



STANLEY
COLLEGE OF ENGINEERING & TECHNOLOGY FOR WOMEN
(Approved by AICTE , New Delhi | Affiliated to Osmania University ,Hyderabad)
Address : Chapel Road, Abids ,Hyderabad

Engineering Chemistry Theory (CH 101)

(Common to all Branches- B.E.1/4- 2015-16 Batch)

UNIT 1:

ELECTRODES - Introduction of electrochemistry, Electrochemical cells- electrolytic and galvanic cells. Cell notation. Concept of electrode potential and EMF. Determination of single electrode potential. Electrochemical series and its significance. Nernst equation and its derivation, applications.

Types of electrodes

- a) a) gas electrode(S.H.E)
- b) b) metal insoluble salt electrode(calomel electrode).
- c) c) redox electrode(quinhydrone electrode)
- d) d) ion selective electrode(glass electrode) Numerical problems.

BATTERY CHEMISTRY - Concept of reversible and irreversible cells. definitions of primary and secondary and flow batteries. Zinc-Ago, Ni-Cd, Li-ion batteries- construction, working and application. (Flow batteries) Fuel cells, Methanol – Oxygen, hydrogen-oxygen fuel cells.

ELECTROANALYTICAL TECHNIQUES - Principle, Method and Applications of

- 1) Conductometry: Acid –Base titrations.
- 2) Potentiometry: Acid-Base and Redox Titrations.
- 3) pHmetry: Acid – Base titrations.

UNIT 2:

CORROSION AND ITS CONTROL-Causes and effects of corrosion, chemical(dry) corrosion. Electrochemical(wet) corrosion-Mechanism of it. Formation of anodic and cathodic areas, galvanic corrosion, differential aeration corrosion(waterline and pitting corrosion). Factors effecting the rate of corrosion – position of the metal in galvanic series, relative areas of anode and cathode, nature of corrosion product, temperature, humidity and pH-pourbaix diagram. Corrosion control methods- cathodic protection, sacrificial anode and impressed current methods.

SURFACE COATINGS-Types of metallic coatings- anodic and cathodic coatings. Methods of application of metallic coatings- electroplating(Nickel plating) &electroless plating (copper plating). Paints- constituents and their functions.

WATER CHEMISTRY-Hardness of water ,types of hardness, units of hardness. Determination of temporary & permanent hardness by EDTA method, problems. Alkalinity of water its determination. Water softening by ion exchange and reverse osmosis methods. Specification of potable water, disinfection of drinking water by chlorination-break point chlorination and ozonization. Boiler troubles, causes and effects

UNIT 3:

ENGINEERING MATERIALS

POLYMERS- Definition of the terms: monomer, polymers Degree of polymerisation.functionality of monomer.Nomenclature: homo- hetero and copolymers. Types of polymerization- addition , condensation and copolymerization- examples. Thermoplastics and thermosetting resins. Plastics: preparation, properties & uses of PMMA Teflon and Bakelite. Fibers: preparation, properties & uses of Kevlar and polyurethanes(Perlon-U). Rubbers/elastomers: natural rubber and its chemical structure, vulcanization-compounding, and its significance. Preparation, properties and uses of Buna-S and Silicone rubbers.

Conducting polymers: definition, classification into extrinsic and intrinsic polymers. Mechanism of conduction in polyacetylene, structure of polypyrrol and its doping, application of conducting polymers.

COMPOSITES: basics of composites, composition and properties of composites. types of composites-fiber reinforced: glass fiber and carbon fiber. advantages and applications.

UNIT4:

CHEMICAL FUELS-Fossil fuels- classification of fuels, primary , secondary- solid, liquid and gaseous fuels, requirements of good fuel . calorific value- HCV,LCV. determination of calorific value of gaseous fuels by junkers calorimeter .Theoretical calculation of calorific value by Dulong's formula-numerical. Combustion- . Calculation of air quantities by weight and volume required for combustion of a fuel. Numerical problems. Solid fuels: Coal and its ranking-analysis of coal, Proximate and Ultimate analysis. Liquid fuels: Fractionation of petroleum. Composition and uses of Gasoline, Diesel and Kerosene. Cracking & its significance-catalytic cracking by moving bed method, knocking. Fuel rating- Octane and Cetane numbers. Unleaded petrol- additives Automobile exhaust- catalytic converters. Gaseous fuels-LPG, CNG composition and uses.

BIODIESEL:-Sources, concept of trans esterification, properties and significance.

ROCKET FUELS:-Principles of rocket propulsion, characters. classifications.

UNIT5:

LIQUID CRYSTALS;-Introduction and classification of liquid crystals-thermotropic and lyotropic liquid crystals. Molecular ordering in liquid crystals. Nematic, smectic and cholestric liquid crystals and applicatons.

LUBRICANTS:definition and functions of lubricants.mechanism of lubrication. Boundary film,hydrodynamic and extreme pressure lubrication. Classification of lubricants:solid,semi solid and liquid lubricants. Properties of lubricants:saponification number and acid value.

PHASE RULE: definition of terms. phase, components and degree of freedom. Statement of phase rule. Phase rule equation for one component system –water system. Two component system-Ag-Pb system. Pattinsons desilverisation of lead. GREEN CHEMISTRY: Concept and principles of green chemistry and examples of clean technology.

Suggested Reading:

1. *Principles of Physical Chemistry* by Puri, Sharama and Pathania S.N., S.Chand & Co. New Delhi (Latest Edition)
2. *Engineering Chemistry* By P C Jain and M Jain. Dhanpat Rai & Sons (15th Edition), New Delhi
3. *Engineering Chemistry* By Sashi Chawla. Dhanpat Rai & Sons , New Delhi
4. *Engineering Chemistry* by O G Palanna, TMH, New Delhi
5. *Engineering Chemistry* by S S Dara, S Chand & Sons, New Delhi

Name Of The Faculty:

1. Dr.K.Nagi Reddy (Professor)
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