

Chemistry II

Calendar: 2nd semester

Contact Hours: T=30,0; PL – 37,5; OT – 7,5

Scientific Area: Química

Learning outcomes of the curricular unit

This curricular unit is aimed for the learning of quantitative chemical analysis, in particular, to distinguish between the various chemical equilibria. It is also a goal of this UC to understand: acid-base equilibria in order to use buffers and perform volumetric acid base titrations; complexes and their respective equilibria in order to perform the titration and to determine the hardness of the water. Recognize the solubility equilibria and common ion effect. Understanding redox reactions and their respective dilutions.

Syllabus

Chapter 1

CHEMICAL REACTIONS: Chemical equations; properties of aqueous solutions. Concept of equilibrium and its constants.

Chapter 2

ACID- BASE: definition; acids and base strength and solvent effect; dissociation constants and water autoprotolysis; range of pH, buffer solutions. Exact and approximate methods for determining aqueous solutions pH; acid base indicators and pH titrations; titration curves.

Chapter 3

COMPLEXOMETRIC EQUILIBRIUM: complexing agents; applications and properties of analytical interest; complexometric titrations, titration curves. Determining the water hardness. Indicators.

Chapter 4

SOLUBILITY EQUILIBRIUM: solubility product, precipitation reactions, factors affecting the formation of precipitates; common ion effect and pH.

Chapter 5

REDOX EQUILIBRIUM: Oxidation-reduction reactions; redox titrations.- indicators

Demonstration of the syllabus coherence with the curricular unit's objectives

The goal of the curricular unit is initially to allow students to acquire basic knowledge of chemical equations in aqueous and chemical equilibria. In the remaining sections, students deepen the knowledge of equilibrium in acid-base, complexation and redox reactions as well as solubility equilibrium.

Teaching methodologies

The lectures resort to technical expository of the syllabus stimulating reasoning and critical thinking of students. In practical classes students solve exercises under the teacher's supervision.

Demonstration of the coherence between the teaching methodologies and the learning outcomes.

The main objective of this curricular unit is to enable students to acquire basic knowledge of chemical equilibrium, enabling them to better understand and manage the chemical reactions involved.

These basic contents to be seized correctly by the students are taught in a solid and consistent exposure as theoretical lectures.

The acquired knowledge can be consolidated by solving a relevant amount of exercises and practical problems, either by the teacher or by the student. Finally, the concepts consolidation can be made through laboratorial experiments, results analysis and reports. This fundamental part is achieved in the laboratory curricular unit occurring in the same semester (Laboratory II).