

# 5. GENERAL PRINCIPLES OF METALLURGY

## IMPORTANT POINTS

1. **Metallurgy** deals with various methods of extracting metals from their natural sources and converting them into useful material to the mankind.

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2. **Mineral:** The minerals are naturally occurring chemical substances in earth's crust and are obtained by mining.  
**Ex:** Clay is a mineral of aluminium.

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3. **Ore:** It is the compound form of a metal which occurs in nature and from which the metal can be extracted economically.  
**Ex:** Bauxite is an ore of aluminium.  
**Note:** All ores are minerals but all minerals are not ores.

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4. **Gangue:** An ore is always contained with impurities like sand, rocks and other earthy material. Such impurities are called as gangue (or) Matrix.

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5. **Ore dressing or concentration:** Removal of gangue from the ore of a metal is known as ore dressing or concentration of ore.

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6. **Flux:** Separation of gangue from the ore is difficult, since it is infusible. In order to remove gangue, a chemical substance has to be added to it. Such chemical substance is known as flux. It reacts with gangue to form a fusible product.

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7. **Slag:** The fusible product which is produced when flux reacts with infusible gangue is known as slag. Slag can be easily separated from the ore.  
Gangue + Flux  $\longrightarrow$  Slag

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- 8.0 **Extraction of metal:** Extraction of a metal from its ore generally involves three main stages.
  - 1) Ore-dressing
  - 2) Extraction of crude metal
  - 3) Refining of metal.

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- 8.1 **Ore-dressing:** Removal of gangue from the ore of a metal is known as ore-dressing. The various methods in ore-dressing :
  - 1) Hand picking
  - 2) Washing with water or levigation
  - 3) Liquefaction
  - 4) Froth floatation process
  - 5) Electromagnetic separation.

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- 8.2 **Extraction of crude metal:** Here the metal is liberated from the ore. The methods used for this are :
  - 1) Calcination
  - 2) Roasting
  - 3) Smelting
  - 4) Leaching
  - 5) Reduction
  - 6) Special techniques

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- 8.3 **Refining of metals:** The metals obtained by the extractive methods are initially impure. The impurities consist of foreign metal, residual slag or flux etc.,. Such metals are refined by one of the following methods:
  - 1) Liquefaction
  - 2) Distillation
  - 3) Poling
  - 4) Electrolytic refining
  - 5) Cupellation
  - 6) Zone refining