UCL Université catholique de Louvain

LCHM2130

2014-2015

Inorganic chemistry II and Exercises

6.0 credits	30.0 h + 45.0 h	1q

Teacher(s) :	Devillers Michel ; Hermans Sophie (compensates Devillers Michel) ;
Language :	Français
Place of the course	Louvain-la-Neuve
Main themes :	The course will concern the fundamental concepts in coordination chemistry considering electronic aspects (spectra and magnetic properties), structural aspects (isolobal analogy) and reactivity (reaction mechanisms). Practical exercises will cover: - the synthesis and purification of transition metal coordination compounds - the mastery of principal characterisation technique (principally spectroscopic) of inorganic compounds.
Aims :	This course aims at covering the principal basic concepts in coordination chemistry. Practical exercises will concern the synthesis and study of physico-chemical properties of transition metals coordination compounds. *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Content :	The teaching will cover the following aspects: 1) General properties of coordination compounds: electronic spectroscopy and magnetic properties, description in the frame of the molecular orbital theory. 2) Stability and reactivity of coordination compounds. Thermodynamical aspect: stability factors of complexes, metal-ligand preferences (Pearson concepts: HSAB), chelate effect. Kinetic aspect: inert and labile complexes. 3) Reaction mechanisms in coordination chemistry. Ligand substitution reactions (octahedral complexes, square-planar complexes: trans effect). Electron transfer reactions. 4) Organometallic chemistry complements: isolobal analogy. 5) Molecular polyhedra in inorganic chemistry: the metal-metal bond, boranes structure, metallic clusters. The practical exercises will cover the following manipulations: 1. Synthesis and spectroscopic characterisation of Vanadium complexes. 2. Synthesis and spectroscopic characterisation of Cr(III) complexes. 3. Synthesis and spectroscopic characterisation of Ni(II) complexes. 4. Synthesis and spectroscopic characterisation of Co(III) complexes. 5. Separation of optical isomers of Co(III) complexes. 6. Synthesis of transition metal oxides and study of their magnetic properties. 7. The Job method. 8. Ambidentates ligands and linkage isomerism.
Other infos :	Background: General chemistry notions (CHM 1111-1231) - Molecular symmetry and crystal structures (CHM 1251A) - Fundamentals of theoretical chemistry (CHM 1252) and molecular spectroscopy (CHM 1251B). Inorganic chemistry I (CHM 1331) Evaluation: Course: written and oral exams. Exercises: continuous evaluation including lab reports and an oral exam. Documents: - Inorganic Chemistry: principles of structure and reactivity, J. Huheey, E. Keiter, R. Keiter, 4th ed., Harper and Collins, 1993. ISBN 006042995X - Other bibliographic references advised at the beginning of the course. - Overhead transparencies used by the teacher. - Laboratory notebook for practical exercises The course could be partly or totally delivered by an invited lecturer.
Cycle and year of study :	> Master [120] in Chemistry > Master [60] in Chemistry
Faculty or entity in charge:	CHIM