

Fundamentals of Chemistry

Code: 100915
ECTS Credits: 6

Degree	Type	Year	Semester
2500253 Biotechnology	FB	1	1

Contact

Name: Luis Rodríguez Santiago
Email: Luis.Rodriguez.Santiago@uab.cat

Use of languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

Javier Heras Domingo

Prerequisites

Although there are no official prerequisites, it is advisable for the student to review the general concepts of chemistry, physics and mathematics acquired in the secondary education.

Objectives and Contextualisation

The general objective is to introduce the student to the fundamental concepts of Chemistry. In the long run, it is intended that the student becomes aware of the importance of Chemistry and become familiar with these fundamental concepts of Chemistry.

The aim is to help the student to understand the chemical phenomena of the macroscopic world and to introduce him into the knowledge of the interactions between atoms and molecules at the microscopic level (through the atomic structure and bonding).

The main bases to understand the structure of matter at the microscopic level will be studied, relating them to the type of bond. We will present the basic concepts of chemical thermodynamics that will allow rationalization of macroscopic behavior and the concept of chemical equilibrium. Then, the most common equilibria will be studied and the basic notions of chemical kinetics will be presented.

Main objectives of the subject:

- 1) Introduce the microscopic vision of chemistry.
- 2) Knowing the macroscopic interpretation of chemical phenomena:
 - a. Chemical thermodynamics

b. Chemical equilibrium

c. Chemical kinetics

Content

1. Atomic structure

Hydrogen atom. Polyelectronic atoms. Electronic configurations. Periodic table. Periodic properties.

2. Chemical bond

Chemical bonding models. Covalent bond Lewis structures. Molecular geometry Polarity Hybrid orbitals
Molecular orbitals

3. Intermolecular forces

Hydrogen bonding. Vander Waals Forces

. First law of thermodynamics.

Thermodynamic systems. Internal energy Heat and work. First law of thermodynamics. Reaction heat and standard states. Law of Hess.

5. Second law of thermodynamics.

Spontaneity. Entropy. Second principle of thermodynamics. Entropic Change. Third principle of thermodynamics. Gibbs Energy

6. Definition of chemical equilibrium

Dynamic equilibrium. Expression of the equilibrium constant. Gibbs energy and equilibrium. Criterion of spontaneity. Variation of $\Delta_r G^\circ$ and K with the temperature. Principle of Le Chatélier.

7. Acid-base equilibria

Acids and bases of Brønsted and Lowry. Constants of acidity and basicity. Concept and pH calculation. Buffer solutions

8. Electrochemistry

Equalization of redox reactions. Electrochemical cells. Cell potential. Standard chemical and biochemical reduction potentials. Equation of Nernst.

9. Fundamental concepts of chemical kinetics.

Reaction rate. Rate laws. Reaction order. Dependence of the rate constant with the temperature.

10. Reaction Mechanisms

Rate determining step. Approximation of the stationary state. Catalysis