CHAPTER 20

General Principles and Processes of Isolation of Elements

1. Aluminium is extracted by the electrolysis of **[2002]**

(a) bauxite
(b) alumina
(c) alumina mixed with molten cryolite
(d) molten cryolite.

2. The metal extracted by leaching with a cyanide is **[2002]**

(a) Mg (b) Ag
(c) Cu (d) Na.

3. Which one of the following ores is best concentrated by froth-flotation method? **[2004]**

(a) Galena (b) Cassiterite
(c) Magnetite (d) Malachite

4. During the process of electrolytic refining of copper, some metals present as impurity settle as 'anode mud'. These are **[2005]**

(a) Fe and Ni (b) Ag and Au
(c) Pb and Zn (d) Sn and Ag

5. 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? **[2008]**

(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

6. Which method of purification is represented by the following equation ? **[2012]**

$$Ti(s) + 2I_2(g) \xrightarrow{523K}$$

$$TiI_4(g) \xrightarrow{1700K} Ti(s) + 2I_2(g)$$

(a) Zone refining (b) Cupellation
(c) Polling (d) Van Arkel

7. The metal that cannot be obtained by electrolysis of an aqueous solution of its salts is: **[2014]**

(a) Ag (b) Ca
(c) Cu (d) Cr

8. In the context of the Hall - Heroult process for the extraction of Al, which of the following statements is **false** ? **[JEE M 2015]**

(a) Al^{3+} is reduced at the cathode to form Al
(b) Na_3AlF_6 serves as the electrolyte
(c) CO and CO_2 are produced in this process
(d) Al_2O_3 is mixed with CaF_2 which lowers the melting point of the mixture and brings conductivity

9. Which one of the following ores is best concentrated by froth floatation method? **[JEEM 2016]**

(a) Galena (b) Malachite
(c) Magnetite (d) Siderite

Answer Key														
1	2	3	4	5	6	7	8	9						
(c)	(b)	(c)	(b)	(c)	(d)	(b)	(b)	(a)						

SOLUTIONS

1. **(c)** Pure aluminium can be obtained by electrolysis of a mixture containing alumina, crayolite and fluorspar in the ratio 20 : 24 : 20. The fusion temperature of this mixture is 900°C and it is a good conductor of electricity.

2. **(b)** Silver ore forms a soluble complex with NaCN from which silver is precipitated using scrap zinc.

$$Ag_2S + 2NaCN \rightarrow Na[Ag(CN)_2] \xrightarrow{Zn} Na_2[Zn(CN)_4] + Ag\downarrow$$

sodargento-cynanide (soluble)

3. **(c)** **NOTE** Galena is PbS and thus purified by froth floatation method.

Froath floatation method is used to concentrate sulphide ores. This method is based on the preferential wetting properties with the froathing agent and water.

4. **(b)** During the process of electrolytic refining Ag and Au are obtained as anode mud.

5. **(c)** **NOTE** The reduction of metal sulphides by carbon reduction process is not spontaneous because ΔG for such a process is positive. The reduction of metal oxide by carbon reduction process is spontaneous as ΔG for such a process is negative.

From this we find that on thermodynamic considerations CO_2 is more stable than CS_2 and the metal sulphides are more stable than corresponding oxides.

In view of above the factor listed in choice (c) is incorrect and so is of no significance.

Hence the correct answer is (c)

6. **(d)** Van Arkel is a method in which heat treatment is used to purify metal in this process metals are converted into other metal compound for loosly coupled like as iodine to make metal iodide which are easily decomposed and give pure metal.

The process is known as Van Arkel method.

7. **(b)** On electrolysis of aqueous solution of *s*-block elements H_2 gas discharge at cathode.

At cathode: $H_2O + e^- \rightarrow \frac{1}{2}H_2 + OH^-$

8. **(b)** In the metallurgy of aluminium, purified Al_2O_3 is mixed with Na_3AlF_6 or CaF_2 which lowers the melting point of the mix and brings conductivity.

9. **(a)** Froth floatation method is mainly applicable for sulphide ores.

(1) Malachite ore : $Cu(OH)_2 . CuCO_3$
(2) Magnetite ore : Fe_3O_4
(3) Siderite ore : $FeCO_3$
(4) Galena ore : PbS (Sulphide Ore)