

Biophysics (Pharmacy)

LESSON № 1

The topic of section: Introduction to the subject " Biological Physics ".

The topic of seminar: Physics and Biophysics, subject and methods. Introduction to the workshop. Types of measurement and calculation of measurement errors. Theory of errors.

The purpose of lesson: Learn the procedure for processing of direct and indirect measurement of physical quantities. How to calculate the random error of the direct and indirect measurements.

Theoretical questions:

1. Direct and indirect measurement of physical quantities.
2. Systematic and random errors, error theory
3. The assessment and calculation of random errors of direct measurements.
4. Evaluation and calculation of the random error of indirect measurements.
5. Definitions of the confidence interval, confidence level. Finding Student coefficients.

Practical tasks:

1. Calculate the absolute and relative error and standard deviation of the diameter of the tablets of the total sample of 10, if the value of direct measurements are, respectively: 2.36; 2.42; 2.35; 2.37; 2.34; 2.32; 2.39; 2.41; 2.39; 2.41.

2. Produced fivefold measurement of the surface tension of hawthorn alcohol solution using the Rebinder's method. Calculate the surface tension of the test solution using the following

formula. $\sigma = \sigma_0 \frac{h}{h_0}$, where σ_0 – the surface tension of distilled water ($\sigma_0 = 72 \text{ mN} / \text{m} = 72 \cdot 10^{-3} \text{ N} / \text{m}$), h_0 - the difference in pressure for a distilled water, h - the difference in pressure for an alcohol solution (millimeter scale in U-shaped pressure gauge).

$h_0, \text{ mm}$	10	11	9	10	9
$h, \text{ mm}$	5	5	4	6	5

Determine the average value and the statistical error at a confidence level $\gamma = 0,95$.

Literature

1. Medical and biological physics for medical students: Textbook / L.V.Kucharenko et all. – Minsk: BSMU. 2015. – 260p. *Chapter 4.topic 4.3*
2. Medical and Biological Physics. Workshop: Textbook / V.G.Leschenko [et al.]; ed. V.G.Leschenko. - Minsk: The new knowledge; Moscow: INFRA-M, 2013. - 334 p. P. 64–74.