

Chemical Sensors and their Applications

Unit: I - Sensor

Sensor: - Definitions -types of sensors-chemical, physical and biosensor-Characteristics of sensor-fundamental setup of sensor (detector, transducer, signal processor and actuator)-Chemical sensor-Characteristics (Sensitivity, Selectivity, dynamic working range, limit of detection and response).Desired properties of Sensing materials.

Unit: II – Electrochemical Sensor

Electrochemical Sensors-Potentiometric, Conductometric and amperometric Sensors. Optical Sensors-optode- Fiber Optic Chemical Sensors, Fluorescence Fiber Optic Chemical Sensors, Absorption fiber optic chemical sensor and refract metric fiber optic chemical sensors.

Unit: III – ChemFED- Based Sensor

ChemFED-basedSensor-CapacitanceSensor-CatalyticSensor-acousticwavesensor-Flames Photometer-Ion Selective Electrode (ISE) - Principles, types, advantages, limitations and applications of Ion Selective Electrode- P^H electrode-difference between P^H and other ion selective electrodes -reference electrodes.

Unit: IV - Ion Detection by sensor

Determinations of Metal ions (K, Na, Rb, Ca, Pb, Ag) using Sensors-role of ionophore, chromoionophore, Crown ethers in the determination of alkali metal ions- list of ionophores act as a carrier for metal ions. Nanosensor and its applications.

Unit: V – Zeolites

Zeolites- occurrence, natural, artificial zeolite- Silica-aluminum ratio- low silica zeolite- high silica zeolite-moderate silica zeolite-synthesis of common zeolites -FAU, LTA, MOR, ZSM-5, BETA.IUPAC of some common zeolites-zeolite as molecular sieves. Applications of Zeolites: - adsorption, Separation, Ion exchange Capacity, Catalyst. Activity of zeolite with template materials-biological role-drug delivery-support materials for sensor.

References:-

1. Chemical Sensors-Fundamental of Sensing Materials-(volume:1)-Ghenadll Korotcenkov
2. Chemical Sensors and Biosensors- Brain R. Eggins
3. Hand book of Zeolite Science and Technology, edited by Scott.M.Auerbauch, Kathleen A.Carrado and Prabir K.Dutta.