Level: Bachelor

Course title: Development of basic chemical concepts

Status: elective

ECTS: 5

Requirements: none

Learning objective

To develop students' critical attitude through the idea of development of the basic chemical concepts: *the corpuscular concept, the concept of conservation, the concept of chemical equilibrium and the concept of acids and bases.*

Learning outcome

After successfully completing the course, the student is able to:
Understand that the basic chemistry concepts are subject to development; understand that modern chemical aspect of the study of nature is based on the idea of the corpuscular nature of the substance and the principle of conservation; Explain the physical properties and chemical behaviour of substances with the structure of particles that build them and their interactions; Critically analyze the development of basic chemical concepts; Apply modern chemical theories to explain chemical phenomena.

Syllabus

Theoretical instruction:

Corpuscular concept – Development of the idea about the particle nature of substance; Atoms, molecules and ions; Development of the theories on atomic structure; Nucleus of an atom; Electron configuration (Bohr model and the quantum mechanical theory); Absolute and relative masses of subatomic particles and atoms; Molecules; Chemical bond; Development of the theories of chemical bonding; Covalent substances; Ionic crystals; Chemical formulas and their meanings; Complex chemical systems; Types of disperse systems; Quantitative composition of disperse systems.

The concept of conservation - Development of the conservation concept; the law on conservation of mass, Chemical reaction; Chemical equations and their quantitative meaning; Thermal effects of chemical reactions and Hess' law.

The concept of chemical equilibrium – Chemical reaction rate, The systems of equilibrium reactions. Development the theory of chemical equilibrium; Application of the chemical equilibrium theory in the process of electrolytic dissociation. Complex chemical equilibriums - oscillatory reactions.

The concept of acids and bases - Development of theories on acids and bases. The theory of electrolytic dissociation (strong and weak electrolytes, amphoteric hydroxides). Protolytic theory (the concept of acid and base, ampholites). Lewis theory (electron donor and electron acceptor). Pearson theory (hard and soft acids and bases).

Practical instruction:

Exercises, Other forms of teaching, Study research work

Analysis of development of the corpuscular concept, the concept of conservation, the concept of chemical equilibrium and the concept of acids and bases. Proving the particle nature of the substance. Determination of Avogadro's number. The development of criteria for the classifications of substances: descriptive, functional and conceptual criteria. Heat of neutralization. Converting chemical energy into other forms of energy. Factors influencing the composition of the equilibrium mixture. Oscillatory reactions. Experiments illustrating the developmental concept of acids and bases.

Weekly teaching load				Other:
Lectures: 2	Exercises: 2	Other forms of teaching:	Student research:	