

SYLLABUS DEL CORSO

Chimica Inorganica II e Laboratorio

2425-3-E2702Q073

Aims

Familiarize the student with structure, chemical bonding and properties of inorganic solids and nature of transition metal ions.

Contents

Bonding in inorganic solids. Electronegativity and chemical bonding in solids. Ionic bonding. Ionic solids (structure, lattice energy, Born-Haber cycle, covalent character in ionic solids). Crystal field theory and ligand field theory. Synthesis and properties of a few classes of inorganic materials. Solid state synthesis, sol-gel synthesis, hydrothermal synthesis, CVD synthesis. Periodic properties and reactivity of oxides and inorganic materials. Silicates, silica, intercalation materials, zeolites, oxides for catalysis.

Laboratory activities will deal with the crystalline solid state in chemistry by:

- using programme Mercury for visualizing molecules and crystal structures
- point symmetry for molecules by means of symotter.org
- bidimensional space symmetry (programme escher.jar) and basics of tridimensional space symmetry

Detailed program

Bonding in inorganic solids. Electronegativity and chemical bonding in solids. Ionic bonding. Ionic solids (structure, lattice energy, Born-Haber cycle, covalent character in ionic solids). Crystal field theory and ligand field theory. Synthesis and properties of a few classes of inorganic materials. Solid state synthesis, sol-gel synthesis, hydrothermal synthesis, CVD synthesis. Periodic properties and reactivity of oxides and inorganic materials.

Silicates, silica, intercalation materials, zeolites, oxides for catalysis.

Laboratory with interactive teaching in person:

- definition of crystal, unit cell, atomic cell content and evaluation of stoichiometry in crystalline solids
- Mercury CSD software for visualizing of molecules and crystal structures
- point symmetry in molecules
- bidimensional space (wallpaper) symmetry; basics of tridimensional space symmetry

Prerequisites

Basic knowledge of general and inorganic chemistry

Teaching form

The course provides 16 two-hour lectures in person (Delivered Didactics)

Laboratory sessions (Interactive Teaching) are performed with computer sessions using free software suitable for the introductory level of the course. There will be 12 four-hour lab activities, in person with compulsory attendance.

Lectures and laboratory activities will be given in Italian.

Textbook and teaching resource

Lecture notes available can be downloaded from the e-learning platform

Semester

Second semester

Assessment method

Oral Exam. Basic knowledge of inorganic solids (structure and properties) and transition metal ions (crystal field theory).

The exam for the laboratory consists of three tests with problem solving about: . 1) evaluation of stoichiometry in crystals; 2) point symmetry of molecules; 3) two-dimensional symmetry. The tests are individual and will be performed in the laboratory. The report will be evaluated in thirtieths and will weight as 50% of the final mark.

It is possible to take the exam in English.

Office hours

By appointment

Sustainable Development Goals

AFFORDABLE AND CLEAN ENERGY
