

MLPC2004 SURFACE PHENOMENON AND FROTH FLOTATION (3-0-0)

Course Objective:

1. To learn the scope and principle of froth flotation
2. To learn about various types of flotation reagents and equipment

Module I (6 hrs)

Scope and principle of froth flotation. Overview of the properties of solid-liquid, solid-gas and gas-liquid interfaces, Adsorption theories, Surface characteristics and analysis. Electrical Characteristics of Interfaces. Electrical Double Layer and Zeta Potential.

Module-II (6 hrs)

Contact angle: its role in froth flotation. Froth stability, Hydrophobicity and bubble mineralization, Mechanism of collector and frother action, conditioning.

Module III (6 hrs)

Different types of frothers and collectors. Activators, depressants, pH regulators and modifiers. Interaction of the different reagents in froth flotation.

Module IV (6 hrs)

Froth flotation machines: Mechanical, pneumatic and other types of flotation cells, Electroflotation, Design of aeration devices, impellers, casings and air flow rates. Flotation Kinetics, The effects of the reagents, cell design and mode of operation on the flotation rates. Estimation of residence time and total cell volumes required.

Module V (6 hrs)

Design and operation of froth flotation circuits. Rougher, scavenger, cleaner and recleaner operations with examples. Pulp density in froth flotation. Froth depth, bias rate and gas hold-up. Estimation of the effects of the circulating load in the froth flotation circuits, Release Analysis.

Text Books:

1. A. M. Gaudin, Froth Flotation, McCraw-Hill
2. S. R. Rao, Surface Chemistry of Froth Flotation (Revised edition), Springer Science + Business Media

Reference Books:

1. B. A. Wills and Tim Napier Munn, Mineral Processing Technology, Elsevier 2006
2. Jain, S.K., Ore Processing, Oxford – IBH Publishing, 1984.
3. Taggart, A.F., Handbook of Mineral Dressing, John Wiley and Sons, New York, 1990.

Course Outcome:

- CO1: To understand the concept of froth flotation for processing of mineral
CO2: To explore the working principle of various reagents used in froth flotation
CO3: To study the various types of reagents used in froth flotation
CO4: To analyze the concept of laboratory and industrial flotation process
CO5: To apply the concept of froth flotation process in designing and operation in mineral industry