

# AMSF-09 REACTION ENGINEERING AND CHEMICAL TECHNOLOGY

## UNIT-1 CLASSIFICATION OF REACTIONS

- 1.1 Variables affecting rate of reaction, definition of reaction rate.
- 1.2 Kinetics of homogeneous reactions- concentration dependent term of a rate equation, temperature dependent term of a rate equation,
- 1.3 Theories of reaction- collision theory, transition theory, Arrhenius equation.
- 1.4 Analysis of experimental reactor data, evaluation of rate equation, integral and differential analysis for constant variable volume system, fitting of data complex reaction mechanism.

## UNIT-2 IDEAL REACTORS

- 2.1 Design for homogeneous systems, batch, stirred tank and tubular flow reactor,
- 2.2 Design of reactors for multiple reactions, combination reactor system, size comparison of reactors.
- 2.3 Elementary ideas of non-ideal reactor performance, residence time distribution.
- 2.4 Types of fermenters and bioreactors. Enzymes- mechanism of enzyme action,
- 2.5 Introduction to enzyme kinetics, Michaelis– Menten kinetics, methods of enzyme immobilization.

## UNIT-3 INORGANIC CHEMICAL TECHNOLOGY

- 3.1 Chlor- alkali industries- soda ash-caustic soda-chlorine hydrochloric acid.
- 3.2 Manufacture of sulphuric acid. Phosphorous industries- phosphoric acid-wet process phosphoric acid, electric furnace phosphoric acid, single super phosphate and triple super phosphate.
- 3.3 Nitrogenous industries ammonia, nitric acid, urea, ammonium sulphate, ammonium phosphate. (Only the processes currently in use in industries need be covered)

## UNIT-4 ORGANIC CHEMICAL TECHNOLOGY

- 4.1 Manufacturing processes for pulp and paper, sugar, industrial alcohol by fermentation- absolute alcohol, beers, wines, oils and fats, soaps and detergents, agrochemicals,
- 4.2 Introduction to polymers, synthetic rubbers- SBR, neoprene, urethane rubbers. (Only the processes currently in use in industries need be covered)

### References Books:

1. O. Levenspiel, Chemical Reaction Engineering, John Wiley & Sons,
2. M.Gopal Rao & M.Sittig(Eds), Dryden's Outlines of Chemical Technology , Affiliated East West Press
3. Michael L. Shuler and Fikret Kargi, Bioprocess Engineering: Basic Concepts, Prentice-Hall of India, 2002.
4. G.T.Austin(Ed), Shreve's Chemical Process Industries, McGraw-Hill Book Company.