

Chemistry

Architecture of matter

IDENTIFICATION

CODE : PC-S1-CH-TF
ECTS : 3.0

HOURS

Lectures : 12.0 h
Seminars : 29.0 h
Laboratory : 0.0 h
Project : 0.0 h
Teacher-student
contact : 41.0 h
Personal work : 30.0 h
Total : 71.0 h

ASSESSMENT METHOD

continuous assessment

TEACHING AIDS

Lecture and tutorial handouts.
First Cycle Moodle interface:
all lecture tutorial documents,
schedule and organization, basic
exercise corrections, links to
internet sites, interactive periodic
table, examination questions and
answers in French and in English.

TEACHING LANGUAGE

French

CONTACT

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AIMS

The main competencies covered by this chemical education are:

C13 -To modelize a system or a problem by convenient dimensions or objects in relation; C14
- To build a scheme of the system or the problem; C16 - To build a justification; C51 To select
and implement well-adapted tools to represent and analyze data.

CONTENT

The engineering student will work and will be evaluated on the following knowledge:

1. The atom. Classical model, undulatory model, spatial electronic organization in atoms.
2. X-rays Spectroscopy. Production, emission, absorption [general principles].
3. Periodic table. Explanations and examples of periodicity.
4. Chemical bonding. Classical models: covalent [VSEPR], ionic, metallic and intermolecular.
5. Chemical bonding. Undulatory model. Molecular orbits and hybridization.
6. Structure-reactivity relations [redox, solubility, acid/base, miscibility]
7. Crystallized solid state architecture. Networks, patterns, lattice planes, crystal structures. Typical structures. Radio crystallography.

BIBLIOGRAPHY

- Chimie Générale : S.S. Zumdahl (Ed. De Boeck Université)
- Cours de Chimie-Physique et Exercices résolus de Chimie-Physique : P. Arnaud (Ed. Dunod)
- Chimie I, 1ère année PCSI, collection H Prépa [Chapitres 1 à 4] (Ed. Hachette)
- Chimie II, 1ère année PCSI, collection H Prépa [Chapitre 7] (Ed. Hachette)
- Introduction à la Science des Matériaux : W. Kurz, J.P. Mercier, G. Zambelli (Ed. Presses Polytechniques Romandes)
- Chemical bonding: M.J. Winter (Oxford Chemistry Primers)
- <http://chimie.net.free.fr/index2.htm> [site opened since 27/08/14]

PRE-REQUISITE

Chemistry and physics knowledge from secondary school (5th, Junior and Final years of high school) about atomic structure and the phases of matter.