

CHEMISTRY STUDY MATERIALS FOR CLASS 12

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General Principle and Process of Isolation of Elements

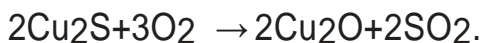
SHORT ANSWER TYPE QUESTION (3 marks)

Q.1 Explain the following:

- i) Zinc but not copper is used for recovery of Ag from the complex $[\text{Ag}(\text{CN})_2]$.
- ii) Partial roasting of sulphide ore is done in the metallurgy of copper.
- iii) Extraction of Cu from pyrites is difficult than that from its oxide ore through reduction.

A.1 (i) Zn is more powerful reducing agent in comparison to copper. Zn is also cheaper than Cu.

- ii) Partial roasting of sulphide ore forms some oxide. This oxide then reacts with remaining sulphide ore to give copper i.e. self reduction occurs.



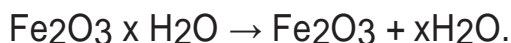
- iii) Though carbon is good reducing agent for oxide but it is poor reducing agent for sulphides.

The reduction of metal sulphide does not have large negative value.

Q.2 Explain the method of the obtaining pig iron from magnetite.

A.2 Extraction of iron from magnetite takes place in following steps :

- i) Concentration of ore : It is done by gravity separation followed by magnetic separation process.
- ii) Calcination: It involve heating when the volatile matter escapes leaving behind metal oxide.

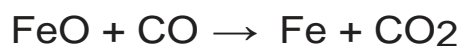
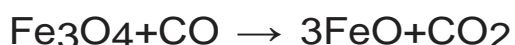


- iii) Roasting: It involves heating of ore in presence of air, thus moisture, CO_2 , SO_2 , As_2O_3 removed and FeO oxidized to Fe_2O_3 .

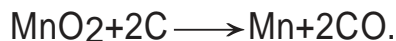
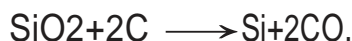
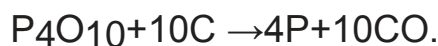
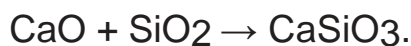
iv) Smelting of roasted ore: A mixture of ore, coke & CaCO_3 is smelted in long BLAST FURNACE.

following reaction takes place at different temperature zones :

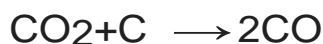
- i) Zone of reduction: Temperature range $250^\circ\text{C} - 700^\circ\text{C}$ $3\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow 2\text{Fe}_3\text{O}_4 + \text{CO}_2$



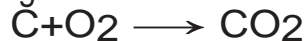
ii) Zone of slag formation: Temperature range 800°C – 1000°C $\text{CaCO}_3 \longrightarrow \text{CaO} + \text{CO}_2$



iii) Zone of fusion: Temperature range 1150°C – 1350°C



iv) Zone of fusion: Temperature range 1450°C – 1950°C



Thus, Pig iron is obtained from blast furnace.

Describe the principles of extraction of copper from its ore.

Q.4 Name the principal ore of aluminium and describe how Al is extracted from its ore.

A.4 Important ores (i) Bauxite $\text{Al}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ (ii) Corundum Al_2O_3 . Bauxite is commercially important ore of Al.

Extraction from Bauxite ore involves the following two stages.

i) Purification of bauxite to get pure alumina (Al_2O_3)

ii) Electrolysis of pure alumina in molten cryolite

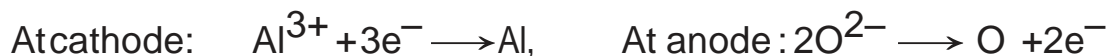
Step: 1 · Bauxite is treated with NaOH. Following reaction takes place :



$\text{Na}[\text{Al}(\text{OH})_4]$, then reacts with CO_2 then pure Alumina is obtained.



Step:2· Electrolytic reduction of pure alumina takes place in iron box (cathode) with cryolite (Na_3AlF_6) & fluorspar CaF_2 . Graphite rods act as anode. Following reactions take place :



By this process 98.8% pure Aluminum is obtained.

Q.5 Described the principles of extraction of Zinc from zinc blende.

A.5 Important ores of Zn: · Zinc blende – ZnS . Calamine – ZnCO_3 , and Zincite – ZnO , ZnS is commercially important ore of Zn. Various stages involved in the extraction of Zn from ZnS are as following :-

i) Concentration of ore: It is concentrated by Froth flotation process followed by gravity separation process.

MULTIPLE CHOICE QUESTIONS (MCQ) (1 Mark)

1-What is the role of Zinc metal in the extraction of Silver.

- (i) As Oxidising agent (ii) As Reducing agent (iii) Both of them (iv) None of them
1-Ans.(ii)

2-Name the method that is used for the refining of Nickel

- (i)Mond's Process (ii) Electrolytic Refining (iii) Zone Refining (iv) All of them
2-Ans.(i)

3- Which reducing agent is employed to get copper from leached low grade copper ore.

- (i)N₂ (ii) H₂ (iii) Coke (iv) CO

3-Ans.(ii)

4-Name the depressant which is used to separate ZnS and PbS ores in froth flotation process.

- (i) NaCN (ii) NaOH (iii) NaCl (iv) KCl

4-Ans.(i)

5-Silica is used as a flux in the extraction of Metals which is an example of

- (i)Basic (ii) Neutral ((iii) Acidic (iv) Amphoteric

5-Ans.(iii)

6- What name is given to Carbon Reduction process for extracting the metal?

- (i)Roasting (ii) Calcination (iii) Electrolytic (iv) Smelting

6-Ans.(iv)

7-Which process is generally used for the concentration of sulphide ores

- (i)Hydraulic Washing (ii) Magnetic Separation (iii) Froth Flotation (iv) Distillation

7-Ans.(iii)

8-Which metal is obtained by reacting the ore with dilute sodium cyanide solution?

- (i)Gold (ii) Silver (iii) Iron (iv) Gold

8-Ans.(ii)

9-Which one of the purest form of commercial iron

- (i)Pig Iron (ii) Steel (iii) Wrought Iron (iv) None of them

9-Ans.(iii)

10-Name the process by which an ore of tin containing FeCr₂O₄ is concentrated.

- (i)Magnetic Separation (ii) Liqutation (iii) Froth Floatation (iv) Leaching

10-Ans.(i)
