There are random numbers generators in the mathematical programs of MATHCAD, MAPLE, MATLAB, STATISTICS and other. It is possible to get the arrays of random numbers with the different laws of distributing – even, normal, exponential and other with their help.

It is shows the study of Brownian motion by using of random number generator and calculations of integrals in this work.

Aim of work. Different tasks for the decision of which the method of Monte Carlo is used are considered in our researches.

Methods of research. The program MATHCAD is using for demonstration of solving of different tasks by using of Monte-Carlo method:

1.Generation of random numbers. The different variants of the programs realizing this process are considered.

2.Demonstration of one-dimension moving of particle.

3.Two-dimension Brownian motion of particle. The numeral experiment is made on verification of Einshtein-Smolukhovsky equation for diffusive processes.

4. Three-dimension Brownian motion of particle.

5. The numeral experiment is made on verification of Einshtein-Smolukhovsky equation for diffusive processes.

6. Calculation of double integrals, triple and multiple.

Results of researches. The numeral experiments are look the possibilities of Monte-Carlo method for modelling of different processes in physics, mathematics, biology.

Conclusions. Monte-Carlo method can be using for solving of many tasks, which not possible to solve by traditional methods.

REFRACTOMETRY IN ANALYSIS OF MULTICOMPONENT MEDICINES

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Relevance. Currently, a lot of attention in pharmacy is given to multi-component drugs, which, due to the various substances that make up their composition, ensure the complexity of their properties. Examples of such drugs are multivitamins, agents for the symptomatic treatment of colds. The presence of several substances in the pharmaceutical composition causes a wider spectrum of action, accelerating the process of recovery of the patient. In this regard, the efforts of scientists are aimed at the creation and study of combined drugs.

Purpose of the study. Theoretically justify the use of refractometry in the analysis of multi-component drugs.

Materials and methods. Various chemical and physicochemical methods, in particular, based on refractive index measurement, are used to analyze such drugs.

Refractometry is one of the most common methods for the identification of chemical compounds, quantitative and structural analysis, and the determination of the physicochemical parameters of substances.

Refractometric determination of dosage forms consisting of two or more components is based on the additivity of the increments of the refractive indices.

For example, scientists-pharmacists have developed a method for applying refractometry for the quantitative determination of polyvinylpyrrolidone (PVP), which has an advantage compared to other physicochemical methods, since polyvinylpyrrolidone is a polymer that is obsessed with titrimetric methods in its composition.

To determine the PVP content, the analyte powder was transferred to a solution of the exact concentration by a volume-volume method, and the refractive index was determined for the resulting aqueous solution.

Results. To calculate the content of the PVP complex in the solution prepared for refractometry, respectively, use the formula:

$$W\% = \frac{n(n_0 + C_{novocaine}F_{novocaine} + C_{ioda}F_{ioda}V)}{F_{pvp}m_{nav}}$$

Conclusion. This method of determining the content of substances in the composition using the refractometric method, allows you to analyze multi-component drugs.

GRAPH THEORY IN MEDICAL AND PHARMACEUTICAL INVESTIGATIONS

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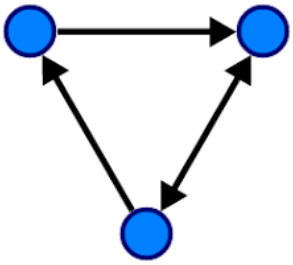
Introduction. Graph theory is the area of discrete mathematics, which feature geometric approach to the objects study. Modeling of complex systems starts with qualitative description of the system structure in which various relationships between its components are identified. Mathematical tool to formalize the structure of relationships in such models are graphs. Visibility in the description of the structure depends on the dimension of the graph, but application of algorithms developed, with implementation in special or standard programs, processing data large numbers processing enables to obtain required information.

Aim. Graph theory is applied in the description of environmental and biological systems. Important tasks of the system analysis are the prediction problem, especially while some biosystem imbalance. In this case it is useful to present different scenarios and to detect possible underlying causes that lead to chaotic behavior of the system.

Materials and methods. As the most illustrative examples of graph models in biology are usually power supply. However, the graph in which recorded only the relationship of the "predator-prey" is insufficient for modeling complex, multi-component biological system. Methods for the task graphs:

1. Geometric:



2. Matrix adjacency:

	a	B	c	d
A	0	1	1	0
B	1	0	1	0
C	1	1	0	1
D	0	0	1	0

The adjacency matrix is a square matrix of dimension which is equal to the number of vertices. Moreover, a [i, j] is an integer which is equal to the number of edges connecting the i-th, j-th vertex. If there are no loops in the graph, then the diagonal elements are equal to 0. If the edges are not repeated, then all the elements are 0 or 1. If the graph is undirected, then the matrix is symmetric.