

CH-222

Coordination chemistry

Queen Wendy Lee

Cursus	Sem.	Type
Chemistry and chemical engineering	BA4	Obl.

Language of teaching	English
Credits	2
Session	Summer
Semester	Spring
Exam	During the semester
Workload	60h
Weeks	14
Hours	2 weekly
Lecture	2 weekly
Number of positions	

Summary

Fundamental knowledge of coordination compounds.

Content

Chapters 1-2, 4-5 are given in English. Chapter 3 is given in English.

- 1. Coordination complexes:** concepts, nomenclature, structure and isomers
- 2. The preparation and stability of complexes:** Ligand substitution, thermodynamic stability, hard-soft acid-base theory, structural aspects of stability
- 3. Bonding in coordination compounds:** atomic orbitals (reminder), crystal field theory, ligand field theory, molecular orbitals
- 4. Properties of coordination compounds:** optical properties, explanation of electronic spectra, magnetic properties, magnetic measurements

Learning Outcomes

By the end of the course, the student must be able to:

- Recall typical ligands; name typical coordination compounds and describe their geometry; Judge the existence of isomers and draw such isomers; Calculate the oxidation states of metals and the number of d electrons.
- Apply soft-hard acid-base theory to predict the stability of complexes; interpret chelate effect; determine the relative stability of complexes according to structural factors.
- Deduce the crystal field splitting diagram for octahedral, tetrahedral, and square planar complexes; decide the electronic configuration. Generate the ligand field diagram for octahedral complexes.
- Decide if a complex is high spin or low spin using ligand field theory; understand and explain the spectrochemical series.
- Estimate the spin-only magnetic moment of complexes according to ligand field theory; Determine whether an electronic transition is allowed and the intensity of such transition.

Assessment methods

1 compulsory test during the semester.

Final grade: 30% for test + 70% for final written exam

Supervision

Office hours	Yes
Assistants	Yes
Forum	Yes

Resources

Ressources en bibliothèque

- [Inorganic Chemistry / Miessler](#)
- [Chemical Applications of Group Theory / Cotton](#)
- [Chimie et théorie des groupes / Walton](#)

Websites

- http://scgc.epfl.ch/telechargement_cours_chimie

Moodle Link

- <https://go.epfl.ch/CH-222>