Course Title: Chemical Kinetics

Course Code: CH-806

Credit Hours: 3-0

Prerequisite: Nil

Course Objectives

Students will acquire knowledge and learn about reaction dynamics and kinetic theories. They will also know about the factors which can influence the rates of reactions under different reaction conditions.

Course Outcomes

After having completed the course, the candidates will be able to conclude about the reaction kinetics and the laws governing this kinetics. They will be able to develop the reaction mechanisms, thermodynamically and kinetically.

Course Contents

Correlation between physical properties and concentration. Some basic terminologies. Kinetics of the reversible reactions. Kinetics of the parallel reactions. Kinetics of the consecutive bimolecular reactions. Kinetics of the chain reactions. Kinetics of the opposing reactions. Kinetics of Photochemical Reactions. Kinetics of Polymerization. Kinetics of Catalyzed Reactions. Acid-Base catalyzed reactions. Enzyme catalyzed reactions. Step Growth Polymerization. Chain Growth Polymerization. Lindemann's theory of unimolecular reactions. Bimolecular collision theory. Transition state theory. Characteristics of transition state theory. Comparison of collision and absolute reaction theories. Thermodynamic formulation of reaction rates. Calculation of entropy and enthalpy changes. Thermal decomposition of nitrogen pentaoxide. Influence of ionic strength on the reaction rate. Effect of dielectric constant of the medium on the rate of the reaction. Single sphere activated complex model. Double sphere activated complex model. Single chain carrier with second order breaking. One chain carrier with first order breaking. Two chain carrier with second order breaking. Experimental techniques for fast reactions. Reactions in Solution. Effect of Solvent in Solution Kinetics.

Recommended Books

1. Atkins, P. and Paula, J. D., Atkin's Physical Chemistry, 9th ed., Oxford University Press, (2010).

2. Santosh K. Upadhyay, Chemical kinetics and reaction dynamics, Springer, (2006)

3. Laidler, K. J., Chemical Kinetics, 3rd Edition, Prentice Hall. (1987)

4. Frost, A. A., and Pearson, R. G., Reaction Mechanism, 2nd Edition John Wiley and sons, Inc. (1961)

5. Espenson, J. H., Chemical Kinetics and Reaction Mechanism 2nd ed., McGraw-Hill, London (2002).