

# Unit 1-METALLURGY

## Learning Objectives

After studying this unit, students will be able to

- ❖ Describe various methods of concentrating ores
- ❖ Explain various methods of extraction of crude metals
- ❖ Apply thermodynamic principles to metallurgical processes
- ❖ Predict the favourable conditions for the reduction process using Ellingham diagram
- ❖ Describe the electrochemical principles of metallurgy
- ❖ Apply the electrochemical principles in the extraction of metals
- ❖ Explain the electrode reactions in electrolytic refining.
- ❖ list the uses of Al, Zn, Fe, Cu and Au

## Important Notes and Points

- ❖ The sulphur dioxide produced during roasting process is harmful to the environment. In modern metallurgical factories, this by product is trapped and converted into sulphuric acid to avoid air pollution.

- ❖ Ellingham diagram helps us to select a suitable reducing agent and appropriate temperature range for reduction.
- ❖ The carbon line cuts across the lines of many metal oxides and hence it can reduce all those metal oxides at sufficiently high temperature.
- ❖ Aluminium is the most abundant metal and is a good conductor of electricity and heat. It also resists corrosion.
- ❖ The Iron pillar, also known as Ashoka Pillar, is 23 feet 8 inches high, 16 inches wide and weighs over 6000 kg.
- ❖ The surprise comes in knowing its age, some 1600 years old, an iron column should have turned into a pile of dust long ago. Despite that, it has avoided corrosion for over the last 1600 years and stands as an evidence of the exquisite skills and knowledge of ancient Indians.
- ❖ A protective film was created through a complicated combination of the presence of raw and unreduced iron in the pillar and cycles of the weather, which helped to create a thin, uniform layer of magnetite on the pillar. Magnetite is a compound of iron, oxygen and hydrogen which does not rust and gives corrosion resistance.