SYLLABUS
SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
T.Y.B.Sc. Chemistry w.e.f. June 2022-2023
CH-611 (A), Semester - VI, Analytical Chemistry - II

(2 Credit 36 Lecture)

(8 Lecture)

1 Solvent extraction

Introduction to solvent extraction, organic phase, Partition the theory of extraction (distribution coefficient, Distribution ratio, solute remaining unextracted. Separation coefficient), Factors favouring solvent extraction, Quantitative treatment to solvent extraction equilibrium, lon association complexes, synergic extraction, some extraction reagent specifically used for inorganic ions (Acetylacetone, 8 Hydroxyquinoline, Diphenylthiocarbazone, Sodium diethyldithiocarbamate, Ammonium pyrrolidine dithiocarbamate), some practical aspects. Applications: determination of copper as the diethyldithiocarbamate complex. Determination of Fe(III) with 8-hydroxyquinoline, determination of nickel by synergistic extraction. Solid phase extraction.

2 Instrumental Methods of Chromatographic Analysis (4 Lecture)

Principles of Chromatographic Separations, classification, Theory of Column Efficiency in Chromatography, (theoretical plate, rate theory of chromatography-the Van Deemter equation, efficiency and particle size in HPLC, retention factor efficiency and resolution

3 High Performance Liquid Chromatography (6 Lecture)

Introduction, Types of liquid chromatography (liquid-solid, liquid-liquid, bonded phases), Choice of mode of separation, Equipment for HPLC: mobile phase, sample injection and column design (mobile phase, optimization of mobile phase, gradientelution, solvent delivery and sample injection, sample injection system, the column (effect of column length and column diameter), Choosing the Detector, Ultraviolet detector, Luminescence detector, RI detector, electrochemical detector, Column efficiency, HPLC chromatogram and its characteristics (retention time, peak height, peak area), method of quantitative analysis by HPLC, Example: determination of aspirin, phenacetin and caffeine in a mixture, numerica

4 Gas Chromatography (6 Lecture)

Introduction, Apparatus: A supply of carrier gas from a high-pressure cylinder, Sample injection system and derivatization, the colunin (Packed columns, Open tubular columns), the detector (properties, hot wire detector or TCD, FID, ECD), Quantitative analysis by GC (Area normalization method and internal standard addition method), Elemental analysis

5 Atomic Absorption Spectrosco (8 Lecture)

Introduction, Elementary theory, Instrumentation, flames, the nebulizer-burner system, non-flame techniques, (graphite furnace, cold vapour technique), resonance line sources, monochromator, detectors, interferences, chemical interferences, background correction methods, Atomic absorption spectrophotometers, Experimental preliminaries (calibration curve methods, standard addition method) Preparation of sample (wet ashing, fusion, Dry ashing, microwave dissolution, concentration procedures), Detection limits, Estimation of Ca and Mg in water.

6 Flame Emission Spectroscopy (4 Lecture)

Introduction, emission spectra, flame emission spectroscopy, flame photometers Evaluation methods, calibration curve procedure, the standard addition technique. Applications: determination of alkali metals by flame photometry, determinations of trace elements in contaminated soil by AAS