

Ankit Gupta Classes



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UNIT—6

GENERAL PRINCIPLES AND PROCESSES OF ISOLATION OF ELEMENTS

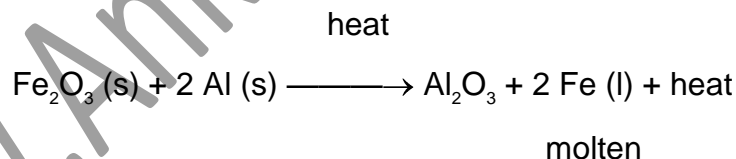
1 MARK QUESTIONS

Q. 1. Why carbon reduction process is not applied for reducing aluminium oxide to aluminium ?

Ans. Because aluminium metal itself a very powerful agent and can easily reduce CO formed during the reaction back to carbon.

Q. 2. Explain why thermit process is quite useful for repairing the broken parts of a machine ?

Ans. In thermit process, oxides of metals are reduced by aluminium in which large amount of heat is evolved, \therefore metal is in the molten state & is allowed to fall between the broken parts of a machine.



Q. 3. Free energies of formation ($\Delta_f G$) of MgO (s) and CO (g) at 1273 K and 2273 K are given below :

$$\Delta_f G \text{ MgO (s)} = - 941 \text{ KJ/mol at 1273 K}$$

$$= - 344 \text{ KJ/mol at 2273 K}$$

$$\Delta_f G \text{ CO (g)} = - 439 \text{ KJ/mol at 1273 K}$$

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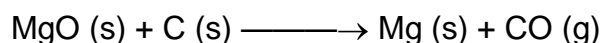
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$$= -628 \text{ KJ/mol at } 2273 \text{ K}$$

On the basis of the above data, predict the temperature at which carbon can be used as reducing agent for MgO (s).

Ans. The redox reaction is :



$$\Delta G^\circ = \Delta_f G^\circ_{(\text{Products})} - \Delta_f G^\circ_{\text{reactant}}$$

$$\text{At } 1273 \text{ K} \quad \Delta G^\circ = -439 - (-941) = 502 \text{ KJ mol}^{-1}$$

$$\text{At } 2273 \text{ K} \quad \Delta G^\circ = -628 - (-314) = -314 \text{ KJ mol}^{-1}$$

The reaction is feasible at 2273 K.

Q. 4. Why is Zinc and not Copper used for the recovery of Silver from the complex $[\text{Ag}(\text{CN})_2]$?

Ans. Zinc is stronger reducing agent and more electropositive than Copper. ($E^\circ = +0.34\text{V}$)

Q. 5. Graphite is used as anode and not diamond. Assign reason.

Ans. In graphite there are free electrons which helps in electrical conductivity.

Q. 6. How is granular zinc & zinc dust obtained ?

Ans. Granular zinc is obtained by pouring molten zinc in cold water & zinc dust by melting zinc & then atomising it with blast of air.

Q. 7. How does NaCN act as a depressant in preventing ZnS from forming the froth ?

Ans. NaCN forms a layer of zinc complex, $\text{Na}_2[\text{Zn}(\text{CN})_4]$ on the surface of ZnS and thereby prevents it from the formation of froth.

Q. 8. In the process of extraction of gold, Roasted gold ore :



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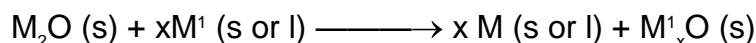
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Identify the complexes [X] & [Y].

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

Q. 9. Why is the reduction of a metal oxide easier if the metal formed is in liquid state at the temp. of reduction ?

Ans. The reduction of metal oxide is as :



The entropy of liquid metal is more than entropy of the metal in solid state. $\therefore \Delta G$ for the reduction become more on negative side.

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

Q. 10. What is the role of collector in froth floatation process ?

Ans. Collector enhances non-wettability of the mineral particles.

Q. 11. At which temperature direct reduction of Fe_2O_3 by carbon is possible ?

Ans. Above 1123 K, carbon can reduce Fe_2O_3 .

Q. 12. Why a very high cosmic abundance of iron is there ?

Ans. A very high cosmic abundance of iron is due to its high nuclear binding energy.

Q. 13. Why refractory metals are used in construction of furnaces ?

Ans. Refractory metals are used in construction of furnaces because they can withstand high temperature.

Q. 14. What is pyrometallurgy ?

Ans. Extraction of metals using heat is called pyrometallurgy. It involves concentration of ores, roasting calcination, smelting, reduction and refining of metals. Sulphide, carbonate, oxide ores etc. are subjected to pyrometallurgy.

Q. 15. How the most electropositive metals are isolated from their ores ?

Ans. The most electropositive metals are isolated from their ores by electrolysis of fused ionic salts.

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