

CH P 517: INORGANIC CHEMISTRY PRACTICALS – III

Course Outcome

- The students will have hands on experience in the analysis of Brass, Stainless Steel.
- Understand the analysis of Type metal and quantitative analysis of the constituents of mixtures containing the radicals such as Fe + Ni, Fe + Ca, Cr + Fe.
- Train the students in separation and determination of Mg^{2+}/Zn^{2+} , Zn^{2+}/Cd^{2+} by Ion-Exchange Chromatography in Part A and in Part B
- Able to determine COD, DO, nitrate, nitrite and alkalinity, fluoride in various water samples.
- The students will acquire practical experience in determination of Na, K, Li and Ca by Flame photometry and Solvent extraction of Ni(II) and $UO_2(II)$.
- Learn the preparation and analysis of complexes and measurement of magnetic susceptibility.
- Demonstrate skills related to determination of composition of complexes by Job's method, Mole ratio method and Slope ratio method.
- Understand the determination of stability constants of complexes.

A. Any four of the following experiments are to be carried out:

1. Analysis of brass-Cu gravimetrically using α -Benzoinoxime and Zn complexometrically.
2. Analysis of Stainless Steel-Insoluble residue by gravimetry, Ni gravimetrically using DMG, Fe volumetrically using Ce(IV) and Cr(III) volumetrically by persulphate oxidation.
3. Quantitative analysis of the constituents and mixtures containing the following radicals:
 - a) Fe(II) + Ni(II) - Fe gravimetrically as Fe_2O_3 and Ni using EDTA.
 - b) Fe(III) + Ca(II) - Fe gravimetrically as Fe_2O_3 and Ca using EDTA.
 - c) Cr(III) + Fe(III) - Using EDTA by Kinetic masking method.
4. Analysis of chalcopyrites, magnetite and ilmenite.
5. Ion-exchange chromatography: Separation and determination of Mg^{2+}/Zn^{2+} , Zn^{2+}/Cd^{2+} and Cl^-/Br^- .

B. Any four of the following experiments are to be carried out:

1. Determination of i) COD ii) dissolved oxygen (DO) iii) alkalinity of a water sample.
2. Determination of nitrate & nitrite in water samples and sea water.
3. Analysis of heavy metals in waste water, sea water (Pb, Hg etc. by spectrophotometry)
4. Nephelometric determination of sulphate/phosphate.
5. Determination of fluoride in drinking water by spectrophotometry and ion selective electrode.

C. Any four of the following experiments are to be carried out:

1. Colorimetric determination of Ti(IV) and Zr(IV)
2. Determination of composition of complexes:
Job's method: Fe-phenanthroline complex

Mole ratio method: Zr-Alizarin red S complex,

Slope ratio method: Cu ethylenediamine complex

3. Determination of stability constants of Fe-Tiron system by Turner Anderson method.
4. Flame photometric determination of Na, K, Li and Ca individually and in mixtures.
5. Electrogravimetric determination of Cu-Ni alloy in Type Metal.
6. Solvent extraction of Ni(II) and $\text{UO}_2(\text{II})$.
7. Preparation of any three of the following complexes, checking the purity of the prepared samples by chemical analysis, structural study of the prepared complexes using conductance and magnetic susceptibility measurements, recording the electronic and infrared spectra:
 - i) Chloropentamminecobalt(III) chloride
 - ii) Hexamminecobalt(III)chloride.

References

1. Standard Method for the Examination of water and Waste Water, Ed. A. E. Greenberg, L. S. Clesceri and A. D. Eaton, American Public Health Association (1989).
2. Quantitative Chemical Analysis, I. M. Kolthof and E. P. Sandell, McMillan (1980).
3. Environmental Chemistry, I. Williams, Wiley (2001).
4. Spectrochemical Trace Analysis for Metals and Metalloids: Comprehensive Analytical Chemistry-Vol. 30, R. Lobinski and Z. Marczenko, Elsevier (1996).
5. Vogel's Text Book of Quantitative Chemical Analysis, 5th edn., G. H. Jeffrey, J. Bassette, J. Mendham and R. C. Denny, Longman (1999).