace is



Answer: B

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23. Copper ore is heated in a blast furnace after mixing with silica. Iron oxide slage off as iron silicate and

copper is produced in the form of

- A. copper sulphate
- B. copper silicate
- C. copper matte
- D. copper hydroxide

Answer: C



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24. The iron obtained from the blast furnace contains 4%

- A. phosphorus

B. sulphur

C. magnesium

D. carbon

Answer: D



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25. 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: A



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26. For which of the given sulphides, auto-reduction is not applicable?

A. CuS

B. PbS

C. FeS

D. Sb_2S_3

Answer: C



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27. Process of removing layers of basic oxides from metals before electroplating is called

A. galvanising

B. anodising

C. pickling

D. poling

Answer: C



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28. The term 'anode mud' refers to

A. impure metal acting as anode

B. anode coated with mud

C. insoluble matter collecting under the anode
during electrolytic refining of metals

D. calcium silicate

Answer: C



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29. Aluminium is obtained by

- A. reducing Al_2O_3 with coke
- B. electrolysing Al_2O_3 dissolved in Na_3AlF_6
- C. reducing Al_2O_3 with chromium
- D. heating alumina with cryolite

Answer: B



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30. The major role of fluorspar (CaF_2) which is added in small quantity in the electrolytic reduction of alumina dissolved in fused cryolite (Na_3AlF_6) is

1. as a catalyst
2. to make the fused mixture very conducting
3. to lower the temperature of melting
4. to decrease the rate of oxidation of carbon at the anode

A. 2,3

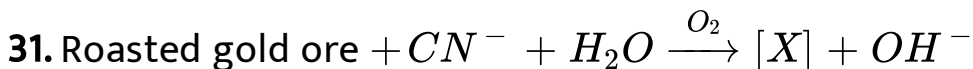
B. 1,2

C. 2,3,4

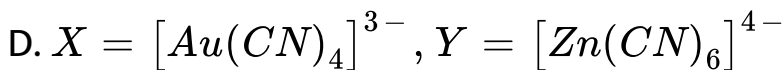
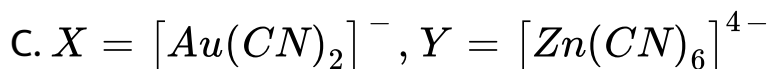
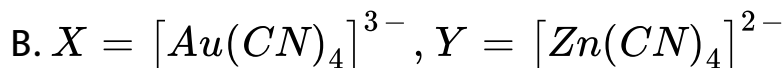
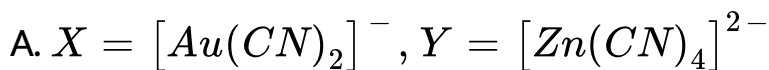
D. 3,4

Answer: A

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$[X] + Zn \Rightarrow [Y] + Au$ [X] and [Y] are



Answer: A

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

A. nitrogen

B. oxygen

C. carbon dioxide

D. argon

Answer: B



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33. For metal oxides, when ΔG° is plotted against temperature, there is a point where the graph crosses ΔG -zero line, above this temperature

- A. the oxide is stable
- B. the oxide is unstable
- C. the oxide melts
- D. the oxide is reduced.

Answer: B



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34. In blister copper, the blisters are formed due to passing

A. nitrogen

B. CO

C. CO_2

D. SO_2

Answer: D



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35. Which of the following metals can be obtained by reducing their oxides with hydrogen at high

temperature?

A. Ni

B. Mo

C. W

D. all of these

Answer: D



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36. Wllingham diagrams can be drawn for the

A. sulphides

B. oxides

C. halides

D. all of these

Answer: D



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37. Select the true statement

A. Below $710^{\circ} C$, C is better reducing agent than CO

B. Below $710^{\circ} C$, CO is better reducing agent than C

C. Below $710^{\circ} C$, CO is an oxidising agent

D. Below $710^{\circ} C$, CO_2 is reducing agent

Answer: B



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38. Which of the following statements regarding the metallurgy of magnesium using electrolytic method is not correct?

- A. Electrolyte is magnesium chloride containing a little of NaCl and CaCl_2
- B. Magnesium is discharged at cathode
- C. Electrolysis is done in presence of inert gas
- D. Molten magnesium is heavier than the electrolyte.

Answer: D

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39. Which of the following statements, about the advantage of roasting of sulphide ore before reduction is not true?

A. The ΔG_f° of the sulphide is greater than those for

CS_2 and H_2S

B. The ΔG_f° is negative for roasting of sulphide ore

to oxide

C. Roasting of the sulphide to the oxide is thermodynamically feasible

D. Carbon and hydrogen are suitable reducing agents for metal sulphides.

Answer: D



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40. When an aqueous solution of sodium chloride is electrolysed using platinum electrodes, the compounds discharged at the electrodes are

A. sodium and hydrogen

B. sodium and chloride

C. hydrogen and chlorine

D. hydroxyl and chloride

Answer: C



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41. Silver is precipitated from an aqueous solution of sodium argentocyanide by adding

A. zinc dust

B. copper powder

C. sodium amalgam

D. sodium thiosylphate

Answer: A



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42. Which of the following statements about electrolytic refining of silver is not true?

A. Anode consists of impure silver

B. Cathode consists of pure silver

C. Electrolytic solution consists of $AgNO_3$ and nitric acid

D. Electrolytic solution consists of $AgNO_3$ and hydrochloric acid

Answer: D



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43. Oxidation is employed in refining crude metal from impurity in the case of

A. Ag from Pb

B. Zn from Hg

C. Mg from Al

D. Au from Ag

Answer: A



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44. Hydrometallurgy is employed in the extraction of

1. Ag 2. Pb 3. Cu 4 Au

A. 1,4

B. 1,3

C. 1,2,3

D. 1,3,4

Answer: D



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45. The metals that cannot be obtained by electrolysis of the aqueous solution of their salts are

A. Ag

B. Mg

C. Cu

D. Pb

Answer: B



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46. Near the top of the blast furnace, iron oxides are reduced to spongy iron by

A. C

B. CO

C. CO_2

D. $CaCO_3$

Answer: B

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47. In the metallurgy of iron, when limestone is added as flux to the blast furnace, the calcium ion ends up in

A. slag

B. gangue

C. metallic calcium

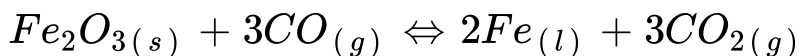
D. calcium carbonate

Answer: A



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48. The following reaction occurs in the blast furnace where iron ore is reduced to iron metal



Using the Le Chatelier's principle, predict which one of the following will not disturb the equilibrium?

A. Addition of Fe_2O_3

B. Removal of CO_2

C. Removal of CO

D. Addition of CO_2

Answer: A



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49. Roasted copper pyrite on heating 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. $Ca_3(PO_4)_2$ 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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50. Cupellation process is used in the metallurgy of

A. copper

B. silver

C. aluminium

D. iron

Answer: B



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51. Semiconductors of very high purity are obtained by

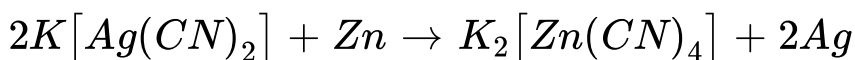
- A. liquation
- B. vapour phase refining
- C. zone refining
- D. electrolysis

Answer: C



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52. Silver metal is recovered industrially by using the chemistry shown below. Which of the following statements is true?



- A. Ag has been oxidised and Zn reduced
- B. Ag has been reduced and Zn oxidised
- C. Both Ag and Zn have been oxidised
- D. Both Ag and Zn have been reduced.

Answer: B

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53. Carbon cannot reduce Fe_2O_3 to Fe at a temperature below 983K because

- A. free energy change for the formation of CO is more negative than that of Fe_2O_3
- B. CO is thermodynamically more stable than Fe_2O_3
- C. carbon has higher affinity towards oxygen than iron
- D. iron has higher affinity towards oxygen than carbon.

Answer: D



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54. Which method is not correctly given for refining of crude metals?

A. Distillation: zinc and mercury

B. Liquation : tin

C. van Arkel : zirconium

D. Mond's process: lead

Answer: D



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

A. Silver

B. Titanium

C. Vanadium

D. Zinc

Answer: A



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56. Gallium arsenide is purified by

A. froth floatation process

B. van-Arkel method

C. zone refining method

D. electrolytic method

Answer: C



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Check Your Neet Vitals

1. In a mixture of PbS , ZnS and FeS_2 each component is separated from other in froth floatation process by using the reagents

A. potassium ethyl xanthate, KCN

B. potassium ethyl xanthate, KCN, NaOH , copper sulphate, acid

C. KCN, $CuSO_4$, acid

D. none of these

Answer: B



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Check Your Neet Itals

1. Which of the following involves both calcination and carbon reduction processes to obtain metal from its

ore?

- A. Zinc from zinc carbonate
- B. Calcium from calcium carbonate
- C. Copper from copper sulphide
- D. none of these

Answer: A



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

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

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

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

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

Answer: B



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

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

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

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

D. greater solubility of the impurity in the molten state than in the solid

Answer: D

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4. The function of potassium ethyl xanthate in froth floatation process is to make the ore

A. attracted towards water

B. water repellent

C. lighter

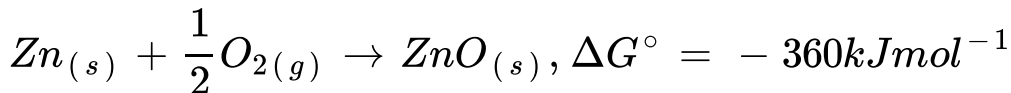
D. heavier

Answer: B

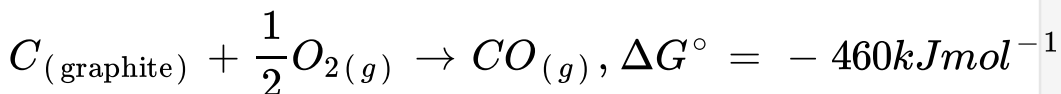
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5. Consider the following reactions at $1000^{\circ}C$,

I.



II.



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

- A. zinc can be oxidised by CO
- B. Zinc oxide can be reduced by graphite
- C. Both statements (a) and (b) are true
- D. CO can be reduced by Zinc

Answer: B



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6. A sulphide ore is generally roasted to the oxide before reduction, because

A. the enthalpy of formation of CO_2 is more than that of CS_2

B. a metal sulphide is generally more stable than the metal oxide

C. no reducing agent is found suitable for reducing a sulphide ore

D. a sulphide ore cannot be reduced at all

Answer: A



7. Carbon cannot be used in the reduction of Al_2O_3 because

- A. the enthalpy of formation of CO_2 is more than that of Al_2O_3
- B. pure carbon is not easily available
- C. the enthalpy of formation of Al_2O_3 is very high
- D. it is an expensive proposition

Answer: C



8. Identify x, y, z for the following metallurgical process. Metal sulphide \xrightarrow{x} Metal oxide \xrightarrow{y} Impure metal \xrightarrow{z} pure metal. x, y and z are respectively

- A. roasting, smelting , electrolysis
- B. roasting, calcination, smelting
- C. calcination, auto-reduction, bessemerisation
- D. none of the above

Answer: A

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9. Refining of impure copper with zinc impurity is to be done by electrolysis using electrodes as

- A. Cathode Anode
 pure copper pure zinc
- B. Cathode Anode
 pure zinc pure copper
- C. Cathode Anode
 pure copper impure copper
- D. Cathode Anode
 pure zinc impure zinc

Answer: C



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10. Which of the following ores is not a sulphide ore?

A. Galena

B. Argentite

C. Malachite

D. Pyrargyrite

Answer: C



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11. Which of the following ores is not concentrated by electromagnetic separation?

A. Copper pyrites

B. Pyrolusite

C. Chromite

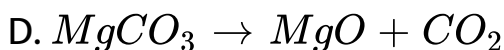
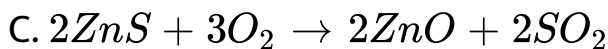
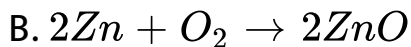
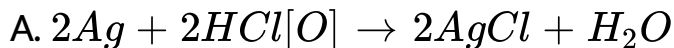
D. Cassiterite

Answer: A



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12. Which of the following reaction is an example of calcination process?



Answer: D

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13. During the extraction of Cu in the blast furnace at the roasting step

A. Cu_2S gets converted to Cu_2O if temperature is

below $800^\circ C$

B. Cu_2S gets converted to Cu_2O if temperature is

above $800^\circ C$

C. FeS remains unaffected and gets converted to FeO

only at temperature above $1000^\circ C$

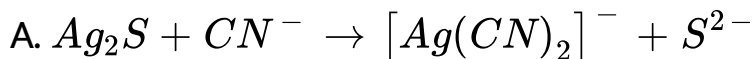
D. $FeSiO_3$ is formed and removed

Answer: B

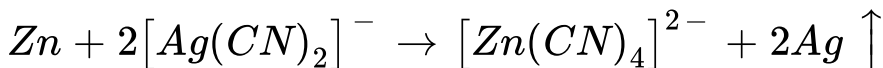


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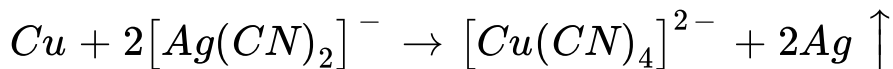
14. Which of the following reactions is not taking place during the extraction of Ag from Ag_2S by cyanide process?



B.



C.



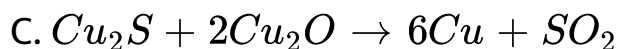
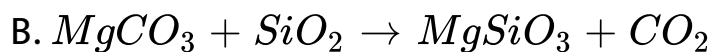
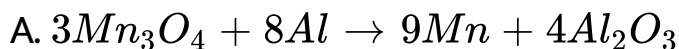
D. None of these

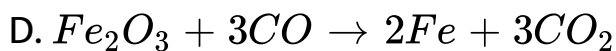
Answer: C



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15. Which of the following represents the thermite reaction?





Answer: A



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16. Which one of the following statements is false?

- A. During roasting, moisture is removed from the ore
- B. Cementite is the hardest variety of iron
- C. Calcination of ore is carried out in the absence of blast of air
- D. The concentrated zinc blende is subjected to calcination during its extraction by pyrometallurgy.

Answer: D



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17. The underlining of blast furnace is made of

- A. graphite
- B. silica rocks
- C. fireclay bricks
- D. basic bricks

Answer: C



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18. Aluminium is prepared in large quantities by

A. heating cryolite in a limited quantity of air

B. reducing aluminium oxide with coke

C. reducing aluminium oxide with sodium

D. electrolysing aluminium oxide dissolved in fused electrolyte

Answer: D



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19. Silver is precipitated from an aqueous solution of sodium argentocyanide by adding

A. zinc dust

B. copper powder

C. sodium amalgam

D. sodium thiosulphate

Answer: A



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20. Which of the following statements about electrolytic refining of silver is not true?

A. Anode consists of impure silver

B. Cathode consists of pure silver

C. Electrolytic solution consists of $AgNO_3$ and nitric acid

D. Electrolytic solution consists of $AgNO_3$ and hydrochloric acid

Answer: D



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21. Match the Column I with Column II and select the correct option

Column I

(P) Magnesite

(Q) Dolomite

(R) Corundum

(S) Bauxite

Column II

1. Ore of magnesium

2. Ore of aluminium

3. Oxide ore

4. Carbonate ore

A. $P - 1, 2, Q - 1, R - 2, 4, S - 2$

B. $P - 1, 4, Q - 1, 4, R - 2, 3, S - 2, 3$

C. $P - 1, 3, Q - 1, 3, R - 2, 4, S - 2, 4$

D. $P - 1, Q - 2, R - 3, S - 4$

Answer: B



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22. Match the Column I with Column II and select the correct option

Column I	Column II
(P) Self reduction	1. Lead
(Q) Carbon reduction	2. Nickel
(R) Thermal decomposition of carbonyl	3. Copper
(S) Decomposition of iodide	4. Titanium

A. $P - 1, 2, Q - 1, 4, R - 2, S - 3$

B. $P - 1, 2, Q - 2, 4, R - 3, S - 2$

C. $P - 1, 3, Q - 1, 3, R - 2, S - 4$

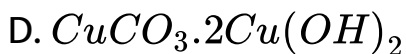
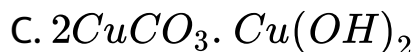
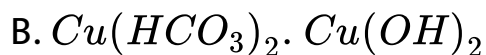
D. $P - 1, 4, Q - 1, 3, 4, R - 2, S - 3$

Answer: C



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23. Composition of azurite mineral is



Answer: C



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24. The process of pickling is to

A. cover metal surface with a less reactive metal

B. electroplate a metal with a non-metal

C. cool a red hot steel by dipping it in oil

D. remove layers of basic oxides from metal surface
before electroplating.

Answer: D



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Aipmt Neet Mcqs

1. Which of the following elements is present as the impurity to the maximum extent in the pig iron?

A. Manganese

B. Carbon

C. Silicon

D. Phosphours

Answer:



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2. Which of the following pairs of metals is purified by van Arkel method?

A. Ga and In

B. Zr and Ti

C. Ag and Au

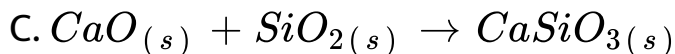
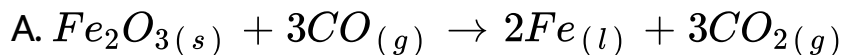
D. Ni and Fe

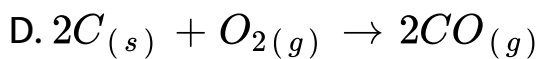
Answer:



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3. The following reactions take place in the blast furnace in the preparation of impure iron. Identify the reaction pertaining to the formation of the slag.





Answer:



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

A. copper (I) sulphide (Cu_2S)

B. sulphur dioxide (SO_2)

C. iron sulphide (FeS)

D. carbon monoxide (CO)

Answer:



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

A. Invar

B. Steel

C. Bell metal

D. Bronze

Answer:



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6. Which one of the following is a mineral of iron?

- A. Malachite
- B. Cassiterite
- C. Pyrolusite
- D. Magnetite

Answer:



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7. 'Metals are usually not found as nitrates in their ores'.

Out of the following two (I and II) reasons which is/are

true for the above observation?

I. Metal nitrates are highly unstable

II. Metal nitrates are highly soluble in water

A. I is false but II is true

B. I is true but II is false

C. I and II are true

D. I and II are false

Answer:



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8. Match items of Column I with the items of Column II and assign the correct code

	Column I		Column II
(A)	Cyanide process	(i)	Ultrapure Ge
(B)	Froth floatation process	(ii)	Dressing of ZnS
(C)	Electrolytic reduction	(iii)	Extraction of Al
(D)	Zone refining	(iv)	Extraction of Au
		(v)	Purification of Ni

- A. $A \quad B \quad C \quad D$
 (i) (ii) (iii) (iv)
- B. $A \quad B \quad C \quad D$
 (iii) (iv) (v) (i)
- C. $A \quad B \quad C \quad D$
 (iv) (ii) (iii) (i)
- D. $A \quad B \quad C \quad D$
 (ii) (iii) (i) (v)

Answer:



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9. Extraction of gold and silver involves leaching with CN^- ion. Silver is later recovered by

- A. distillation
- B. zone refining
- C. displacement with Zn
- D. liquation

Answer:

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10. Considering Ellingham diagram, which of the following metals can be used to reduce alumina?

A. Fe

B. Zn

C. Mg

D. Cu

Answer:



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