CH 581: PHYSICAL CHEMISTRY LABORATORY (0-0-8: 4)

Chemical Kinetics

1. To determine the velocity constant, order of reaction and energy of activation for saponification of ethyl acetate by sodium hydroxide conductometrically.
2. Kinetics of salt effect and ionic strength (persulfate-iodine reaction).

Adsorption/Surface Tension/Viscosity

1. To study the adsorption of oxalic acid on charcoal and test the validity of Langmuir and Freundlich adsorption isotherm
2. Determination of molecular weight of a high polymer (e.g. PEG) by viscosity measurement.

Potentiometry/pH metry

1. Study of an oscillatory reaction by EMF measurement.
2. Determination of *pKa* of poly-basic acid with the pH meter.
3. Determination of the acid and base dissociation constants of an amino acid and hence the isoelectric point of the acid.
4. Determination of the valency of mercurous ions potentiometrically.

Polarimeter

1. To study the mutarotation of D-Glucose at different pH.

Spectrophotometer/Chromatography

1. Determination of stoichiometry and stability constant of metal complex (e.g. ferric- salicylic acid).
2. Determination of *pKa* of an indicator (e.g. methyl red) in aqueous and micellar media.
3. Enzyme Kinetics (Michaelis-Menten Kinetics).
4. Effect of pH on absorption spectra of paranitrophenol and the measurement of pKa.
5. Ion-exchange separation of ATP and ADP.

Phase Rule

1. To construct the phase diagram for three component system (chloroform-acetic acid-water).
2. Determination of congruent composition and temperature of a binary mixture (e.g. benzophenone-diphenylamine).

Spectrofluorimeter/FT-IR

1. To study the fluorescence quenching of Anthracene by CCl_4 in n-hexane and ethanol.
2. To study the fluorescence behaviour of tryptophan in polar and non-polar media.
3. To determine the fundamental vibration frequency and bond length for HCl and DCl and to compare the isotope effects to theoretically predicted values.
4. Interaction of 8-anilinonaphthalene-1-sulfonic acid (ANS) with bovine or human serum albumin (BSA or HSA).

Text Books and References:

1. D. P. Shoemaker, C. W. Garland and J. W. Nibler, “Experimental Physical Chemistry”, McGraw-Hill.
2. F. A Settle, “A Handbook of Instrumental Techniques for Analytical Chemistry”, Prentice Hall.
3. J. N. Gurtu and A. Gurtu, “Advanced Physical Chemistry Experiments”, Pragati Prakashan.