

PCH 105 CHEMICAL ENGINEERING LAB I

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Course Objective:

To learn chemical engineering principles and their practical applications in the areas of mass transfer, reaction engineering and particle mechanics.

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Fluid and Particle Mechanics	
1.	To study the power consumption in an agitated vessel for different impellers
2.	To carry out size analysis of solids sample using sieve shaker
3.	To conduct sedimentation study on particle suspension in water
4.	To study the liquid-solid fluidization phenomena
5.	To study the filtration operation and determine specific cake resistance
6.	To determine friction factor in a randomly packed bed
Mass Transfer Operations	
7.	To determine the diffusion coefficient of an organic vapor in air
8.	To determine gas film coefficient for air water system in a wetted wall column
9.	To determine mass transfer coefficient for absorption with chemical reaction in a packed bed
10.	To calculate HETP and HTU for packed distillation column operating under total reflux
11.	To study the drying characteristics of a solid under forced draft conditions
12.	To study pressure drop and tower characteristics for various flow rates in a counter current forced draft cooling tower
Chemical Reaction Engineering	
13.	To study the kinetics of a non-catalytic homogeneous reaction in a batch reactor
14.	To study the kinetics of a non-catalytic homogeneous reaction in a plug flow reactor
15.	Study of a non-catalytic homogeneous reaction in a semi-batch reactor
16.	To study residence time distribution (RTD) characteristics in a packed bed reactor
17.	To study residence time distribution (RTD) characteristics in a CSTR
18.	To study the kinetics of first order decomposition of diacetone alcohol using dilatometer

Course learning outcome (CLOs):

The students will be able to

1. plan experiments and present the experimental data meaningfully
2. apply theoretical concepts for data analysis and interpretation
3. calculate the design parameters related to fluid and particle mechanics, and mass transfer operations
4. understand the experimental procedures related to chemical reaction engineering

Recommended Books:

1. McCabe, W.L., Smith, J.C., and Harriot, P., *Unit Operations of Chemical Engineering*, McGraw-Hill, (2005).
2. Richardson, J.F., Harker, J.H. and Backhurst, J.R., *Coulson and Richardsons Chemical Engineering, Vol. 2*, Butterworth-Heinemann (2007).
3. Treybal, R.E., *Mass Transfer Operations*, McGraw Hill (1980).
4. Fogler, H.S., *Elements of Chemical Reaction Engineering*, Prentice Hall of India (2003).
5. Levenspiel, O., *Chemical Reaction Engineering*, John Wiley & Sons (1998).

Evaluation Scheme:

S. No.	Evaluation Elements	Weightage (%)
1.	Continuous evaluation (Assignments/Micro Projects/Quizes)	50
2.	Lab Evaluation (Viva-voce/record/performance)	50