CHEM 2006 INORGANIC CHEMISTRY

Credit Points 10

Legacy Code 300899

Coordinator Feng Li (https://directory.westernsydney.edu.au/search/name/Feng Li/)

Description This subject introduces students to a thorough study of coordination chemistry (discussing complexes, ligands, structure, isomerism, stability, reaction mechanisms, oxidation states, elements in the first transition series, coordination chemistry in biological systems). The subject then moves on to areas of fundamental inorganic chemistry, including bonding, and solid state chemistry. Advanced Modules cover the following topics: spectroscopy in coordination complexes, physiology and inorganic chemistry, and medicinal inorganic chemistry. This subject also introduces many of the laboratory techniques and equipment that are used in synthetic procedures in coordination chemistry.

School Science

Discipline Inorganic Chemistry

Student Contribution Band HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 2 subject

Pre-requisite(s) CHEM 1008 Introductory Chemistry

Restrictions

Successful completion of 60 credit points

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Describe the properties and features of coordination compounds (coordination number and geometry; types of ligands; isomerism in coordination compounds; nomenclature; variable oxidation states; nomenclature; spectroscopy) and apply these concepts to other coordination complexes.
2. Differentiate the varied roles of metals in biochemical systems.
3. Recognise the strengths and weaknesses of various bonding theories in coordination chemistry and apply them appropriately (ligand field theory, molecular orbital theory, valence bond theory).
4. Apply a knowledge of solvent properties and evaluate their effect on chemical systems.
5. Describe the structures and properties of ionic and non-ionic solids.
6. Apply the fundamental principles of inorganic chemistry to advanced areas through the Advanced Modules.
7. Research the literature of coordination chemistry and relate this to experimental results within an experimental Report.
8. Demonstrate laboratory techniques and conduct experiments in the coordination chemistry laboratory, acquire experimental data, analyse and communicate in written format as result sheets or reports(s).
9. Identify, interpret and comply with safety requirements in relation to the use of chemical reagents and laboratory equipment.

Subject Content

1. Structure and Isomerism in Inorganic Chemistry
- Structures of inorganic and coordination compounds; coordination number and geometry; types of ligands; isomerism in coordination compounds; nomenclature.
2. Properties of Coordination Complexes
- Variable oxidation states; formation of complexes in solution; the chelate effect; hard and soft acids and bases; the first transition series.
3. Bonding in Inorganic Chemistry
- Introduction to bonding in inorganic and coordination complexes; ligand field theory; magnetic properties; electronic spectra; ligand field stabilisation energy; molecular orbital theory.
4. Bioinorganic Chemistry
- Introduction to bioinorganic chemistry; heme in hemoglobin, myoglobin and cytochromes; zinc enzymes; iron-sulfur proteins; bioinorganic chemistry of molybdenum; model compounds.
5. Solvent Properties
- Comparison between water and non-aqueous solvents; concepts of acid-base behaviour.
6. Inorganic Solids
- The structure of ionic solids; lattice energy calculations; the Born-Haber cycle; imperfection and conductivity in ionic solids; the structure of non-ionic solids.
7. Advanced Modules - Several Advanced Module topics will be used to review and analyse the principles covered in the six topics, and their applications in various areas of science.
- Spectroscopic Characterisation of Coordination Complexes - Characterisation using electronic spectra; infrared spectra; nuclear magnetic resonance spectra.
- Medicinal Inorganic Chemistry - Anti-cancer drugs; chelate therapy; diagnostic and therapeutic radiopharmaceuticals, medical imaging and coordination chemistry

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Type	Length	Percent	Threshold	Individual/ Group Task
Practical	Report - approximately six pages long, including calculations and diagrams.	30	N	Individual
Quiz	20 minutes each	20	N	Individual
Final Exam	2 hours	50	N	Individual

Prescribed Texts

- Housecroft, C.E. and Sharpe, A.G., 2012, ﷺInorganic Chemistryﷺ, 4th ed, Pearson Prentice-Hall (Recommended but not compulsory.)

Teaching Periods

Autumn (2022)

Parramatta - Victoria Rd

Day

Subject Contact Feng Li (https://directory.westernsydney.edu.au/search/name/Feng Li/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=CHEM2006_22-AUT_PS_D#subjects)

Autumn (2023)

Parramatta - Victoria Rd

On-site

Subject Contact Feng Li (https://directory.westernsydney.edu.au/search/name/Feng Li/)

View timetable (https://classregistration.westernsydney.edu.au/odd/timetable/?subject_code=CHEM2006_23-AUT_PS_1#subjects)