Cristallochimie et chimie inorganique

Lecturers
François RENIERS (Coordinator), Karen FONTIJN and Jon USTARROZ TROYANO

Course mnemonic
CHIM-F207

ECTS credits
5 credits

Language(s) of instruction
French

Course period
Second term

Campuses
Solbosch and Plaine

Course content

reminders and developments of atomic and molecular structure, structure and composition of inorganic solids (metallic, semi-metallic, non-metallic). Chemistry of solutions of electrolytes, in aqueous and non-aqueous solution, coordination chemistry, elements of descriptive inorganic chemistry.

Crystalline chemistry:

Geometric Crystallography: Crystalline geometry in 2D and 3D, crystal lattices, symmetry operations, point and space groups, crystal systems, ...

Applications in mineralogy: principles of diffraction, the reciprocal lattice, X-ray diffraction (single crystals vs powders), interaction of X-rays with matter, ...

Practical Work: Dedicated exercises on crystalline geometry, recognition of elements of symmetry and deduction of point group of a crystal form, stereographic projection, X-ray diffraction, ...

Objectives (and/or specific learning outcomes)

For the part of inorganic chemistry : to develop a series of concepts so as to realize the general properties of inorganic compounds. A fraction of the course will be devoted to descriptive aspects of inorganic chemistry

Crystalline chemistry:

- Formulate the fundamental definitions relevant to cristallography
- Explain symmetry operations in 2D and 3D
- Compare cristal lattices in 2D and 3D
- Explain the principles of X-ray diffraction
- Explain the interaction of X-rays and matter
- Practicals : Identify elements of symmetry in 2D and 3D and determine the point group
- Practicals: Examine and interpret an X-ray diffractogram

Pre-requisits and co-requisits

Pre-requisites courses

CHIM-F101 | Chimie générale | 10 crédits, CHIM-F101 | Chimie générale | 15 crédits, CHIM-F101 | Chimie générale | 20 crédits and CHIM-F101 | Chimie générale | 5 crédits

Teaching method and learning activities

Courses with short exercices for the inorganic chemistry part

Crystalline chemistry:

Theory : classes are given in-person. Some lectures may be replaced by podcasts / videos. The educational material (slides, syllabus) is accompanied by multiple-choice tests on UV.

Practical sessions: in-person, including a session in a laboratory (if organisational conditions allow). Participation to the practical sessions is mandatory.

If the public health conditions allow, the entire course is given in-person. If not, theory and/or practicals will be given online with adequate guidance.

References, bibliography and recommended reading

Huheey, Keiter & Keiter, Principles of Structure and Reactivity (4th Edition), Prentice Hall.

Schrivers & Atkins, Inorganic chemistry, Oxford University Press; 4th edition

Borchardt-Ott, W. (2011). Crystallography – An Introduction, Third edition. Springer-Verlag, 355 pp.

Hammond, C. (2015). The Basics of Crystallography and Diffraction, fourth edition. International Union of Crystallography and Oxford University Press, 519pp.

Klein, C. & Dutrow, B. (2007). The 23rd Edition of the Manual of Mineral Science. John Wiley & Sons, 675 pp.

Course notes

Syllabus and Université virtuelle

Other information

Place(s) of teaching

Plaine and Solbosch

Contact(s)

Jon Ustarroz Troyano: Jon.Ustarroz@ulb.be

Crystalline chemistry:

Karen Fontijn

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Evaluation method(s)

Other, written examination and Oral examination

Evaluation method(s) (additional information)

Oral exam for the inorganic chemistry part (ca. 30-40 minutes per exam)

Crystalline Chemistry: written exam if the public health conditions allow an on-site evaluation; if not: oral examination on Teams, without time to prepare. The exam will contain some questions on the theory and on the practicals.

Determination of the mark (including the weighting of partial marks)

The final mark consists of the weighted average of the marks obtained on each part:

- Crystalline chemistry : 1/3 (33%)
- Volet chimie inorganique : 2/3 (67%)

In case of a mark below 7/20 for one or both part(s) of the exam, the course teachers may decide to attribute the lowest mark to the entire course, even if the weighted average represents a mark equal to or above 10/20. The student will have to retake the part of the exam for which the mark is below 10/20.

Main language(s) of evaluation

French

Programmes

Programmes proposing this course at the faculty of Sciences

BA-CHIM | Bachelor in Chemistry | unit 2