Introduction to Analytical Chemistry

Chemistry 215

Section: D100

Term: 1999 Spring

Instructor: Dr. L. P. Peterson. Office: C-8070

Discussion Topics: The basic analytical principles of species (solid, solution, gaseous) measurement, and the concepts of simple and complex equilibria, will be introduced and developed. While the analysis of solid and gaseous species will be covered at an introductory level, the analysis of solutions will be given in detail. The importance of sampling and sample preparation will be discussed, in relation to such analytical techniques as: gravimetry, titrimetry, classical and chromatographic separation science, including an introduction to coupled gas chromatography-mass spectrometry (GC-MS), spectrophotometry, and introductory electrochemical analysis. The advantages and limitations of these techniques, and the statistical evaluation of data, will be critically examined.

2 lecture hours/week; 0 tutorial hour/week; 4 lab hours/week.

Lecture Topics:

Introduction; Laboratory Preparation; Multiprotic acids & bases; solution equilibria, solubility; complexometric reactions; principles of sampling and sample preparation; classical separations; modern chromatography; spectrophotometry; electroanalytical chemistry (potentiometry, coulometry, voltammetry); mass spectroscopy; evaluation of data.

Laboratory Assignments:

1. Gravimetry: Determination of chloride as silver chloride.

2. Titrimetry: Implementation of calcium by complexometric titration;

3. Titrimetry: Determination of complex acids and bases by potentiometric titration.

4. Potentiometry: Determination of fluoride using an ion selective electrode.

5. Coulometry (introduction).

6. Voltammetry (introduction).

7. GC-MS (introduction)

8. Thermogravimetric analysis (of calcium oxalate, polyethylene glycol, a grain sample, and an unknown carbonate mixture).

9. Atomic Emission Spectroscopy: Determination of calcium and barium.

Grading: Exams (In-terms 2 x 15% and Final 40%); Assignments 30%.

Introduction to Analytical Chemistry

Required Texts: Skoog, West & Holler, "Fundamentals of Analytical Chemistry". 7th Edition, 1996. Holt & Rinehart.

Recommended Texts: None

Materials/Supplies: None

Prerequisite/Corequisite: Prerequisite: CHEM 122 (or 103) and CHEM 126 (or 118).

Notes: None