

UG	Department: <b>Chemical Engineering</b>
Course Code: <b>CHP311</b>	Course Name: <b>Chemical Reaction Engineering Lab</b>
Credit: <b>2</b>	L-T-P: <b>0-0-3</b>
Version: <b>1</b>	Approved on:

Prerequisite Course: **CHT204 Chemical Reaction Engineering-I**

**At least Seven Experiments need to be done from the following:**

**EXPERIMENT: 1:** Study of a non-catalytic homogeneous reaction between sodium hydroxide and ethyl acetate in a Batch Reactor and to determine: (i) Order of reaction, (ii) Rate constant k, and (iii) Effect of temperature on k and determine activation energy E.

**EXPERIMENT: 2** Study of a non-catalytic homogeneous reaction between sodium hydroxide and ethyl acetate in a Plug Flow Reactor between and to determine: (i) Order of reaction and (ii) Rate constant k

**EXPERIMENT: 3** Study of a non-catalytic homogeneous reaction between sodium hydroxide and ethyl acetate in a series of three CSTRs and to draw the performance chart for the reactor system and evaluate the rate constant at ambient temperature.

**EXPERIMENT: 4** Study of a non-catalytic gas solid reaction for the decomposition of  $\text{CaCO}_3$  in air in a Muffle Furnace and to record the decomposition-time data for calcination of  $\text{CaCO}_3$  particles and find out a suitable model for the reaction.

**EXPERIMENT: 5** Characterization of the given sample of Adsorbent/Catalyst and to determine its (i) Bulk density and (ii) Pore volume

**EXPERIMENT: 6** Study of the behaviour of a given CSTR/ Packed Bed Reactor/ CSTRs in series by using pulse input and step input of a tracer and determine (i) Mean residence time, (ii) Variance, (iii) Dispersion no., and (iv) Dispersion coefficient.

**EXPERIMENT: 7** Study of the kinetics of hydrolysis of ethyl acetate in a Packed Bed Recycle Reactor filled with ion exchange resin and to determine the effect of recycle ratio on the conversion.

**EXPERIMENT: 8** Study heterogeneous catalytic hydrolysis of ethyl acetate using ion exchange resin in a Spinning Basket Reactor and determine (i) Reaction rate constant (ii) Study the effect of Mass Transfer.

**EXPERIMENT: 9** Study of the kinetics of photocatalytic oxidation of formic acid in a UV Reactor and to determine the rate constant of reaction

**EXPERIMENT: 10 (Small Project)** Propose an experiment based on any of the existing experimental set up of CRE Lab. or a combination of the same.

**EXPERIMENT: 11 (Small Project)** Propose an experimental set up (with as much details as possible) along with a suitable experiment, which is not presently existing in CRE Lab.

### Books

1. Levenspiel, O., "Chemical Reaction Engineering," 3<sup>rd</sup> ed., John Wiley, 1999.
2. Fogler, H. S., "Elements of Chemical Reaction Engineering," 3<sup>rd</sup> ed., Prentice-Hall of India, Delhi, 2003.
3. Smith, J. M., "Chemical Engineering Kinetics," 3<sup>rd</sup> ed., McGraw-Hill, 1981.
4. Carberry, J. J., "Catalytic Reaction Engineering," McGraw-Hill, 1976.