



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Chimica Inorganica I e Laboratorio

2425-2-E2702Q092

Aims

Aim of the course is to give a deep knowledge of the chemistry of the elements and the inorganic compounds, focusing on the relationships between structure, properties and reactivity. At the end of the course the student will possess the basic knowledge of inorganic chemistry and will learn some main experimental methodologies for the synthesis of inorganic compounds.

Contents

The course of Inorganic Chemistry is organized in two parts: a) the fundamental topics of inorganic chemistry (atomic structure, molecular structure and chemical bond, structure of the solids, acid and base, oxidation and reduction, coordination compounds, periodic properties of the elements); b) the chemistry of the elements of the main groups and of transition metals.

The Laboratory of Inorganic Chemistry provides a theoretical part to recall and examine in depth the basic knowledge of inorganic chemistry necessary for lab experiments and a practical part of experiments of synthesis and reactivity of inorganic compounds, performed individually or in couple, also devoted to the learning of the main experimental lab techniques.

Detailed program

Inorganic Chemistry.

Atomic structure – Introduction to the chemical bond. The bonding and the properties of covalent and ionic compounds – The structure of the solids - Chemistry of acid/base and donor/acceptor.- Reactions of oxidation and

reduction – Main properties and periodicity of s and p groups and of transition metals. - Hydrogen – Groups 1 and 2 – Group of boron – Group of carbon – Group of nitrogen – Group of oxygen – Halogens- The chemistry of transition metals. Coordination compounds. Coordination number and symmetry. Classification of ligands. The constant of stability. The chemical bond in the coordination compounds. Reaction of complexes: substitution, redox, isomerization. Metallorganic compounds.

Laboratory of Inorganic Chemistry .

Experiences of synthesis and reactivity of the main group element and of transition metals: Synthesis and thermal analysis of oxalates hydrate of Group II; Synthesis of polysiloxanes; The acid properties of boron: synthesis and reactivity of tetrafluoroborate; The oxidation states of tin: synthesis of Sn(II) and Sn(IV) iodides; Synthesis of transition-metal acetylacetonates; Synthesis and properties of ZnO.

Prerequisites

Basic knowledge concerning the General Chemistry and the Laboratory of General Chemistry.

Positive evaluation of General and Inorganic Chemistry and Laboratory Exam of the first year of the Degree Course)

Teaching form

The course of Inorganic Chemistry and Laboratory (10 CFU) include 8 CFU of lectures corresponding to 64 hours and 2 CFU of activities of laboratory corresponding to 24 hours:

- 32 lectures of two hours are delivered as in-presence delivered lessons;
- 6 activities of laboratory of four hours are delivered as in-presence interactive activities.

The lessons are recorded and put at students disposal on the e-learning platform.

Introductory lessons for the laboratory activities, preliminary recorded and integrated with tutorial videos of the experimental operations of the laboratory experiences, are put at students disposal on the e-learning platform.

The lessons of Inorganic Chemistry are delivered in Italian language by the teacher which presents the topics of the course by slide presentation or on the blackboard. The slides of the lessons will be supplied to the students on the e-learning platform. The regular attendance of the lessons is recommended for an easier learning, although it is not more compulsory.

The activities of the Laboratory provides individual or in couple laboratory experiences preceded by the recorded introductory lessons available for the students on e-learning platform and by short lectures also with the help of slide presentation before the beginning of every experience. The attendance of the Laboratory is compulsory

Textbook and teaching resource

Slides of the lessons of Inorganic Chemistry (e-learning)

Learning exercises of the main topics of Inorganic Chemistry (e-learning)

Lecture Notes of the Laboratory experiences (e-learning)

Recording of the Introductory lessons for the laboratory activities (e-learning)

Slides of the Introductive lessons for the laboratory activities (e-learning)

Textbook of Inorganic Chemistry suggested by the lecturer:

M.Weller, T.Overton, J.Rourke, F.Armstrong, La Chimica Inorganica di Atkins, Zanichelli

Semester

Second semester of the second year of the Degree Course.

Assessment method

The student acquires the CFU of the course passing a written and an oral examination. No *in- itinere* tests are provided.

The written examination consists in Relations of scientific laboratory, papers reporting for every laboratory experience the operating methods of the experimental tests, , the obtained results and observations on the own experimental activity. The evaluation of the Reports concerns the knowledge by the student of the inorganic chemistry principles at the basis of the laboratory experiences, and the precisions and accuracy in reporting the results, the graphics and the experimental observations (mark from 0 to 5 for every experience). The positive evaluation of the laboratory reports (minimum average score of 3) and the attendance to the Lab (at least 5 on 6 experiments) allow the admission to the oral exam.

The oral examinations consists in open questions on the topics of the Inorganic Chemistry course and the Laboratory activity treated at the lesson and on the textbooks.

The final grade corresponds to a weighted sum of the results of the two parts of the course.

Office hours

From Monday to Friday by appointment.

Sustainable Development Goals

AFFORDABLE AND CLEAN ENERGY
