

Often referred to as a universal solvent, water plays a central role in numerous chemical reactions and processes. The module provides students with a deep insight into understanding the unique chemical properties of water and its importance in various reactions, as well as an in-depth understanding of the scientific principles that govern water and its interactions with other chemicals and substances. It lays the foundation for further studies and applications in water science.

1. Introduction

Objectives: To provide students with an overview of the subject area and to highlight the importance of water from a natural science perspective.

Contents: Presentation of the module, emphasis on the relevance of water in scientific processes, short preview of the module contents.

2. Chemical basics

Objectives: Basic understanding of chemical concepts and terms. Insight into the molecular structure of water.

Contents: Basic concepts of chemistry (elements, molecules, ions, etc.), Introduction to types of bonds.

3. Water - a special molecule

Objectives: Explanation of the chemical properties of water and its uniqueness.

Contents: Structure of water molecule, polarity, hydrogen bonding, thermodynamic and kinetic properties of water.

4. Water as a solvent

Objectives: To illustrate the prominent role of water as a solvent.

Contents: Interactions of water with ions and molecules, hydration, properties of aqueous solutions.

5. Reactions of acids and bases

Objectives: Understanding of the theory and practice of acids and bases in aqueous solutions.

Contents: Theories of acids and bases, measurement and calculation of pH, buffer solutions.

6. Solubility and solubility product

Objectives: Insight into the principles of solubility and the concept of solubility product.

Contents: Factors affecting solubility, saturation solutions, solubility product and its importance.

7. Redox reactions

Objectives: To understand the principles and applications of redox reactions in aqueous solutions.

Contents: Basic concepts of oxidation and reduction, galvanic cells, electrochemistry.

8. Lime-carbonic acid equilibrium.

Objectives: To recognise the chemical interactions between lime and carbonic acid and their relevance to water chemistry and treatment.

Contents: Equilibrium reactions of lime and carbonic acid, precipitation of calcium carbonate, applications in water treatment.