UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Laboratory of Inorganic Chemistry

2122-1-E2701Q034-E2701Q037M

Aims

General objectives

The course allows students to gain familiarity with laboratory techniques and apparatus, and to apply their knowledge of concepts from General Chemistry course in an actual laboratory situation. The course will also give the basic principles and procedures of laboratory safety.

Knowledge and understanding.

Students, by the end of the course, will learn the basic principles of stoichiometry and of the chemical reactions of inorganic compounds. Moreover, students will learn to know and exploit general chemistry lab equipment and glassware as well as the basic safety rules.

Applying knowledge and understanding.

By the end of the course, students will be able to solve simple problems of stoichiometry and to perform simple chemistry lab experiments.

Making judgments.

By the end of the course, students will become able to choose the methodology to study the chemistry of a selected system and to individuate proper compounds and techniques to carry out simple chemical reactions.

Communication skills.

By the end of the course, students will be able to describe the arguments of the course and to participate in stimulating discussions.

Learning skills.

By the end of the course, students will have developed the ability to solve and face with more complex exercises, arguments and experiments.

Contents

The course is designed in order to recall the basic principles of general chemistry necessary for the understanding of the lab experiments. These practical experiments will be devoted to the learning of the main chemistry lab techniques and will be performed by the student individually or in small groups.

Detailed program

Stoichiometry: Elements, atoms, ions, atomic mass, Periodic system, oxidation number. Molecules, Molecular Mass, Moles, Empirical Formulas and Molecular Formulas, Percent composition of compounds. Balance of chemical eqations. Concentration of a solution, Mixing and dilution, Volumetric Analysis, Equilibrium and equilibrium constant. Dissociation and formation equilibria. Acid and bases, Ionic product of water, pH and pOH, strong and weak acid and bases. pH of the saline solutions. Buffer solutions. Solubility and solubility equilibria, solubility and pH.

Laboratory experiments: Limiting agent, Synthesis and reactivity of inorganic compounds (perborate, alum), redox reactions (copper cycle), solubility , introduction to volumetric analysis (acid-base titrations), precipitation / separation and identification of cations (qualitative analysis), synthesis of materials applicable to electronic devices.

Prerequisites

Algebraic calculations, SI units, knowledge of logarithmic and exponential functions, numbers in decimal and scientific notation, are required. All students must complete mandatory safety training to participate in the course.

Teaching form

The Laboratory of General Chemistry involve 3 CFU of in-class exercises in Italian language and 3 CFU of individual or in couple laboratory experiences in chemistry lab, preceded by brief explanatory lectures in Italian language with the help of slide presentation (power point) or blackboard explanation.

The attendance of the Laboratory is compulsory.

Students lab will start at the end of October 2021. The lab experiments could be performed both in lab and in remote way.

Textbook and teaching resource

Materials to be downloaded from e-learning

Useful text book : Michelin Lausarot, G.A. Vaglio, Stechiometria per la chimica generale, Piccin

Semester

first semester

Assessment method

The evaluation of the 3 CFU related to the in-class exercises will be assessed by two tests during the semester or a global test at the end of the semester, both constituted of exercises connected to the arguments of the lessons. This will help to assess the effective learning by the students of the main principles of chemical stoichiometry.

The exam will be constituted by 6-7 exercises for a maximum duration of 2h 30 min.

In the case of the two tests carried out during the semester, the scheme will be similar, with 4-5 exercises for a maximum duration of 2h.

The assessment, regarding the 3 CFU of Lab activity, is composed by two aspects: the attendance to the Lab (at least 7/9 of the experiments), the evaluation of the reports, including graphics, numerical results and comments (either in printed format or uploaded in the e-learning page, marks in the 0-5 range). This will help to assess the effective learning by the students of the main principles of the chemical reactivity of inorganic compounds.

The evaluation of the lab reports will increment the final mark of the written part according to these indications:

- Reports with marks 27-30: +3 to the average mark of the two tests or to the mark of the global test
- Reports with marks 23-26: +2 to the average mark of the two tests or to the mark of the global test
- Reports with marks 18-22: +1 to the average mark of the two tests or to the mark of the global test

Lab activity concur to assess the unique mark of the complete course of General Chemistry.

Office hours

Any time, to be fixed by phone or e-mail