CH-222

Coordination chemistry

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Cursus	Sem.	Type
Chemistry and chemical engineering	BA4	Obl.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Written
Workload	90h
Weeks	14
Hours	**3 weekly**
Courses	3 weekly
Number of positions	

Summary

Fundamental knowledge of coordination compounds. Molecular symmetry and basic group theory.

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. Molecular symmetry and group theory: operations and elements, point groups, matrix representations of groups, applications
4. Bonding in coordination compounds: atomic orbitals (reminder), crystal filed theory, ligand field theory, molecular orbitals
5. 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 geometryJudge 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

2 compulsory tests during the semester.
Final grade: 15% for each test + 70% for written exam

Resources

Ressources en bibliothèque

- Inorganic Chemistry / Miessler

- Chimie et théorie des groupes / Walton
- Chemical Applications of Group Theory / Cotton

Websites

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

Moodle Link

- http://moodle.epfl.ch/enrol/index.php?id=9461