Zone refining & Mond processs

PREREQUISITE

- Metallurgical process
- Purification methods

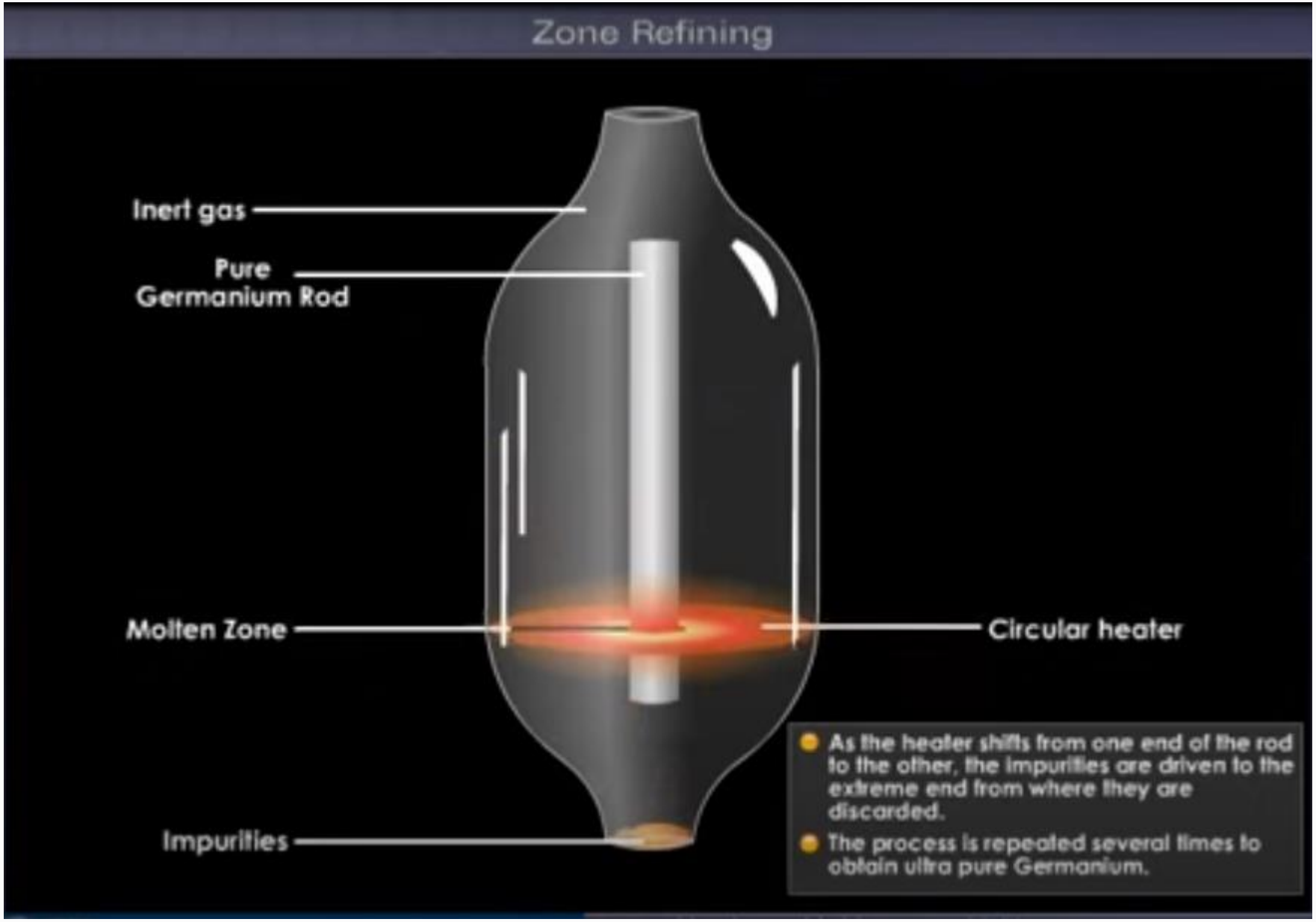
LEARNING OUTCOMES

- Knowledge of purifications process like zone refining and Mond process.

- Knowledge of steps and reactions involved in these process

Zone refining

The principle of zone refining is that the impurities in an ingot or ore of metal are more soluble in the melt state when compared to the corresponding solid state of the impurities.


Zone Refining
Inert gas
Pure
Germanium Rod
Molten Zone
Circular heater
Impurities
As the heater shifts from one end of the rod to the other, the impurities are driven to the extreme end from where they are discarded.
The process is repeated several times to obtain ultra pure Germanium.

Mond's process

- This process converts nickel oxides into nickel metal with very high purity.
- Nickel reacts with CO to form a volatile compound which gets decomposed at high temperature to give pure Nickel.

This process has three steps:

1. Nickel oxide reacts with syngas at 200 °C to give nickel, together with impurities including iron and cobalt.

$NiO(s) + H2(g) \rightarrow Ni(s) + H2O(g)$

2. The impure nickel reacts with carbon monoxide at 50–60 °C to form the gas nickel carbonyl, leaving the impurities as solids.

$Ni(s) + 4\ CO(g) \rightarrow Ni(CO)4$

. The mixture of nickel carbonyl and syngas is heated to 220–250 °C, resulting in decomposition back to nickel and carbon monoxide:

$Ni(CO)4(g) \rightarrow Ni(s) + 4\ CO(g)$

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Thank you