OC E 456: 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,
- Polymers used in day to day life and for medical and technical applications will be taught.
- 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, Green house 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 hrs]

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. 7 hrs

Introduction to bio electrochemistry, electrochemical communication in biological organisms.

Theory and applications of Electroplating and electroless plating. 7hrs.

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.

5 hrs

UNIT- III [12 hrs]

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 6hrs

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. 6hrs

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4. An Introduction to metallic corrosion and its prevention-Raj Narayan (Oxford-IBH, New Delhi), 1983.
5. Chemical& Electrochemical Energy Systems, R. Narayan & B. Viswanathan (University Press), 1998.
6. Industrial Electrochemistry, D. Peltcher & F. C. Walsh (Chapman & Hall)1990.
7. F.W. Billmeyer, Text book of Polymer science, 3rd Edn, A Wiley- Interscience Publication, New York, 2005
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