

# AMPE08 MASS TRANSFER

## UNIT-1 ABSORPTION

- 1.1 Gas Absorption and Stripping
- 1.2 Equilibrium; material balance; limiting gas-liquid ratio; tray tower absorber
- 1.3 Calculation of number of theoretical stages, tray efficiency, tower diameter; packed tower absorber- rate based approach;
- 1.4 Determination of height of packing using HTU and NTU calculations.

## UNIT-2 DISTILLATION

- 2.1 Vapour liquid equilibria- Raoult's law, vapor-liquid equilibrium diagrams for ideal and nonideal systems, enthalpy concentration diagrams.
- 2.2 Principle of distillation- flash distillation, differential distillation, steam distillation,
- 2.3 Multistage continuous rectification, Number of ideal stages by McCabe
- 2.4 Thiele method and Ponchan - Savarit method, \
- 2.5 Total reflux, minimum reflux ratio,
- 2.6 Optimum reflux ratio.
- 2.7 Introduction to multi-component distillation,
- 2.8 Azeotropic and extractive distillation

## UNIT-3 LIQUID-LIQUID EXTRACTION

- 3.1 Liquid - liquid extraction - solvent characteristics-equilibrium stage wise contact calculations for batch and continuous extractors
- 3.2 Differential contact equipment-spray,
- 3.3 Packed and mechanically agitated contactors and their design calculations-packed bed extraction with reflux.
- 3.4 Pulsed extractors, centrifugal extractors-Supercritical extraction

## UNIT-4 LEACHING

- 4.1 Solid-liquid equilibria- leaching equipment for batch and continuous operations
- 4.2 Calculation of number of stages
- 4.3 Leaching - Leaching by percolation through stationary solid beds,
- 4.4 Moving bed leaching, counter current multiple contact (shank's system),
- 4.5 Equipment's for leaching operation,
- 4.6 Multi stage continuous cross current and counter current leaching, stage calculations, stage efficiency.

## UNIT-5 ADSORPTION AND ION EXCHANGE & MEMBRANE SEPARATION PROCESS

- 5.1 Adsorption- Types of adsorption, nature of adsorbents, adsorption equilibria,
- 5.2 Effect of pressure and temperature on adsorption isotherms,
- 5.3 Adsorption operations - stage wise operations,
- 5.4 Steady state moving bed and unsteady state fixed bed adsorbents, break through curves.

- 5.5 Principle of Ion exchange, techniques and applications.  
5.6 Solid and liquid membranes; concept of osmosis;  
5.7 Reverse osmosis; electro dialysis; ultrafiltration.

**References Books:**

1. Seader, J.D. and E.J. Henley, "Separation Process Principles", 2nd Ed., John Wiley, 2006.
2. McCabe, W.L., Smith, J.C., and Harriot, P., "Unit Operations in Chemical Engineering", 7th Edn., McGraw-Hill, 2005.
3. King, C. J., "Separation Processes", 2nd Edn., Tata McGraw-Hill 1980.

