

INORGANIC CHEMISTRY***Quantitative analysis***

Separation and determination of two metal ion Cu-Ni, Cu-Zn., Cu-Fe etc. involving volumetric and gravimetric methods.

Preparation and their characterisation

Preparation of selected inorganic compound and their studies by I.R., electronic spectra, Mossbaure, E.S.R. and magnetic susceptibility measurements. Handling of air and moisture sensitive compound.

1. $\text{VO}(\text{acac})_2$
2. $\text{TiO}(\text{C}_9\text{H}_8\text{NO})_2 \cdot 2\text{H}_2\text{O}$
3. $\text{cis-K}[\text{Cr}(\text{C}_2\text{O}_4)_2(\text{H}_2\text{O})_2]$
4. $\text{Na}[\text{Cr}(\text{NH}_3)_3(\text{SCN})_4]$
5. $\text{Mn}(\text{acac})_3$
6. $\text{K}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$
7. Prussian Blue, Turnbull's Blue
8. $\text{Co}[(\text{NH}_3)_6][\text{Co}(\text{NO}_2)_6]$
9. $\text{cis-}[\text{Co}(\text{trine})(\text{NO}_2)_2]\text{Cl} \cdot \text{H}_2\text{O}$
10. $\text{Hg}[\text{Co}(\text{SCN})_4]$
11. $[\text{CoI}(\text{py})_2\text{Cl}_2]$
12. $[\text{Ni}(\text{NH}_3)_6]\text{Cl}_2$
13. $\text{Ni}(\text{dmg})_2$
14. $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4 \cdot \text{H}_2\text{O}$

ORGANIC CHEMISTRY**Organic synthesis**

Acetylation: Acetylation of cholesterol and separation of cholesteryl acetate by column chromatography.

Oxidation: Adipic acid by chromic acid oxidation of cyclohexenol.

Grignard reaction: Synthesis of triphenylmethanol from benzoic acid.

Aldol condensation: Dibenzal acetone from benzaldehyde.

Sandmeyer reaction: p- Chlorotoluence from p- toluidne.

Acetoacetic ester Condensation: Synthesis of ethyl n-butylacetoacetate by A.E.C. condensation.

Cannizzaro reaction: 4-Chlorobenzaldehyde as substrate.

Friedel Crafts reaction: B-Benzoyl propionic acid from succinic anhydride and benzene.

Aromatic electrophilic substitution: Synthesis of p-nitroaniline and p-bromoaniline

The product may be characterized by spectral techniques.

PHYSICAL CHEMISTRY

Error and statistical analysis

1. Draw a straight line using method of least squares from given data.
2. Test the validity of student's t test by F-test approach.

Conductance measurements

3. Determine the equivalent conductance of a weak electrolyte at different concentration and hence test the validity of Ostwald's dilution Law. Also determine the dissociation constant K_a/K_b of the weak electrolyte
4. Determine the solubility of sparingly soluble substance in water at given temperature by conductance method.

Electrochemistry (EMF – Measurements) – Potentiometry/pH - Metry

5. Determine the EMF of a given concentration cell by potentiometer and find out the effect of dilution on the EMF of cell.
6. Determine the pH of a given buffer solution using given hydrogen electrode.
7. Determination of dissociation constant of monobasic/polybasic acid using pH meter.

Chemical Kinetics

8. Determine the velocity constant and order of reaction for hydrolysis of ethyl acetate by sodium hydroxide at given temperature (saponification of an ester)
9. Study of kinetics of iodine clock reaction.

Cryoscopy

10. Determine the apparent molecular weight of non electrolyte cryoscopically.
11. Study of association of benzoic acid in benzene by cryoscopic method.

Phase Equilibria

12. Construct the phase diagram for three component system (eg. ethanol, benzene and water or chloroform, acetic acid and water).

Polarimetry

13. Determine the rate constant for inversion of cane sugar using a polarimeter.
14. Find the specific rotation and molecular rotation of cane sugar polarimetrically and also find the concentration of unknown solution.