UNIVERSITÀ DI PAVIA

Anno Accademico 2020/2021

GENERAL AND INORGANIC CHEMISTRY

Enrollment year	2020/2021
Academic year	2020/2021
Regulations	DM270
Academic discipline	CHIM/03 (GENERAL AND INORGANIC CHEMISTRY)
Department	DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
Course	NATURAL SCIENCES AND TECHNOLOGIES
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	1st semester (28/09/2020 - 23/12/2020)
ECTS	6
Lesson hours	48 lesson hours
Language	Italian
Activity type	ORAL TEST
Teacher	CARUGO OLIVIERO ITALO (titolare) - 9 ECTS CAPUCCIATI ANDREA - 0 ECTS
Prerequisites	Given that this is a basic Chemistry course, no previous knowledge of Chemistry is required. Only basic information in Physics (electrostatic and Coulomb force) and Mathematics is necessary.
Learning outcomes	The student is supposed to acquire the basic chemical knowledge that is necessary to understand several geological topics, ranging from mineralogy to geochemistry.
Course contents	The course is divided into four parts. The first part is focused on the electronic structure of atoms and molecules (Bohr's atom model, the Schroedinger equation, the atomic orbitals, the Hartree-Fock approximations for non-hydrogen atoms, periodicity, and the periodic table of the elements). The second part is focused on atomic models and properties of the solid, liquid, and gas states, and on the solutions. Chemical thermodynamics is the focus of the third part; the definition of

	system, the three principles of thermodynamics, and three state functions – enthalpy, entropy, and Gibbs free energy – are described first, and then the chemical equilibrium is defined and examined in acid-base systems – definitions of acids and bases, strong and weak acids and bases, polyprotic acids and bases, definition of pH, computations, and measurements of pH, buffers – and in redox systems – reduction potentials, Nernst equation, batteries, and electrolytic processes - phase diagrams with one and two components are then described and an introduction to chemical kinetics concludes the third part of the course. The fourth and last part is dedicated to an introduction of inorganic chemistry – aluminum, iron, alkali, and alkaline earth metals, copper, silver, and gold – to a brief description of coordination compounds – ligands, chelation, coordination number, coordination geometry – to an introduction to organic chemistry – alkanes, alkenes and alkynes, functional groups, fossil fuels -, and to a short introduction to nuclear chemistry – nucleus stability, alpha, beta and gamma decays, radiometric dating of minerals and artifacts. During the course, several aspects of stoichiometry are introduced, when necessary, including the concept of mole, the computation of solute concentrations in solutions, pH computations, chemical equation balancing and chemical nomenclature.
Teaching methods	The course is organized in daily two-hours lectures and in several sessions of stoichiometry exercises. The lecturer, who speaks English and French, is available for further explanations to foreign students not yet familiar with the Italian language. It is moreover possible to study also on text-book written in languages different from Italian.
Reccomended or required readings	Autore: Nivaldo J. Tro Titolo: Introduzione alla Chimica Casa editrice: Pearson (Ed. 2018) Autori: L. Palmisano, M. Schiavello Titolo: Elementi di Chimica Casa editrice: EdiSES
Assessment methods	Two written tests performed during the course (about 20 questions, one on the atom electronic structure and the other on the chemical bond) and one oral examination at the end of the course.
Further information	Two written tests performed during the course (about 20 questions, one on the atom electronic structure and the other on the chemical bond) and one oral examination at the end of the course.
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile