

# Smelting process

by

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# Smelting process

- A large number of metal oxide obtained during roasting can be reduced to metals by heating with at carbon elevated temperature. This process is called “Smelting”
- Carbon monoxide reduce the oxide to the free metal
- During reduction an additional substance called flux is added to the ore

- It combines with impurities to form fusible product slag
- Impurities + flux = slag
- $\text{Fe}_2\text{O}_3 + 3\text{C} \longrightarrow 2\text{Fe} + 3\text{CO}$
- $\text{FeO}_3 + 3\text{CO} \longrightarrow 2\text{Fe} + 3\text{CO}_2$

- Smelting involves “melting the metal out of its ore”
- Most ores are a chemical compound of the metal with other elements
- To produce the metal ,these compounds have to undergo a chemical reaction.

# Types of smelting

- Reduction smelting

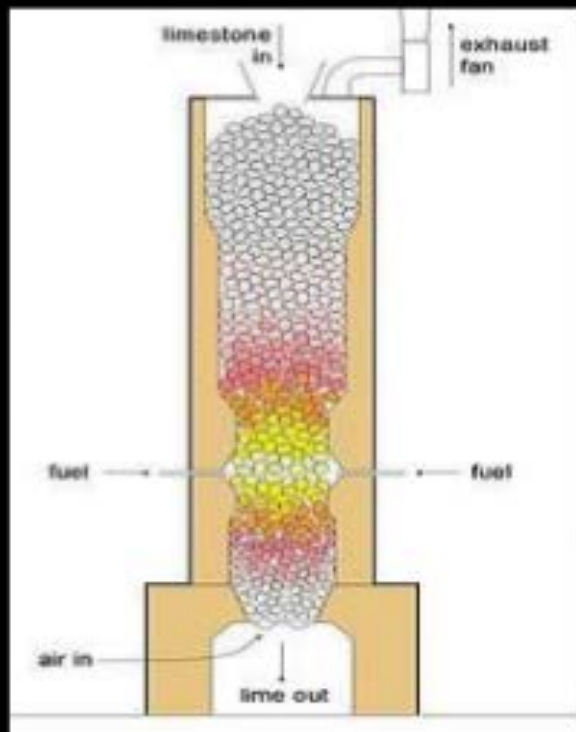
The ore is reduced by carbon in the presence of flux to give molten metal and slag

- Matte smelting

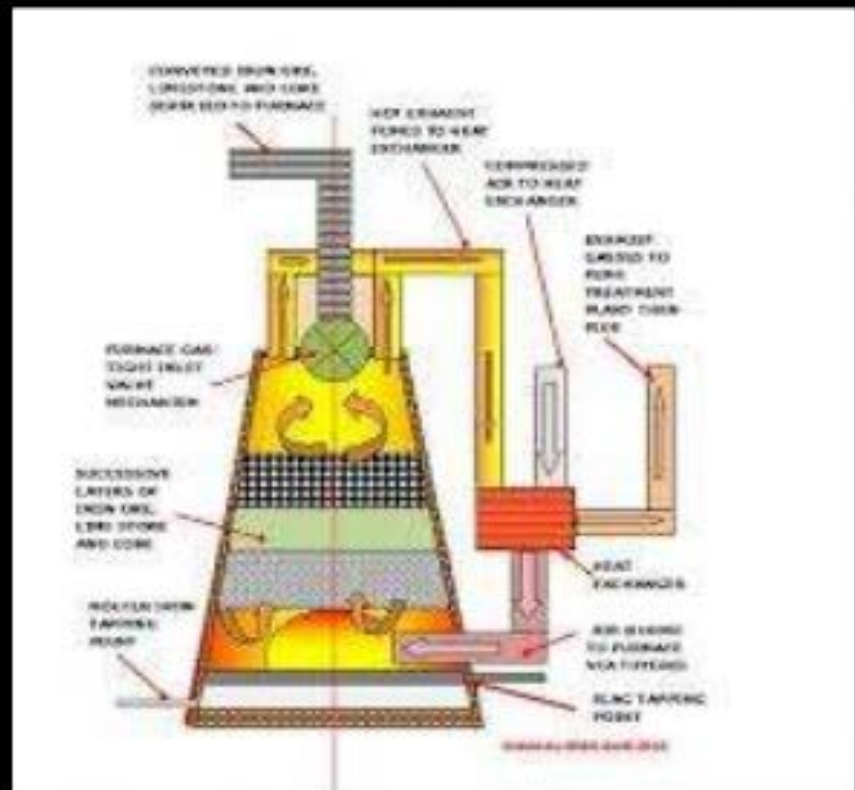
No reducing agent is used. Matte and slag is used

# Blast furnace

- Lead is usually smelted in a blast furnace using the carbon
- As melting occurs, several layers form in the furnace
- The molten lead layer sinks to the bottom of the furnace
- A layer of the lightest element, including arsenic and antimony floats to the top and its referred to as the “speiss”



CALCINATION



SMELTING

# Reverberatory furnace

- It is used for
  - ✓ smelting
  - ✓ refining
  - ✓ melting
- The fuel is not in direct contact with the contents but heats it by flame blown over it from another chamber



- The primary mode of heat transfer is through radiation from the refractory brick walls to the metal
- The convective heat transfer also provides additional heating from the burner to the metal

- Less active heavy metals of oxides are unstable
- The sulphide ore of mercury gives the metal rather than its oxide
- Roasted in the absence of air the sulphides and the oxides formed react to give the metal

- Advantages

- low operating
- high volume processing rate
- maintenance costs

- Disadvantages

- high metal oxidation rates
- low efficiencies
- large floor space requirements



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