

## DEVELOPMENT OF THE APPLICATION OF THE MONTE CARLO METHOD FOR SOLUTION OF ECOLOGICAL CHEMISTRY TASKS

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**Abstract.** The possibilities of application of the Monte Carlo method for the purpose of simulating the consequences of burst emissions of pollutants in the case of their specific adsorptive binding by the underlying surface (water, soil) are considered. An evaluation of the historical development of this class of modeling methods is carried out. The limiting cases of the modes of diffusion, drift, and chemical degradation of the pollutant are considered, as well as all kinds of their combinations. The results of model calculations by Monte Carlo are compared with the results of numerical integration of the differential equation for the pollutant distribution obtained for identical conditions. The complete adequacy of the simulation model is shown and its advantages associated with the stability of the solution and lower costs of computer time are demonstrated. The basic techniques for the implementation of the model in the VBA-Excel environment are shown. The possibilities of the developed software toolkit for the application of the Monte Carlo method to solving problems of the spatio-temporal dynamics of a pollution spot in natural conditions are demonstrated. Effective methods of obtaining kinetic curves for the concentration of a pollutant for a selected square on the field and constructing contamination profiles for a specified time are analysed and formulated. The estimation of the necessary parameters of the model for obtaining high-quality kinetic curves was performed and recommendations for their optimization are given.

**Keywords:** Monte-Carlo method, mass transfer, bulk emissions, adsorption, spatial-time dynamics, computational efficiency.