

Materials and Energy balance in Metallurgical Processes - Video course



NP-TEL

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Metallurgy and Material Science

COURSE OUTLINE

Introduction, Relationship between energy balance, energy conservation and environment; Dimensions, units and conversion factors; Stoichiometry; Principles of calculations; Sampling and measurements.

Principles of materials and energy balance; Laws of thermodynamics, Thermochemistry, and illustration of the concepts with suitable example, Fundamental Principles of metal extraction and refining and combustion, carbonization and gasification.

Set up of material balance problems in mineral processing unit operations, Set up and illustration of energy balances in various unit processes like calcinations, sintering, roasting, smelting, converting, refining, gasification, carbonization, Case studies: Energy balance of a reheating furnace, rotary kiln ,etc, Integration of energy balance with clean development mechanism with an illustration.

COURSE DETAIL

S.No	Topics and contents	Number of Lectures
1.	Introduction, Relationship between energy balance, energy conservation and environment.	1
2.	Dimensions, units and conversion factors.	1
3.	Stoichiometry; Principles of calculations.	2
4.	Sampling and measurements.	1
5.	Principles of materials and energy balance; Laws of thermodynamics, Thermochemistry and illustration of the concepts with suitable example.	4
6.	Fundamental Principles of metal extraction and refining and combustion, carbonization and gasification.	6
7.	Set up of material balance problems in mineral processing unit operations.	5
8.	Set up and illustration of energy balances in various unit processes like calcinations, sintering,	14

Pre-requisites:

Thermodynamics course.

Additional Reading:

1. R. Schumann: Met. Engg. Principles.
2. P. Mullinger and B. Jenkins: Industrial furnaces.

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	roasting, smelting, converting, refining, gasification, carbonization etc.	
9.	Case studies: Energy balance of a reheating furnace, rotary kiln ,etc.	6
10.	Integration of energy balance with clean development mechanism with an illustration.	2
	Total number of lectures	42