

CH355: MASS TRANSFER – II

CREDITS = 6 (L = 4, T=0, P = 2)

1. **LIQUID-LIQUID EXTRACTION:** Phase equilibriums & solvent selection. Theoretical stages; single stage, cross-current and counter-current extraction; calculations with and without reflux for immiscible and partly miscible systems, packed, plate and other contacting equipments and their designs, industrial applications. 10 Hours
2. **LEACHING:** Preparation of solids, Unsteady state operation, Counter current multiple contact; the shanks system, percolation in closed vessel, Filter press leaching, agitated vessels, leaching equipments, Continuous counter current decantation and its equipments, Stage efficiency, practical equilibrium, Single stage leaching, multistage cross current leaching, multistage counter current leaching. 8 Hours
3. **ADSORPTION:** Types of adsorption, adsorption equilibria, adsorption isotherm, stage wise and continuous adsorption, rate of adsorption & fixed beds, fluidized adsorbers, ion exchange. 10 Hours
4. **CRYSTALLIZATION:** Mires theory; yield of crystallization; types of equipment; fractional crystallization; solubility and phase diagrams; nucleation and crystal growth; industrial applications. 6 Hours
5. **DRYING:** General, mechanism of drying, constant and fall in frate period. Critical and Equilibrium moisture contents. Equipments – Batch Dryers, Continuous dryers. Design methods. Rotary dryers, Agitated dryers, Fluidized bed dryer. 6 Hours

REFERENCE BOOKS

Title: Mass Transfer Operations
Author: R E Treybal
Publisher: Tata McGraw Hill

Title: Mass Transfer Opeations
Author: Binay K Dutta
Publisher: PHI

Title: Unit Operations in Chemical Engineering
Author: McCabe & Smith
Publisher: Tata McGraw Hill

Title: Transport Processes & Unit Operations
Author: Geankopils C

Publisher: PHI

LIST OF EXPERIMENTS

1. To study the rate of adsorption of acetic acid over a fixed bed of activated carbon and regeneration of wave curve (S-curve) or breakthrough curve.
2. To study the rate of adsorption of moisture over a fixed bed of silica gel and generation of wave curve.
3. To determine the percentage recovery of acetic acid using water as a solvent for three stage cross current extraction.
4. To calculate the percentage yield of crystal obtained with and without seeding of the soluble in its super saturated solution.
5. To study and obtain rate of drying curve for a given sample and to find out initial and equilibrium moisture content. (Tray dryer)
6. To study the effects of quantity of solvent used and time of contact between solid and liquid phase for cross current leaching operation.
7. To study the rate of drying curve for a given sample of solid material (sand) and find out initial and final moisture content for a vacuum dryer.
8. To determine the hold up and the average time of retention of solid in a rotary dryer.
9. To calculate the yield of crystal obtained with and without seeding for the continuous crystallization.
10. Study of the Adsorption isotherm (Langmuir and Freundlich) in Batch system.