

PCE3I001 CHEMICAL PROCESS CALCULATIONS

Module I:

Units & dimensions, Ideal gas laws, equation of state, Vapor pressure, Clausius-Clapeyron equation, Ideal and non-ideal solutions, humidity-relative saturation & percentage saturation, concept of wet & dry bulbs thermometer, use of Humidity chart.

Module II:

The chemical equation & stoichiometry, concept of limiting & excess reactants, conversion, degree of conversion, yield etc.

Material balances & unit operations: drying, crystallization dissolution, combustion, etc. Solving material balance (steady and unsteady state processes) without and with chemical reactions, recycle, bypass, & purge calculations.

Module III:

Energy balance concepts: Heat capacity, Calculation of enthalpy changes without change of phase, Energy balance with chemical reaction, Standard heat of reaction at constant pressure & constant volume, effect of T and P on heat of reaction, Adiabatic reaction of temperature, heat of solution & mixing.

Text Books:

1. *Stoichiometry and Process Calculations* by B Lakshmikutty and K V Narayanan, PHI.
2. *Stoichiometry*, 5th ed. by B I Bhatt and S B Thakore, McGraw-Hill.

References Books:

1. *Elementary Principles of Chemical Processes*, 3rd ed. by R M Felder and R W Rousseau, John Wiley.
2. *Chemical Process Principles: Material and Energy Balances (Part - 1)*, 2nd ed. by O A Hougen, K M Watson, and R A Ragatz, CBS.
3. *Principles of Chemical Engineering Processes* by N Ghasem and R Henda, CRC.
4. *Basic Principles and Calculations in Chemical Engineering*, 8th ed. by D M Himmelblau and J B Riggs, PHI.