**BS 4th YEAR**

**Inorganic Chemistry Lab-1**

**Semester: VII Inorganic Chemistry**

**Course Title: Inorganic Lab-I Code:**

**Contact Hours:** **Credit Hours:**

Practical = 48 Practical = 01.0

Total = 48 Total = **1.0**

**--------------------------------------------------------------------------------------**

**Course Objectives**

The objectives of the course are:-

1. To give students experience with a range of synthetic, purification and characterization methods.
2. To impart in-depth knowledge about inorganic synthesis characterization

**COURSE LEARNING OUTCOMES:**

Upon successful completion of the course, the student will be able to:

1. Perform chemistry practical safely
2. Learn theoretical concepts through laboratory approach.
3. Observe phenomena and describe, measure and record these as data
4. To be able to interpret results obtained
5. Construct and or interpret visual representations of phenomena and relationships (equations, diagrams, graphs, flowcharts, physical models)

**Course outline:**

1. The resolution of cis-dichlorobis (ethylenediamine) chromium (III) chloride into its optical isomers.
2. The preparation and resolution of the tris (ethylenediamine) cobalt (III) ion into its optical antipodes. Estimation of Al (III) and Fe (III) using 8-hydroxyquinoloine
3. Synthesis and characterization of potassium tris-oxolato chromate (III) trihydrate
4. Preparation of bis (N,N- disalicylidene ethylenediamine) µ-aquo-dicobalt
5. Synthesis and characterization of bis pyridine iodo nitrate
6. Simultaneous determination of chromium and manganese in a solution by visible spectroscopy.
7. Estimation of Ni (II) in the presence of Cu (II)
8. Determination of dissociation constant Ka for acetic acid
9. Determination of Ni+2 ions by EDTA (Back titration).
10. Determination of Ca+2 and Zn+2 ions by EDTA (Masking titration)
11. Precipitation titration involving AgNO3 and KCl
12. Metal acetylacetonate complexes; Synthesis and Characterization
13. Metal oxide nanoparticles preparation
14. Estimation of metal ions using various chelating agents

**Teaching Methodology**

* Working in the Chemistry Laboratory
* Multimedia usage (pre- and post- performances)

**Assessment**

* Lab safety rule following 10%
* Regularity and handling 05%
* Written (Long Questions, Short Questions, MCQs and Quiz) 50%
* Results compilation and laboratory report 10%
* Viva Voce 25%

**Text and Reference books:**

1. Bassett, J., Denny, P. C., Jeffery, G. H., Mendham, J., *Vogel’s textbook of Quantitative Inorganic Analysis, 6th ed*., Pearson Education, copyrights (2009).

2. Pass, G., Sutcliffe, H., *Practical Inorganic Chemistry: Preparation Reactions and Instrumental Methods, 2nd ed.*, Chapman and Hall, (1974)

# 3. J. Derek Woollins, *Inorganic Experiments*, 3rd revised edition, John Wiley & Sons, 22-Feb-2010

4. Rodríguez, J.A. and Fernández-García, M. eds., 2007. *Synthesis, properties, and applications of oxide nanomaterials*. John Wiley & Sons.

**Inorganic Chemistry Lab-II**

**Inorganic Chemistry**

**Semester: VIII Inorganic Chemistry**

**Course Title: Inorganic Lab-I Code:**

**Contact Hours:** **Credit Hours:**

Practical = 48 Practical = 01.0

Total = 48 Total = **1.0**

**--------------------------------------------------------------------------------------**

**Course Objectives**

The objectives of the course are:-

1. To give students experience with a range of synthetic, purification and characterization methods.
2. To be able to interpret results obtained

**COURSE LEARNING OUTCOMES:**

Upon successful completion of the course, the student will be able to:

1. Perform Chemistry practical safely
2. Learn theoretical concepts through laboratory approach
3. Observe phenomena and describe, measure and record these as data
4. Construct and or interpret visual representations of phenomena and relationships (equations, diagrams, graphs, flowcharts, physical models)

**Course outline:**

1. Synthesis of ferrocene and acetyl ferrocene
2. Synthesis of triaryl phosphines
3. Reduction of anisole by lithium-Birch-reduction.
4. Preparation of ferrocenyl oximes
5. Preparation of Zinc-porphyrin complexes
6. Synthesis of Zinc-Phthalocyanine
7. Synthesis of coordination polymers of transition metals.
8. Direct synthesis of organotin compounds. I. Di-and tribenzyltin chlorides
9. Preparation of manganese dioxide nanoparticles or alumina-particles.
10. Hydroquinone clathrate with sulphur-dioxide.
11. Synthesis and characterization of Tris-triphenyl-phosphine copper(I) nitrate
12. Electrochemical synthesis of copper (I) dicyclopentadiene perchlorate
13. Preparation of soap and study of its properties.
14. Preparation of a fertilizer and its estimation of anion

**Teaching Methodology**

* Working in the Chemistry Laboratory
* Multimedia usage (pre- and post- performances)

**Assessment**

* Lab safety rule following 10%
* Regularity and handling 05%
* Written (Long Questions, Short Questions, MCQs and Quiz) 50%
* Results compilation and laboratory report 10%
* Viva Voce 25%

**Text and Reference books:**

1. Angelici, R. J. (1977). *Synthesis and technique in inorganic chemistry*, pp. 157-168 Philadelphia: W. B. Saunders Company.

2. Elschenbroich, Ch., & Salzer, A. (1992). *Organometallics*. VCH Weinheim.

3. Hartley, F. R. (1974). *Elements of organometallic Chemistry*. London

4. Lucas, C. R., & Walsh, K. A. (1987). Organometallic chemistry of molybdenum. *Journal of Chemical Education*, 64, 265–266.

5. McNeese, T. J., & Ezbiansky, K. A. (1996). *Photochemical preparation and reactivity of cis- Cr(CO)4(CH3CN)2*. Journal of Chemical Education, 73, 548–550.

6. Miessler, G. L., & Spessard, G. O. (1991). Organometallic chemistry – A course designed for sophomore chemistry students. *Journal of Chemical Education*, 68, 16–18.

7. Rabideau, P. W. (1989). The metal–ammonia reduction of aromatic compounds.

8. Tetrahedron, 45, 1579–1603.

9. Spessard, G. O., & Miessler, G. L. (1996). Organometallic chemistry. Upper Saddle River, New Jersey: Prentice Hall.

10. Szafran, Z., Pike, R. M., & Singh, M. M. (1991). Microscale inorganic chemistry. New York: John Wiley & Sons.

11. ZAVIX Holzbecher and other, Hand Book of Organic reagents in Inorganic Analysis Ellis Hurwod Limited, London. (1976)

12. J. Bassett, R. C. Denny, G. H. Jeffery and J. Mendham, Vogel’s Text Book of qualitative Inorganic Analysis, the English Language Book Society and Longman, New York, (2008)

13. James S. Pritz, George H. Sehenk, Quantitative Analysis Chemistry, Alby and Becon Inc. London. (2001)

14. Pass, G., Sutcliffe, H., Practical Inorganic Chemistry: Preparation Reactions and Instrumental Methods, 2nd ed., Chapman and Hall, (1974)

15. Sisido, K., Takeda, Y. and Kinugawa, Z., 1961. Direct synthesis of organotin compounds. I. Di-and tribenzyltin chlorides. *Journal of the American Chemical Society*, *83*(3), pp.538-541.