UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Inorganic Chemistry I and Laboratory

2324-2-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 betwwen 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 synthesi 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 is organized in lectures, where syllabus topics are exposed with the help of slide presentation (power point) or blackboard explanation. The lessons presentation will be supplied to the students on the e-learning platform.

The Laboratory of Inorganic Chemistry provides individual or in couple laboratory experiences preceded by brief explanatory lectures with the help of slide presentation (power point) or blackboard explanation. The attendance of the Laboratory is compulsory

Textbook and teaching resource

Slides of the lessons of Inorganic Chemistry, Learning exercises aof the main topics of Inorganic Chemistry and Lecture Notes of the Laboratory experiences are supplied by the lecturer in e-learning platform

Textbook of Inorganic Chemistry suggested by the lecturer (P.Atkins, Inorganic Chemistry, Zanichelli)

Semester

Second semester of the second year of the Degree Course.

Assessment method

Laboratory: The assessment, regarding the Lab activity, is composed by : the attendance to the Lab (at least 5 on 6 experiments)

and an evaluation of final report including graphics, numerical results and comments for each laboratory experiments (in printed format, marks in the 0-5 range).

The positive evaluation of the laboratory reports (average score of 3 respect to at least 5 experiences) allows the admission to the oral exam.

The student acquires the CFU of the Laboratory course passing a final oral examination performed in conjunction to that of Inorganic Chemistry.

Inorganic Chemistry: oral exam on the main topics of the course.

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