

**Thematic plan of seminar-type classes
in discipline «Chemistry» for students of 2025 year of admission
under the educational programme
31.05.03, Dentistry
specialisation (profile) Dentistry
(Specialist's degree),
form of study - full-time for the 2025-2026 academic year**

№	Thematic block	Hours (academic) ³
1 semester		
1.	Safety rules in a Chemical Laboratory. Chemical equivalent. ¹ Methods expressing concentration. Calculation of the concentration of solutions. ² Problem solving.	4
2	The subject and methods of chemical thermodynamics. ¹ The first principle of thermodynamics. Enthalpy. Hess's law. The second law of thermodynamics. Reversible and irreversible processes. Entropy. Gibbs energy. Thermodynamic equilibrium conditions ² . Problem solving. Laboratory practice.	4
3	The subject and basic concepts of chemical kinetics. ¹ The law of the acting masses. Factors affecting the reaction rate. Problem solving. Complex reactions. Activation energy; the Arrhenius equation. The catalyst. Homogeneous and heterogeneous catalysis. The energy profile of the catalytic reaction. Features of the catalytic activity of enzymes. The Michaelis-Menten equation and its analysis ² . Laboratory practice.	4
4	Control of knowledge, skills, and abilities in modular units 1,2 ¹ (intermediate control)	4
5	Colligative properties of solutions. ¹ Conditions of dissolution and precipitation formation. Raoul's law, consequences of Raoul's law. Osmosis. Electrolytes in the body, saliva as an electrolytes ² . Problem solving. Buffer systems. ¹ The mechanism of action of buffer systems. Buffer zone and buffer zone container. The Henderson-Hasselbach equations. Calculation of the pH of protolytic systems. Buffer blood systems ² . Problem solving. Laboratory practice.	4
6	Комплексные соединения. ¹ Основные положения координационной теории Вернера. Классы комплексных соединений. Номенклатура, изомерия комплексных соединений. Устойчивость комплексных соединений. Медико-биологическая роль комплексных соединений. Комплексоны ² . Лабораторный практикум.	4
7	Electrochemistry. ¹ Conductometry. Specific and equivalent electrical conductivity. Kohlrausch's law. Problem solving. Potentiometry. Electrode potentials and their mechanisms occurrences. The Nernst equation for calculating electrode potentials. Oxidizing -regenerative potentials, the mechanism of their occurrence, biological significance. The Nernst equation - Peters ² . Problem solving.	4
8	General classification of metals and alloys. ¹ Corrosion of metals. Metal alloys in dentistry ² . Problem solving.	4
9	Control of knowledge, skills, and abilities in modular units 3,4 ¹ (intermediate control)	4
10	The beginning of organic chemistry. ¹ Theory of structure by A.M. Butlerov.	4

	Classification, nomenclature, and isomerism of organic compounds. The concept of configuration and conformation of molecules ² . Problem solving.	
11	Optical isomerism. ¹ D,L isomerism. Fischer projection formulas. R,S , and E,Z are isomerisms. Inductive and mesomeric effects. Pairing. Mechanisms of chemical reactions ² . Problem solving	4
12	Alcohols, phenols. ¹ The structure of the hydroxyl group, the effect on reactivity. Chemical properties. Nucleophilic substitution of a hydroxyl group in alcohols. Electrophilic substitution reactions in phenols. ² Aldehydes, ketones. ¹ The structure of the carbonyl group, the effect on reactivity. Chemical properties. Reactions of nucleophilic addition. ² Laboratory practice	4
13	Heterofunctional aliphatic compounds: amino alcohols, hydroxy - and oxoacids. ¹ Chemical properties and medical applications of heterofunctional compounds. Amino alcohols: colamine, choline, acetylcholine. Specific reactions of α -, β - and γ - hydroxy acids. Lactic, tartaric, malic, citric acids. Oxoacids: glyoxalic acid, pyruvic acid, acetoacetic acid. Phenolic acids: salicylic acid ² . Laboratory practice	4
14	Amino acids, peptides, proteins. ¹ Structure and properties of the amino group. Classification. Chemical properties. Peptides. Synthesis of peptides. The structure of the peptide bond. Proteins, their structure and biological role. Qualitative reactions to proteins and amino acids ² . Laboratory practice.	4
15	Гетероциклические соединения. ¹ Классификация, номенклатура. Применение в медицине. Пятичленные гетероциклы с одним (пиррол, фуран, тиофен) и двумя гетероатомами (пиразол, имидазол, тиазол, оксазол). Строение. Химические свойства. Ацидофобность пиррола и фурана. Реакции электрофильного замещения. Порфин как устойчивая тетрапиррольная система. Шестичленные гетероциклы с одним (пиридин, хиолин) и двумя (пиримидин) гетероатомами. Строение. Химические свойства. Реакции электрофильного и нуклеофильного замещения. Никотиновая кислота. ² Лабораторный практикум	4
16	Carbohydrates. ¹ General characteristics and classification of carbohydrates. Monosaccharides. Chemical properties. Stereoisomerism. Cyclo - oxotautomerism. Haworth formulas, mutarotation. Oligosaccharides. Reducing and non-reducing disaccharides. Types of O -glycoside bond. Polysaccharides. The main representatives of carbohydrates. Heteropolysaccharides and their role in biology and medicine. ² Laboratory practice	4
17	Nucleic acids. ¹ Purine and pyrimidine bases. Nucleosides, nucleotides, structure, biological activity. The structure of ribonucleic and deoxyribonucleic acids. The primary and secondary structure of nucleic acids. The role of DNA and RNA in biochemical processes. ² Laboratory practice	4
18	Control of knowledge, skills and abilities by modular units 5,6 ¹	4
	Total	72

¹ – topic

² – essential content

³ – one thematic block includes several classes, the duration of one class is 45 minutes, with a break between classes of at least 5 minutes

Considered at the department meeting of Chemistry, protocol of «30» May 2025 № 10.

Head of the Department of Chemistry



A.K. Brel