



SYLLABUS

A. Course Description

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab.	Tut.	Private study	Pre-requisites	Course Level	Language
CHM	212	Inorganic Chemistry (2)	4	2	3	1	8	CHM 211	4	English

Topics covered in the course include Coordination Compounds and their magnetic properties, theories regarding complexes geometries with their electronic configuration, types of ligands and properties. The course will be provide the students with Basic information for transition metals including methods of preparation, uses of elements and compounds.

At the end of this course the student will be able to:

- To list the general characteristics of transition elements.
- To identify a number industrial and metallurgical process for the separation, preparation or synthesis of elements and inorganic compounds.
- To describe the Crystal Field Theory and the Molecular orbital theory
- To name complexes made of a central atoms and ligands.
- To recognize the origin of metals magnetism

B. References: Required Textbook & Internal Website

I shall use

Inorganic Chemistry, Catherine E. Housecroft and Alan G. Sharpe, (2nd Ed.). Pearson Education Limited, Essex CM20 2JE, England, 2005 (ISBN: 0130-39913-2) (it is an obligation).

Students are required to purchase the textbook/materials (it is an obligation). The book contains the lecture notes as well as activities for the students to take part in; the book serves as a workbook. Other references:

- *Advanced Inorganic Chemistry: A Comprehensive Text*, F. A. Cotton, S. G. Wilkinson, (3rd Ed.), John Wiley & Sons Inc., 1972, ISBN 13: 9780471175605
- *Quantitative Chemical Analysis*, Daniel C., Harris, (8th Ed.), W. H. Freeman; 2010, ISBN-10: 1429218150
- *Comprehensive Inorganic Chemistry*. Sulekh Chandra, New Age International Limited Publishers, New Delhi, 2004.
- *Descriptive inorganic chemistry*, Rayner-Canham, Geoff., (5th Ed.), W.H. Freeman, New York, 2006: ISBN-13: 978-1-4292-2434-5 ISBN-10: 1-4292-1814-2

Google Classroom Webpage: <http://www.imamm.org/>



C. Topics Outline

Disclaimer: this is a very fast-paced course. There will be little time—if any—for review. What follows is an approximate outline of the pace of the course. We may go faster or slower, contingent on the class response. The tentative list of topics to cover:

a. Theory:

- 1. Werner's Coordination Theory**, ligand classification, Nomenclature of Coordination Compounds
Complex formation, Variable oxidation states, Electroneutrality principle

Isomerism in d-block metal complexes: Structural isomerism: ionization isomers, Structural isomerism: hydration isomers, Structural isomerism: coordination isomerism, Structural isomerism: linkage isomerism, Structural isomerism: polymerization isomerism, Stereoisomerism: geometrical isomers, Stereoisomerism: optical isomers.

Coordination numbers, Factors Affecting Coordination Number, The Kepert model, Coordination number 2-7, stability of complexes, Preparation of coordination complexes, Detection of complexes.

- 2. d-Block chemistry:** general considerations: Topic overview, Ground state electronic configurations, d-Block metals versus transition elements, Electronic configurations, Physical properties, the reactivity of the metals, Characteristic properties: a general perspective, Colour and Paramagnetism.
- 3. Scandium group:** characterization, oxidation states, extraction, compounds, chemical reactions, oxidation states, extraction, compounds, separation, Titanium group: characterization, oxidation states, extraction, compounds, chemical reactions, separation, Vanadium Group: characterization, oxidation states, extraction, compounds, chemical reactions, separation, Chromium group: characterization, oxidation states, extraction, compounds, chemical reactions, separation, Manganese group: characterization, oxidation states, extraction, compounds, chemical reactions, separation, Iron group: characterization, oxidation states, extraction, compounds, chemical reactions, separation, Cobalt group: characterization, oxidation states, extraction, compounds, chemical reactions, separation, Nickel group: characterization, oxidation states, extraction, compounds, chemical reactions, separation, Copper group: characterization, oxidation states, extraction, compounds, chemical reactions, separation, Zinc group: characterization, oxidation states, extraction, compounds, chemical reactions, separation.
- 4. The f-block metals:** lanthanoids and actinoids: Introduction, f -Orbitals and oxidation states, Atom and ion sizes, The lanthanoid contraction, Coordination numbers, Sources of the lanthanoids and actinoids, occurrence and separation of the lanthanoids, The actinoids, Lanthanoid metals, Inorganic compounds and coordination complexes of the lanthanoids, Halides, Hydroxides and oxides, Complexes of Ln(III), The actinoid metals, Inorganic compounds and coordination complexes of thorium, uranium and plutonium, Thorium, Uranium, Plutonium.

b. Practical:

Safety and Laboratory equipments and measurements and reports, Determine M & S for Mg^{2+} , Zn^{2+} and Pb^{2+} , Determine M & S for Cu^{2+} , Ni^{2+} and Ca^{2+} , Determine M & S for Co^{2+} and Zn^{2+} , Determine M & S for Al^{3+} , Ni^{2+} and Mg^{2+} , Determine M & S for Fe^{3+} and Zn^{2+} , Analysis of Mg^{2+} and Zn^{2+} and Mg^{2+} and Ni^{2+} mixtures, Analysis of Mg^{2+} and Zn^{2+} and Mg^{2+} and Zn^{2+} and Cu^{2+} mixtures, Preparation of chloropentammine cobalt(III) chloride, Preparation of chloropentammine cobalt(III) chloride, Separation of group I basic cations, Separation of group II basic cations, Separation of group III basic cations, Separation of group IV basic cations, Separation of group V basic cations.



D. Exams & Grading System

The semi-official dates of the exams for this course, with all the caveats, that the word “semi-official” entails, can be found here:

- **Midterm 1:** 6th or 7th week & **Midterm 2:** 11th or 12th week
- **Quizzes & Homework: During the semester**

Your course grade will be based on Final Exam, Midterms, Homework, Quizzes, Participation, Attendance and Project.

Midterm 1: 10 %	Midterm 2: 10 %	Final Exam: 40 %
Laboratory: 30 %	Quizzes; Homework & Attendance & Participation: 10 %	

Grading distribution:

A+: [95, 100], A: [90, 95), B+: [85, 90) , B: [80, 85), C+: [75, 80), C: [70, 75), D+: [65, 70),
D: [60, 65), F: [0, 60).

E. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. (“Immediate family” is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

[Executive Rules for Study Regulations and Examsgoo.gl/ykm7t3](https://Examsgoo.gl/ykm7t3)

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