

CH402 CHEMICAL REACTION ENGINEERING – II

Credits: 5 (L = 4, P = 2)

(Pre-requisite: None)

Course Details:

Detail 1:

Kinetics of heterogeneous reactions- adsorption, physisorption and chemisorption, Langmuir and Freundlich adsorption isotherm, B.E.T equation, Langmuir and Hinshelwood rate equations for solid catalyzed gas reactions; external and internal transport processes. Effectiveness factors for heterogeneous reactions; Gas - solid catalytic reactor design, isothermal and non - isothermal conditions, fluidized bed reactors, slurry and trickle bed reactors; thermal stability of reactors; novell reactors.

Detail 2:

Non-catalytic gas-solid reactions - Ash diffusion, Gas film and reaction control regimes; evaluation of kinetic rate in different regimes; flow pattern and design of gas-solid reactors like packed bed, fluid bed, moving bed reactors

Detail 3:

Liquid-liquid and gas-liquid reactions- kinetics and controlling regimes; film conversion parameter, kinetic regime determination from solubility and experiments; design of towers for fast and slow reactions. Selection of Equipments for Gas-liq reations.

Detail 4:

Catalyst deactivation- mechanism and rate of catalyst deactivation, experimental determination catalyst decay; parallel, series and side-by-side deactivation of catalyst; application of decay kinetics in design.

Reference Books:

Chemical Reactions Engineering:

Wiley Eastern

Octave Levenspiel

Chemical Engineering Kinetics - 2nd ed:

Mc Graw Hill

J M Smith

Elements of Chemical Reaction Engineering:

PHI

Fogler. H