

29704 - Chemistry

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	434 - Bachelor's Degree in Mechanical Engineering 330 - Complementos de formación Máster/Doctorado
ECTS	6.0
Course	XX
Period	Indeterminate
Subject Type	Basic Education, ENG/Complementos de Formación
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

5.2.Learning activities

5.3.Program

Chapter 1. Basic concepts of chemistry

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1. Atoms and the atomic theory. 2. Atomic structure. 3. An introduction to the periodic table. 4. Nomenclature. 5. Mass's relations in chemistry: atomic mass, the concept of the Mol and molar mass, empirical and molecular formulas. 6. Chemical equation and stoichiometric calculations. 7. Types of chemical reactions. 8. Ways of describing solution composition.

PART II: Chemical Thermodynamics, Chemical Kinetics and Chemical Equilibrium

Chapter 2 . Kinetic and thermodynamic aspects related to chemical reactions

2A. Chemical thermodynamics: 1. Energy, work and heat. 2. Heat of chemical reactions and thermochemical equations. 3. Hess's law. 4. Standard enthalpies of formation and standard change in enthalpy for a given reaction. 5. Direction of the spontaneous processes: entropy, entropy change and standard free energy change.

2B. Chemical kinetics: 1. The rate of a chemical reaction: definition and factors affecting it. A Model for chemical kinetics.

Chapter 3 . Chemical Equilibrium

1. The condition of dynamic equilibrium. 2. The equilibrium constant expression. 3. Relationship between ΔG^0 and the equilibrium constant. 4. Altering equilibrium conditions; Le Châtelier principle.

Chapter 4 . Ionic equilibria

1. Brønsted-Lowry theory of acids and bases. 2. Self-ionization of water and the pH scale. 3. Strengths of acids and bases. 4. Hydrolysis. 5. Acid-base indicators. 6. Solubility equilibria: solubility product constant, K_{sp} . Common-ion effect in solubility equilibria.

Chapter 5 . Redox equilibrium and electrochemistry.

1. Galvanic cells. 2. Standard hydrogen electrode (SHE) and reduction standard. Electrode potentials. 3. Nernst equation. 4. Ecell, ΔG , and K. 5. Commercial galvanic cells. 6. Corrosion. 7. Electrolysis.

PART III: Basic Concepts of Chemistry II

Chapter 6 . Periodic properties of the elements

Chapter 7 . The chemical bond.

1. - Ionic bonds. 2. - Covalent bonds. 3. - Metallic bonds. 4.- Intermolecular forces.

Chapter 8 . - States of matter.

8. A . Gases . 1. - Relationships among pressure, temperature, volume and amount of a gas. 2. - The ideal gas equation. 3. - Mixture of gases: Dalton's law of partial pressures. 4. - The kinetic molecular theory of gases. 5. - Diffusion and effusion: Graham's law. 6. - The behavior of real gases: Van der Waals equation.

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8. B Liquids and solids .-1. - Liquid-vapor equilibrium: vapor pressure and its temperature dependence, boiling point, critical point. 2. - Liquid-solid equilibrium: melting point. 3. - Solid-liquid equilibrium: sublimation point. 4. - Phase diagrams. 5.- Crystal structures. 6. - Correlation between bonding and properties of solids: Ionic solids, covalent solids, molecular solids and metallic solids.

Chapter 9 . Physical properties of solutions

1. Types of solutions. 2. Thermodynamics of the solution process. 3. Solution concentration. 4. Effect of temperature on solubility. 5. Effect of pressure on solubility. 6. Colligative properties.

PART IV: Introduction to Organic and Inorganic Chemistry

Chapter 10 . Introduction to Organic and Inorganic Chemistry

1. Elements: metals and non-metals. 2. Organic compounds: Hydrocarbons and functional groups.

5.4.Planning and scheduling

5.5.Bibliography and recomended resources