

INTER - DEPARTMENT ELECTIVES OFFERED TO OTHER DEPARTMENTS

19CHEE215-1: APPLIED CHEMISTRY

Learning Objectives

To enable the students to have knowledge about the basics aspects of chemistry

UNIT I

Concept and scope of environmental Chemistry. Environmental segments. Lithosphere, Hydrosphere. Atmospheric reactions. Chemical species and particles present in the atmosphere. Formation of ozone in the stratosphere. Natural cycles of environment, Hydrological oxygen, Nitrogen, Phosphorous, Carbon and Sulphur cycles, Radio nuclides in the environment.

UNIT II

Air pollution, classification of air pollutants, acid rain – photochemical smog, particles, sources of important air pollutants man and the environment, Meteorology and air pollution – Precipitation and humidity – air quality standards

UNIT III

Water pollution - classification of water pollutants organic wastes, oxygen demanding wastes. Disease causing wastes-sewage and agricultural run-off water. Inorganic pollutants Character of waste water. Elementary idea of waste water, sedimentation, coagulation chemistry of aerobic and anaerobic processes. Activated sludge, Evaporation, ion exchange adsorption, chemical precepitation.

UNIT IV

Water, boiler feed water, its specifications. Removal of suspended and colloidal impurities, removal of silica and oil, removal of dissolved gases. Injuries due to hazardous chemicals - fire extinguishers.

UNIT V

Preliminary study and application of the following – Fuels, Cement, Glass, Polymers Rubber Paints, Refractories, Ceramics, Oils, Fats, Soaps and Detergends.

Text Books

- 1) A. K. De, Environmental Chemistry, Wiley Eastern, 1990.
- 2) S. S. Dara, A text book of Environmental Chemistry and pollution control, S. Chand & co Ltd.,
- 3) N. Manivasakam, Physico – Chemical examination of water, sawage and industrial effluents.

19CHEE315-1: BASIC CHEMISTRY

Learning Objectives:

To enable the students to have knowledge about the various types of isomerisms in organic compounds. Kinetics and thermodynamic aspects of biological reactions and spectroscopic methods used in the study of biomolecules.

Unit-I: Isomerism in Organic Compounds

Types of Isomerism. Tautomerism with special reference to purines. Stereoisomerism. Geometric isomerism with special reference to fumaric and maleic acids. E – Z notation. Optical isomerism, optical activity, enantiomers, diastereomers. Meso and d, l forms. R – S and D – L notation in amino acids and sugars. Conformational analysis, conformation of ethane, butane and cyclohexane.

Unit – II: Thermodynamics

Thermodynamics – basic concepts. First, second and third laws of thermodynamics – enthalpy and entropy, exothermic and endothermic reactions. Free energy – standard free energy. Temperature and pressure dependence of free energy. Equilibrium for biochemical reactions. High energy phosphates and free energy. Redox reactions and free energy changes in biological reactions.

Unit – III: Chemical kinetics

Chemical kinetics – Rate of reactions – first order and second order reactions. Rate of equilibrium and multistep processes. Activation energy and effect of catalysts on reactions.

Unit – IV: Spectroscopy I

Ultraviolet visible spectroscopy. Beer – Lambert law. Chromophores – bathochromic and hypsochromic shifts. Fluorescence, phosphorescence. Fluorescence quenching. Basic principles of IR spectroscopy and mass spectroscopy and their biological applications.

Unit – V : Spectroscopy II

Basic principles of NMR spectroscopy, FT NMR ^1H NMR spectra, chemical shift and coupling constant. ^1H NMR spectra of simple organic molecules. Spin decoupling. Nuclear Overhauser effect. Detection of nuclear Overhauser effect by using NOESY spectrum. Applications of ^1H NMR in the study of biomolecules.

Text Books:

1. Concise Inorganic Chemistry, J. D. Lee, Blackwell Science Ltd., London(1999).
2. Principles of Inorganic Chemistry, Puri, Sharma and Kalia, Shoban Lal Nagin Chand & co, New Delhi(1995).
3. Quantitative analysis, R.A. Day and A. L. Underwood, prentice Hall,1999.

4. Descriptive Inorganic Chemistry. Geoff Rayner – Canham, 11nd edition, Freeman company, 1999.

19CHEE315-2: INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

Learning Objectives:

The objective of the course is to develop knowledge in instrumental methods of chemical analysis, understand basic principles, instrumentation and simple applications of spectrochemical, electrochemical, techniques for the application of biology and agriculture.

Unit I: Atomic spectroscopy

Principle of atomic absorption spectroscopy, flame photometry, EDX and elemental analysis.

Unit II: Structure Determination

Basic idea on x-ray crystallography, Single crystal structure solving, Structure determination using mass and NMR techniques.

Unit III: Separation Techniques

Solvent extraction-ion-exchange method-principle of chromatography-column, thin layer and gas chromatography, principle methodology and simple applications, elementary idea about HPLC and GC.

Unit IV: Spectrochemical Techniques

Absorption of light - Beer's law – UV - Visible and IR spectrophotometry - principle instrumentation and simple applications in Biology.

Unit V: Electroanalytical Techniques

Basic principles and instrumentation of Cyclic voltammetry, conductometry, potentiometry - simple applications in biology and environment.

Text books:

1. Instrumental methods of chemical analysis, G. Chatwal and S. Anand, Himalaya Publishing House, New Delhi, 1999.
2. H.W. Willard, L.I. Merrit, J.A. Dean and P.A. Settle, Instrumental Methods of Analysis, CBS Publishers, 7th Edn., 1996.