

63243 - Disciplinary Content of Chemistry

Syllabus Information

Academic year: 2023/24

Subject: 63243 - Disciplinary Content of Chemistry

Faculty / School: 107 - Facultad de Educación

Degree: 584 - Master's Degree in Teaching Compulsory Secondary Education

590 - University Master's Degree in Teaching, specializing in Geography and History

591 - Master's Degree in Teaching, specializing in Philosophy

592 - Master's Degree in Teaching, specializing in Business and Economics

593 - Master's Degree in Teaching, specializing in Mathematics

594 - Master's Degree in Teaching, specializing in Technology and Computer Science

595 - Master's Degree in Teaching, specializing in Biology and Geology

596 - Master's Degree in Teaching, specialization in Physics and Chemistry

597 - Master's Degree in Teaching, specializing in Spanish Language and Literature. Latin and Greek

598 - Master's Degree in Teaching, specialization in Foreign Language: French

599 - Master's Degree in Foreign Language Teaching: English

600 - University Master's Degree in Teaching, specializing in Music and Dance

601 - University Master's Degree in Teaching, specializing in Industrial and Construction Processes

602 - University Master's Degree in Teaching, specializing in Administration, Marketing, Tourism, Services to the Community and FOL

603 - Master's Degree in Teaching, specializing in Sanitary, Chemical, Environmental and Health Processes Agri-food

ECTS: 6.0

Year: 1

Semester: Second semester

Subject type: Optional

Module:

1. General information

The general objective of the subject Disciplinary Contents of Chemistry is to provide students of the branches of Science with the necessary knowledge of Chemistry to carry out in a professional, efficient and updated way, the teaching of Chemistry subjects in Secondary Education.

To this end, students must acquire a general vision of chemistry, the ability to reason and analyse simple chemical systems, as well as the importance of chemistry in society.

Students must be able to obtain, analyse and manage relevant information about all this and to use the resources available through the Internet both for their own learning throughout their professional careers and for the learning of their future students.

The approach of the subject corresponds to the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030: ODS-4, ODS-5, ODS-8, ODS-11.

2. Learning results

1. Is able to explain the basic concepts of Chemistry with a global vision that allows its didactic treatment oriented to Secondary Education levels

2. Is able to identify the different types of bonds and rationalize the properties of chemical substances according to their bond type and intermolecular interactions.

3. Is able to apply the concepts of thermodynamics and chemical kinetics in chemical reactions.

4. Is able to apply the concepts of chemistry to the analysis of chemical systems in equilibrium and apply them to the design of red-ox and acid-base reactions.

5. Is able to identify and name the different chemical substances and classify them into organic and inorganic according to their composition.

3. Syllabus

Unit 1: The periodic table and atomic properties. Electronic configurations. Variation of periodic properties. Formulation and inorganic nomenclature.

Topic 2. Chemical Bonding. Ionic, covalent and metallic bonding. Intermolecular interactions. Relationship of properties - type of bond.

Topic 3. Thermochemistry. Conservation of energy. First principle of thermodynamics. Concept of enthalpy. Spontaneity of the processes. Entropy. Second law of thermodynamics. Energetic study of chemical reactions.

Topic 4 Chemical Kinetics. Reaction speed. Theory of collisions. Reaction order. Activation energy. Catalysts.

Topic 5. Chemical Equilibrium. Equilibrium constant. Degree of reaction. Gibbs free energy. Principle of Le Châtelier.

Topic 6. Redox reactions. Adjustment of redox equations. Electrochemical cells. Normal scale of redox potentials. Spontaneity of redox reactions.

Topic 7. Acid-base reactions. Acid and base dissociation equilibria. Water ionic equilibrium and neutralization. Equilibrium constant. Strong and weak acids and bases. Acidity and basicity constants. Concept of pH. Buffering mixtures Acid-base volumetries.

Topic 8. Chemistry of carbon compounds. Organizational functions. Formulation and nomenclature of organic compounds . Isomerism. Hydrocarbons. Alcohols and organic acids. Esters. Polymers and polymerization reactions.

4. Academic activities

Expositions of physical-chemical phenomena directly related to each topic. Group discussion and analysis of the principles to be applied. Individual and group problem solving. Elaboration of the learning portfolio. Exhibitions and demonstrations by students.

Depending on the needs detected, laboratory practices may be organized:

1. Chemical equilibrium, effect of concentration, precision, temperature and common ion.
2. Determination of the acidity of a commercial vinegar.
3. Electrolysis of aqueous solutions of alkaline halides (NaCl, KBr, KI).
4. Separation of organic compounds (acid-base extraction)
5. Work with glass. Obtaining carbon dioxide properties

5. Assessment system

Global written test: The overall written test will consist of questions that require short answers (limited response) and/or questions whose answer consists of a broad development of the topic (essay or free and open response).

Preparation of an individual portfolio: It will reflect the results of the activities carried out. Its minimum contents will be specified throughout the term and will be coherent with the development of the subject.

Attendance and participation: Interventions in debates and presentations of the results of the proposed activities. The student who has attended class regularly, has satisfactorily completed the personal portfolio and has demonstrated achievement of the learning results may be exempted from the written comprehensive test.

Grading.

Continuous evaluation: Attendance at 85% of the sessions, participation in the debates and completion of problems (40% of the final grade) are required. Quality of the presentation and portfolio (60% of the final grade).

Global evaluation pathway: The overall written test will constitute 100% of the final grade.

Students who do not opt for continuous assessment or who do not pass the subject by this procedure will have the right to sit the overall test (final written test).

Second and subsequent calls, including fifth and sixth: In the same terms as the global evaluation described above.

Finally, it must be taken into account that the Regulations of the Norms of Coexistence of the University of Zaragoza will be applicable to the irregularities committed in the evaluation tests by means of academic fraud, as well as the application of article 30 of the Regulations of the Norms of Evaluation of Learning in relation to irregular practices other than academic fraud.

