

Ministry of Health of the Republic of Belarus
Educational institution
"Gomel State Medical University"

Department of Biological Chemistry

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METHODOLOGICAL RECOMMENDATIONS

for a practical lesson in the academic discipline "Biological Chemistry"
for 2nd year **students** of the Faculty of Foreign Students
majoring in 1-79 01 04 "Medical Care"

Topic: Enzymes 1. Structure, properties, nomenclature and classification of enzymes.

Duration 4 hours

Approved at the meeting of the Department of Biological Chemistry
(Protocol No. 10 dated 29.08.2025)

Gomel, 2025

1. TRAINING AND EDUCATIONAL OBJECTIVES, MOTIVATION FOR COMPLETION OF THE TOPIC, REQUIREMENTS FOR THE INITIAL LEVEL OF KNOWLEDGE

The basis of the vital activity of any organism is chemical processes. Almost all of them proceed with the participation of natural biocatalysts - enzymes. They selectively transform substrates along a physiologically beneficial pathway. Thus, enzymes control all metabolic processes in the body.

The purpose of the class:

To consolidate students' knowledge of the structure of proteins, to form their ideas about the structure and properties, nomenclature and classification of enzymes, to master the method for determining the content of total protein in blood plasma by the biuret method and to assess its diagnostic significance. To instill in students a sense of pride in their chosen profession and to form in them a culture of respect for their health.

Class objectives:

The student should know:

1. structure and physicochemical properties of proteins,
2. nomenclature and classification of enzymes,
3. types of biological catalysts,
4. structure, properties of simple and complex enzymes, cofactors and coenzymes.

The student should be able to:

1. determine the content of total protein in blood plasma by the biuret method and evaluate its diagnostic value.

2. CHECKLIST OF THE QUESTIONS FROM RELATED SUBJECTS

2.1. The device and principle of operation of the photoelectric colorimeter (biomedical physics)

3. CHECKLIST OF CONTROL QUESTIONS FOR THE LESSON

3.1 Biological catalysis. Types of biological catalysts (enzymes, ribozymes, abzymes). History of enzymology.

3.2 The concept of enzymes. Features of enzymatic catalysis. Evidence of the protein nature of enzymes.

3.3 The structure of enzymes. Simple and complex enzymes. Enzyme cofactors and coenzymes. The participation of vitamins in the building of coenzymes.

3.4 Structural and functional organization of the enzyme: active site (substrate), allosteric site.

3.5 Units of measurement of enzyme activity: U (unit), katal. Specific activity and turnover number. Qualitative detection of enzymes and quantification of their activity. Isolation and purification of enzymes.

3.6 Nomenclature and classification of enzymes.

4. PRACTICAL PART OF THE LESSON

Laboratory work No. 1 "Studying the action of enzymes", laboratory work No. 2 "Studying the influence of various factors on the rate of enzymatic reactions" are performed according to the publication "Biological Chemistry: Workbook" (in 2 parts, part 1) / Gritsuk A.I. [et. al.]. - Gomel: GomSMU, 2021. - 76 p.

Laboratory work No. 3 “Determining of α -amylase activity in blood plasma by Caraway unified method”.

The experimental part of the laboratory work is performed using a set of reagents for determining the activity of alpha-amylase in blood serum (plasma) and urine by the amyloclastic method (alpha-amylase-Vital). The theoretical part of the laboratory work is carried out according to the publication "Biological Chemistry: Workbook" (in 2 parts, part 1) / Gritsuk A.I. [and etc.]. - Gomel: GomGMU, 2021. - 76 p.

5. PROCESS OF THE LESSON

5.1 Introduction

5.2 The theoretical part of the lesson: control questions are considered, an oral survey of students is carried out.

5.3 Practical part of the lesson: the experimental part of laboratory work No. 3 "Determining of α -amylase activity in blood plasma by Caraway unified method" is performed according to the instructions, the theoretical part using a workbook on biological chemistry. In the practical part of the lesson, during the incubation of solutions in a thermostat, it is possible to discuss theoretical material or solve situational problems.

5.4 Control of mastering the topic.

5.5 The final part of the lesson. Summing up, checking the protocols, announcing assignments for the next lesson.

6 QUESTIONS FOR KNOWLEDGE SELF-CONTROL

Self-control of knowledge on the topic “Structure, properties, nomenclature and classification of enzymes” is carried out by computer testing using the Moodle platform, access mode: <https://dl.gsmu.by/mod/quiz/view.php?id=5024>.

7. LIST OF REFERENCES:

1. Harper's Illustrated Biochemistry / Victor W. Rodwell [and oth.]. — 30th edit. -New York[and oth.] : McGraw-Hill Education, 2015. — 817 p.
2. Meisenberg, G. Principles of medical biochemistry / G. Meisenberg, W. H. Simmons. — 4th ed. -Philadelphia: Elsevier, [2017]. — xii, 617 p.
3. Vasudevan, D. M. Textbook of biochemistry for medical students / DM Vasudevan, S Sreekumari. — 5th ed. — New Delhi : Jaypee brothers medical publishers, 2009. — xvi, 535 p.
4. Gritsuk, A. I. Biochemistry. P. 1 : lectures, notes / A. I. Gritsuk, A. N. Koval ; Gomel state medical University, Department of biochemistry. — Gomel, 2016. — 380 p.