CHEMISTRY

BOOKS - CHEMISTRY

GENERAL PRINCIPLE AND PROCESSES OF ISOLATION OF ELEMENTS

General Principle And Processes Of Isolation Of Elements

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

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

B. reduction of Cl^- ion to chlorine gas occures

C. for overall reaction $\Delta G^{\ominus}$ has negative value

D. a displacement reaction takes place

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. sulphide of copper (II) and iron (II)

B. sulphide of copper (II) and iron (III)
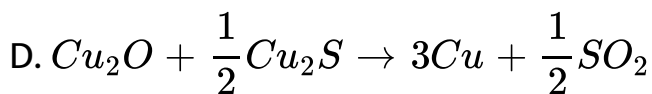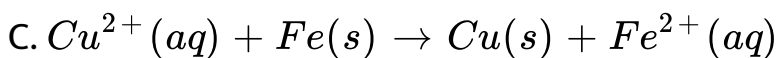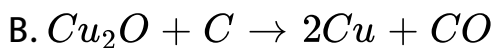
C. sulphide of copper (I) and iron (II)

D. sulphide of copper (I) and iron (II)

Answer: C

3. Which of the following reaction is an example of autoreduction?

A. $Fe(3)O_4 + 4CO \rightarrow 3Fe + 4CO_2$

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

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

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

Answer: D

4. A number of elements are available in earth's crust but most abundant elements are_____

    A. Al and Fe

    B. Al and Cu

    C. Fe and Cu

    D. Cu and Ag

Answer: A

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5. Zone refining is based on the principle that

A. impurities of low boiling metal can be seperated by

distillation.

B. impurities are more soluble in molten metal than in

solid metal.

C. different components of a mixture are differently

adsobed on an adsorbent

D. vapours of volatile compound can be decomposed in

pure metal.

Answer: B

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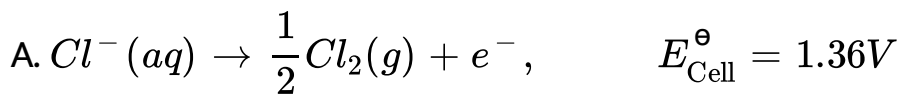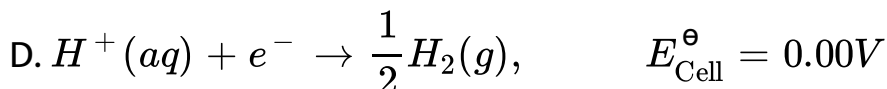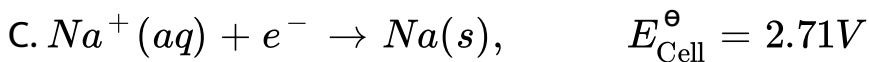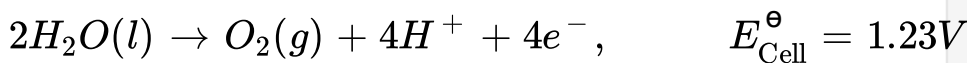
   A. FeS

   B. CO

   C. Cu_2S

   D. SO_2

Answer: C

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7. Brine is electrolysed by using inert electrodes. The reaction at anode is_____

A. $Cl^-(aq) \rightarrow \frac{1}{2}Cl_2(g) + e^-$, $\qquad$ $E^{\ominus}_{Cell} = 1.36V$

B.

$2H_2O(l) \rightarrow O_2(g) + 4H^+ + 4e^-$, $\qquad$ $E^{\ominus}_{Cell} = 1.23V$

C. $Na^+(aq) + e^- \rightarrow Na(s)$, $\qquad$ $E^{\ominus}_{Cell} = 2.71V$

D. $H^+(aq) + e^- \rightarrow \frac{1}{2}H_2(g)$, $\qquad$ $E^{\ominus}_{Cell} = 0.00V$

Answer: A

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8. In the metallurgy of aluminium,

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

B. graphide anode is oxidation to carbon monoxide and

carbon dioxide.

C. oxidation state of oxygen changes in the reaction at

anode.

D. oxidation state of oxygen in the overall reaction

involved in the process.

Answer: B

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9. Elecyroltic 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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10. Extraction of gold and silver involves leaching the metal

with CN^- ion. The metal is recovered by _____

    A. displacement of metal by some metal from the

       complex ion.

    B. roasting of metal complex
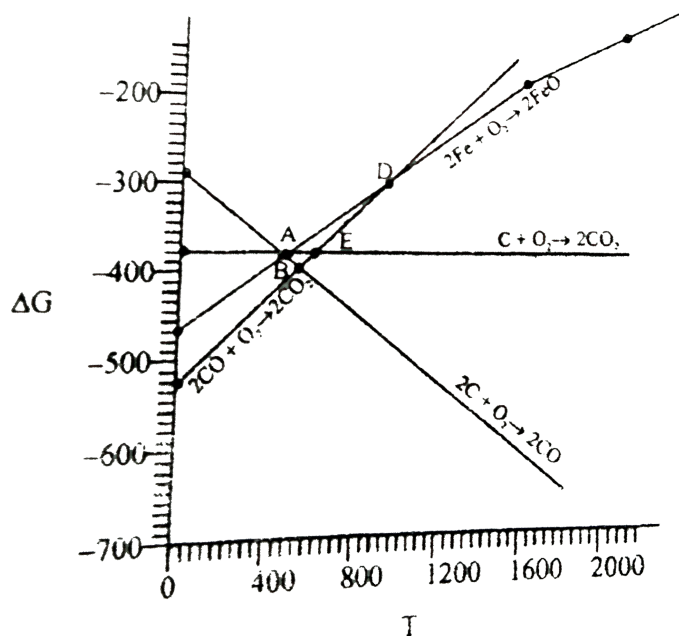
    C. calcination followed by roasting

D. thermal decomposition of metal complex

Answer: A

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11. Choose the correct option of temperature at which carbon reduced FeO to iron and produces CO

A. Below temperature at point A

B. Approximately at the temperature corresponding to

point A

C. Above temperature at point A but below temperature
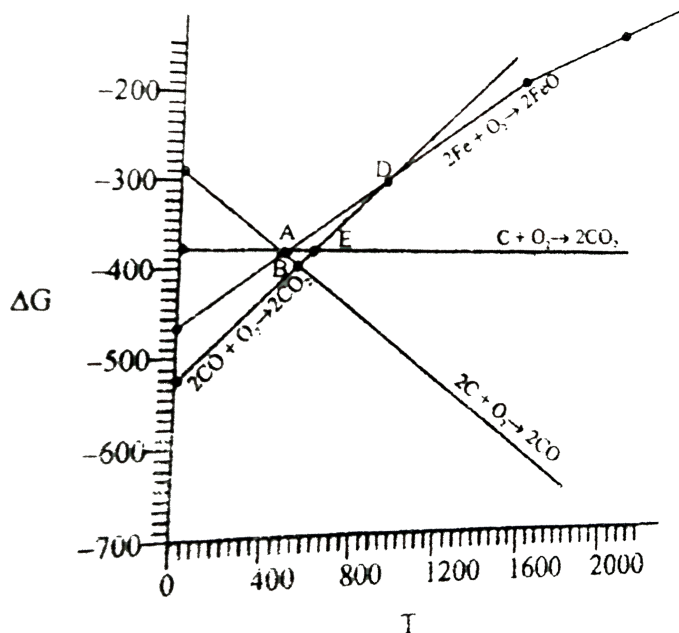
at point D

D. Above temperature at point A

Answer: D

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12. Below point 'A' FeO can _____

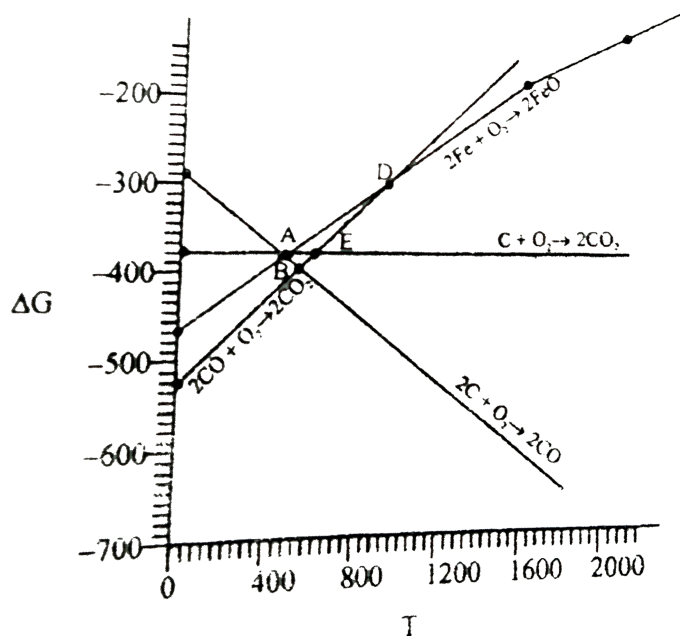A. be reduced by carbon monoxide only.

B. Be reduced by both carbon monoxide and carbon.

C. be reduced by carbon only

D. not be reduced by both carbon and carbon monoxide

Answer: A

13. For the reduction of FeO at the temperature corresponding to point D, which of the following statements is correct?

A. ΔG value for the overall reduction reaction with carbon monoxide is zero.

B. ΔG value for the overall reduction reaction with a mixture of 1 mol carbon and 1 mol oxygen is positive

C. ΔG value for overall reduction with a mixture of 2 mol carbon and 1 mol carbon and 1 mole oxygen will be positve

D. ΔG value for the overall reduction with carbon monoxide is negative

Answer: A

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14. At the temperature corresponding to which of the points in Fig. FeO will be reduced to Fe by coupling the

reaction $2Fe \rightarrow 2Fe + O_2$ with all of the following reactions?

(a) $C + O_2 \rightarrow CO_2$ (b) $2C + O_2 \rightarrow 2CO$ and (c) $2CO + O_2 \rightarrow 2CO_2$

A. Point A

B. Point B

C. Point D

D. Point E

Answer: B::D

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15. Which of the following options are correct?

A. Cast iron is obtained by remelting pig iron with scrap iron and coke using hot air blast

B. In extraction of silver, silver is extacted as cationic complex

C. Nickel is purified by zone refining

D. Zr and Ti are prified by van Arkel method

Answer: A::D

16. In the extraction of aluminium by Hall-Heroult process purified Al_2O_3 is mixed with CaF_2 to

A. lower the melting point of Al_3O_3

B. increase the conductivity of molten mixture

C. reduce AI^{3+} into Al(s)

D. acts as catalyst

Answer: A::B

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17. Which of the following statements is correct about the role of substances addedd in the froth floatation process?

A. Collectors enhance the non-wettability of the mineral particles

B. Collectors enhance the wettablity of gangue particle

C. By using depressants in the process two sulphide

ores can be separated.

D. Froth stabilisers decrease wettabililty of gangue

Answer: A::C

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18. In the Froth Floatation process, zinc sulphide and lead

sulphide can be separated by_____

A. using collectors

B. adjusting the proportion of oil to water

C. using depressant

D. using froth stabilisers

Answer: B::C

19. Common impurities present in bauxite are_____

A. CuO

B. ZnO

C. Fe_2O_3

D. SiO_3

Answer: C::D

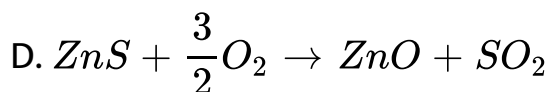**20.** Which of the following ores are concentarted by froth floatation?

    A. Haematite

    B. Galena

    C. Copper pyrites

    D. Magnetite

Answer: B::C

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21. Which of the following reaction occur during calcination ?

A. $CaCO_3 \rightarrow CaO + CO_2$

B. $2FeS_2 + \dfrac{11}{2}O_2 \rightarrow Fe_2O_3 + 4SO_2$

C. $Al_2O_3 . \, xH_2O \rightarrow Al_2O_3 + xH_2O$

D. $ZnS + \dfrac{3}{2}O_2 \rightarrow ZnO + SO_2$
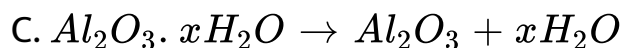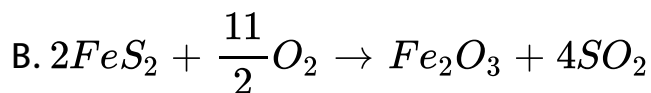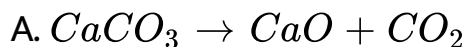
Answer: A::C

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22. For the metallurgical process of which of the ores calcined ore can be reduced by carbon?

A. Haematite

B. Calamine

C. Iron pyrites

D. Sphalerite

Answer: A::B

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23. The main reaction occuring in blast furnace during the extraction of iron form haematite is

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

B. $FeO + SiO_2 \rightarrow FeSiO_3$

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

D. $CaO + SiO_2 \rightarrow CaSiO_3$
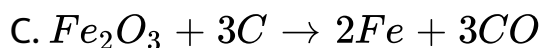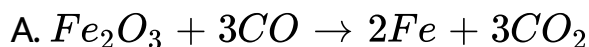
Answer: A::D

24. In which of the following method of purification metal is converted to its volatile compound which is decomposed to give pure metal?

A. Heating with stream of cabon monoxide

B. Heating with iodine

C. Liquation

D. Distillation

Answer: A::B

25. Which of the following statements are correct ?

A. A depressant prevents certain type of particle to come to the froth.

B. Copper matte contains Cu_2S and ZnS

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

D. Zinc can be extracted by self-reduction.

Answer: A::C

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26. In the extraction of chlorine from brine_____

    A. $\Delta G^{\ominus}$ for the overall reaction is negative

    B. $\Delta G^{\ominus}$ for the overall reaction is positive

    C. $E^{\ominus}$ for the overall reaction has negative value

    D. $E^{\ominus}$ for the overall reaction has positive value

Answer: B::C

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27. Why is an external emf of more than $2.2V$ required for the extraction of CI_2 from brine?

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28. At temperature above $1073K$ coke can be used to reduce FeO to Fe. How can you justify this reduction with Ellingham diagram?

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

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30. How is copper extracted from low grade copper ores?

31. Write two basic requirements for refining of a metal by Mond process and by Van Arkel Method

32. Although carbon and hydrogen are better reducing agents but they are not used to reduce metallic oxides at high temperatures. Why?

33. How do we separate two sulphide ores by Froth Floatation Method? Explain with an example.

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34. The purest form of iron is prepared by oxidising impurities from cast iron in a reverberatory furnace. Which iron ore is used to line the furnace? Explain by giving reaction.

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35. The mixture of compounds A and B is passed through a column of Al_2O_3 by using alcohol as eluent. Compound A

is eluted in preference to compound B. Which of the compounds A or B is more readily adsorbed on the column?

36. Why is sulphide ore of copper heated in a furnace afer mixing with silica?

37. Why are sulphide ores converted to oxide before reduction?

38. Which method is used for refining Zr and Ti? Explain with equation.

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39. What should be the considerations during the extraction of metals by electrochemical method?

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40. What is the role of flux in metallurgical processes?

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41. How are metals used as semiconductor refined? What is the principle of the method used?

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42. Write down the reactions taking place in Bast furnace related to the metallurgy of iron in the temperature range $500 - 800K$

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43. Give two requirements for vapour phase refining.

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44. Write the chemical reaction involved in the extraction of gold by cyanide process. Also give the role of zinc in the extraction.

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

	Column I		Column II
A.	Pendulum	1.	Chrome steel
B.	Malachite	2.	Nickel steel
C.	Calamine	3.	Na_3AlF_6
D.	Cryolite	4.	$CuCO_3 \cdot Cu(OH)_2$
		5.	$ZnCO_3$

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

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

	A	B	C	D
C.	2	3	4	5
D.	4	5	3	2

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

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

	Column I		Column II
A.	Coloured bands	1.	Zone refining
B.	Impure metal to volatile complex	2.	Fractional distillation
C.	Purification of Ge and Si	3.	Mond's process
D.	Purification of mercury	4.	Chromatography
		5.	Liquation

	A	B	C	D
A.	1	2	4	5
B.	4	3	1	2

	A	B	C	D
C.	3	4	2	1

	A	B	C	D
D.	5	4	3	2

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

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47. Match the items of Column I with item of Column II and

assign the correct code.

Column I		Column II	
A.	Cyanide process	1.	Ultrapure Ge
B.	Froth floatation process	2.	Dressing of ZnS
C.	Electrolytic reduction	3.	Extraction of Al
D.	Zone refining	4.	Extraction of Au
		5.	Purification of Ni

	A	B	C	D
A.	4	2	3	1

	A	B	C	D
B.	2	3	1	5

$$
\begin{array}{cccc} A & B & C & D \\ 1 & 2 & 3 & 4 \end{array}
$$

C.

$$
\begin{array}{cccc} A & B & C & D \\ 3 & 4 & 5 & 1 \end{array}
$$

D.

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

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48. Match the items of Column I with item of Column II and

assign the correct code.

	Column I		Column II
A.	Sapphire	1.	Al_2O_3
B.	Sphalerite	2.	NaCN
C.	Depressant	3.	Co
D.	Corundum	4.	ZnS
		5.	Fe_2O_3

$$
\begin{array}{cccc} A & B & C & D \\ 3 & 4 & 2 & 1 \end{array}
$$

A.

$$
\text{B.} \quad
\begin{array}{cccc}
A & B & C & D \\
5 & 4 & 3 & 2
\end{array}
$$

$$
\text{C.} \quad
\begin{array}{cccc}
A & B & C & D \\
2 & 3 & 4 & 5
\end{array}
$$

$$
\text{D.} \quad
\begin{array}{cccc}
A & B & C & D \\
1 & 2 & 3 & 4
\end{array}
$$

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

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

	Column I		Column II
A.	Blisterred Cu	1.	Aluminium
B.	Blast furnace	2.	$2Cu_2O + Cu_2S \longrightarrow 6Cu + SO_2$
C.	Reverberatory furnace	3.	Iron
D.	Hall-Heroult process	4.	$FeO + SiO_2 \longrightarrow FeSiO_3$
		5.	$2Cu_2S + 3O_2 \longrightarrow 2Cu_2O + 2SO_2$

$$
\text{A.} \quad
\begin{array}{cccc}
A & B & C & D \\
2 & 3 & 4 & 1
\end{array}
$$

B. $\begin{array}{cccc} A & B & C & D \\ 1 & 2 & 3 & 5 \end{array}$

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

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

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

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

Reason : $Ni(CO)_4$ is a volatile compound which

deomposed at $460K$ to give pure Ni.

A. Both assertion and reason are true and reason is the

correct explanation of assertion.

B. Both assertion and reason are true but reason is not

the correct explanation of assertion.

C. Assertion is true but reason is false

D. Assertion is false but reason is true.

Answer: A

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51. Assertion : Zirconium can be purificed by Van Arkel

method.

Reason : ZrI_4 is volatile and decomposed at $1800K$.

A. Both assertion and reason are true and reason is the

correct explanation of assertion.

B. Both assertion and reason are true but reason is not

the correct explanation of assertion.

C. Assertion is true but reason is false

D. Assertion is false but reason is true.

Answer: A

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52. Assertion : Sulphide ores are concentrated by Froth

Floatation method.

Reason : Cresols stabilise the froth in Froth Floatation

method

A. Both assertion and reason are true and reason is the

   correct explanation of assertion.

B. Both assertion and reason are true but reason is not

   the correct explanation of assertion.

C. Assertion is true but reason is false

D. Assertion is false but reason is true.

Answer: B

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53. Assertion : Zone refining method is very useful for

producing semiconductors.

Reason : Semiconductors are of high purity.

A. Both assertion and reason are true and reason is the correct explanation of assertion.

B. Both assertion and reason are true but reason is not the correct explanation of assertion.

C. Assertion is true but reason is false

D. Assertion is false but reason is true.

Answer: B

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

electropositive metal.

Reason : Copper is extracted by hydrometallurgy.

A. Both assertion and reason are true and reason is the

correct explanation of assertion.

B. Both assertion and reason are true but reason is not

the correct explanation of assertion.

C. Assertion is true but reason is false

D. Assertion is false but reason is true.

Answer: B

55. Explain the following

(a) CO_2 is a better reducing agent below 710 K whereas CO is a better reducing agent above 710 K .

(b) Generally sulphide ores are converted into oxides before reduction.

(c) Silica is added to the sulphide ore of copper in the reverberatory furnance.

(d) Carbon and hydrogen are not used as reducing agents at high temperature.

(e) Vapour phase refining method is used for the purification of Ti

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