

**PROGRAM FOR THE PHYSICS AND CHEMISTRY EXAM
FOR ACCESS AND ADMISSION TO HIGHER EDUCATION FOR INTERNATIONAL STUDENTS**

General Objectives:

- Understand the basic forms of energy and the principle of conservation.
- Describe and analyze motion using fundamental concepts and graphs.
- Apply Newton's Laws and gravitational principles to real-world scenarios.
- Interpret the Periodic Table and the properties of chemical elements.
- Explain the behavior of gases, solutions, and phase changes.
- Identify and analyze chemical reactions, including energy changes.
- Understand chemical equilibrium and factors that influence reactions.

Syllabus:

- 1. Energy and Its Conservation**
 - 1.1. Energy and Motion**
 - 1.1.1. Kinetic and Potential Energy
 - 1.1.2. Work Done by Constant Forces
 - 1.1.3. Kinetic Energy Theorem
 - 1.1.4. Mechanical Energy and Conservation of Mechanical Energy
 - 1.2. Energy and Thermal Phenomena**
 - 1.2.1. Thermal Equilibrium and Temperature Scales
 - 1.2.2. Energy Transfer as Heat (Conduction, Convection, and Radiation)
 - 1.2.3. Phase Changes and Latent Heat
- 2. Mechanics**
 - 2.1. Motion Description**
 - 2.1.1. Position, Trajectory, Distance Traveled, and Displacement
 - 2.1.2. Average Speed and Velocity
 - 2.1.3. Position-Time and Velocity-Time Graphs
 - 2.2. Interactions and Their Effects**
 - 2.2.1. Universal Law of Gravitation
 - 2.2.2. Newton's Laws
 - 2.2.3. Effects of Forces on Velocity
 - 2.3. Forces and Motion**
 - 2.3.1. Uniform Rectilinear Motion and Uniformly Accelerated Motion
 - 2.3.2. Vertical Launch and Free Fall Near Earth's Surface
- 3. Chemical Elements and Their Organization**
 - 3.1. Atomic Mass and Size**
 - 3.1.1. Orders of Magnitude and Length Scales
 - 3.1.2. Atomic Scale Dimensions
 - 3.1.3. Amount of Substance and Molar Mass
 - 3.2. Periodic Table**
 - 3.2.1. Organization of Chemical Elements
 - 3.2.2. Periodic Properties of Representative Elements
 - 3.2.3. Relative Density of Metals
- 4. Properties and Transformations of Matter**
 - 4.1. Gases and Dispersions**
 - 4.1.1. Avogadro's Law: Density and Molar Volume
 - 4.1.2. Substances in the Atmosphere
 - 4.1.3. Quantitative Composition of Solutions

4.2. Chemical Transformations

- 4.2.1. What is Chemical Reaction?
- 4.2.2. Energetic Aspects of Chemical Reaction

5. Chemical Equilibrium**5.1. Quantitative Aspects of Chemical Reactions**

- 5.1.1. Representation of Chemical Reactions
- 5.1.2. Purity of a Sample
- 5.1.3. Complete and Incomplete Reactions
- 5.1.4. Limiting Reactant and Excess Reactant(s)
- 5.1.5. Reaction Yield

5.2. Equilibrium State and Reaction Extent

- 5.2.1. Incomplete Reactions and Chemical Equilibrium
- 5.2.2. Extent of Chemical Reactions
- 5.2.3. Factors Affecting Chemical Equilibrium
- 5.2.4. Optimization of Chemical Reactions

Bibliografia:

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