

86S1-CHEMOG

GENERAL CHEMISTRY

ECTS: 6.0

HOURS PER SEMESTER/WEEK: LECTURES: 30/2; CLASSES: 75/5

FIELD OF THE STUDY: Chemistry

Level of study: First-cycle (Bachelor's degree) program

Course status: obligatory *

Year of the study: I

COURSE CONTENTS

LECTURES: Division of elementary particles. Models of the structure of the atom. Periodic table of elements. Durability of atomic nuclei, natural and artificial radioactivity. Chemical bonds and intermolecular interactions. Matter: elements, chemical compounds and mixtures. Division of inorganic compounds - preparation methods, nomenclature. Basic concepts and chemical laws. Chemical reactions and their classification. Redox reactions, basics of electrochemistry (voltage series of elements, standard potentials of redox systems). Basic issues related to the kinetics of chemical reactions. Chemical balance and influence of external factors on chemical balance. The concept of a solution, division of solutions (colloids, proper solutions). Equilibria in solutions. electrolytic dissociation and hydrolysis; weak and strong electrolytes, dissociation constant and degree, Debye-Huckel theory of strong electrolytes, ionic strength and activity. Theories of acids and bases. The ionic product of water, the concept of pH. Buffer solutions - types, mechanism of action and pH. Solubility and solubility product. Coordination compounds: concept of central atom and ligand, nomenclature of complex compounds, stability and instability constants of complex compounds.

CLASSES: Glassware and laboratory instruments, glass washing and processing. Mixtures, their division and separation. Basic techniques of laboratory work (weighing, precipitation, filtration, evaporation, crystallization, distillation). Types of chemical reactions. Synthesis reactions, exchange analysis. Exothermic and endothermic reactions. Neutralization and precipitation reactions, reactions of acids and bases with amphoteric hydroxides. Testing pH of hydrolyzing salt solutions. Oxidation and reduction reactions. Fundamentals of electrochemistry, electrochemical series of metals, cell, electrolysis. Factors affecting the solubility of chemical compounds. Methods of obtaining and stability of complex compounds. Study of the effect of temperature and catalyst on the rate of chemical reaction. The law of action of the masses and the rule of perversity. Equilibria in solutions of acids and bases. Introduction to volumetric analysis: ways to prepare solutions of specific concentration. Dilution of solutions. pH measurement of prepared solutions. Buffer solutions: preparation of buffer mixtures with a specific pH. Determination of buffering range and buffering capacity.

EDUCATIONAL PURPOSE: Learning the basics of general chemistry, which are important in the next stages of chemical education. The student will get acquainted with various types of transformations of matter in the universe and with the laws governing these transformations. They will acquire elementary chemical concepts, their meaning, universality and omnipresence in everyday life, industry, medicine, etc. The purpose of laboratory exercises is to acquire basic skills related to working in a chemical laboratory and to learn about basic laboratory equipment. Acquiring the skills of critical evaluation and interpretation of experimental results.

LEARNING OUTCOMES

Knowledge. The student has a basic knowledge of general chemistry. Has basic knowledge of chemical elements and their compounds. He knows the mechanisms of chemical bond formation and the mechanisms of intermolecular interactions. He knows the nomenclature of inorganic compounds. He knows the basic methods and devices used in chemical experiments.

Skills. The student is able to use basic laboratory equipment. Performs calculations and measurements of selected physicochemical parameters independently.

Social competences. The student demonstrates responsibility for the safety of his own and others' work. Has the ability to use the acquired knowledge to assess the threat to human health and the environment and ways to counteract these threats. He is open to working in a team and performing various functions in it.

TEACHING FORMS AND METHODS

Lectures. Lecture with multimedia presentation.

Classes. Chemical experiments combined with the analysis of experimental results and discussion.

FORM AND CONDITIONS FOR VERIFICATION OF LEARNING OUTCOMES

Lectures. written exam with open questions (tasks).

Classes. execution of all exercises and passing the report of each laboratory exercise; passing a written test on topics including laboratory exercises. The material will be divided into at least four parts.

BASIC LITERATURE

1) Ebbing D.D., Gammon S.D., General Chemistry. Houghton Mifflin Company, Boston/New York, 2009

ADDITIONAL LITERATURE

1) General Chemistry. Wikibooks. Available on line: https://en.wikibooks.org/wiki/General_Chemistry

THE TEACHER/TEACHERS CONDUCTING THE CLASSES:

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