OC E 466: ENVIRONMENTAL, ELECTRO AND POLYMER CHEMISTRY

Course Outcome

- It is an elective course offered to students from disciplines other than chemistry.
- It aims at enhancing their general understanding of chemistry. Few important topics such as sources and detection of air pollution, batteries as power sources, devices of solar energy conversion.
- It enables to understand polymers used in day to day life and their medical and technical applications.
- It creates awareness of plastic pollution and technique of plastic waste management.

UNIT-I **[12 Hours]**

Environmental segments, evolution of earth's atmosphere. Air pollution: Air pollutants, prevention and control, Greenhouse gases and acid rain. Carbon monoxide, industrial sources and transportation sources. SO_x- sources, ambient concentration, test methods, control techniques - scrubbing, limestone injection process. Ozone hole and CFC's. Photochemical smog and PAN. NO_x - Sources, ambient concentration, test methods, thermodynamics and NO_x, control techniques. Particulates: Size distribution, particulate collection - settling chambers, centrifugal separators, wet scrubbers, electrostatic precipitators & fabric filters. Catalytic converters for mobile sources. Bhopal gas tragedy.

UNIT-II **[12 Hours]**

Corrosion: Introduction, consequence, type, prevention, & measurement. Conventional sources of energy, limitations, Importance of storage, Battery-Electrodes, Cell, battery Brief account of primary, secondary, lithium battery and fuel cells. Semiconductor electrodes and Solar energy system.

Introduction to bio-electrochemistry, electrochemical communication in biological organisms. Theory and applications of Electroplating and electroless plating.

Reaction Kinetics: Theory and applications of different types of reactions-Oscillatory, chain reaction, branched chain reaction. Energy of activation and thermodynamic parameters, Collision theory of reaction rates limitations and basics of transition state theory.

UNIT-III **[12 Hours]**

Polymers: Introduction-Basic concepts and classification of polymers, Molecular weight and its distribution, Chemistry of polymerization-Step, chain, Coordination, Copolymerization.

Polymerization techniques-bulk, solution, suspension, emulsion, poly-condensation, solid and gas phase polymerization. Chemical and geometrical structure of polymer molecules, Structure-property relationship-Physical, Thermal and mechanical properties.

Synthesis, properties, structural features and applications of some important commercial polymers (PE, PP, PS, PVC, PMMA, PET, Nylon-6, Nylon-6,6), Engineering polymers (Kevlar, Nomex, ABS, PC, Teflon). Applications of polymers in separations: reverse osmosis, ultra and nano-filtration.

Applications in electronics- conducting polymers and electronic shielding, Applications of polymers in medicine.

Management of plastics in environment-recycling, incineration and biodegradation.

References

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5. Chemical & Electrochemical Energy Systems, R. Narayan & B. Viswanathan, University Press (1998).
6. Industrial Electrochemistry, D. Peltcher and F. C. Walsh, Chapman & Hall (1990).
7. Text book of Polymer science, 3rd edn., F. W. Billmeyer, Wiley-Interscience Publication, New York (2005).
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