Abstract

The thesis deals with the synthesis and evaluation of quaternary ammonium salts. The theoretical part describes the chemical structure of these substances, their physico-chemical properties and decontamination capabilities.

The experimental part deals mainly with the synthesis of new quaternary ammonium salts, but also with the extension of the spectrum of commonly used substances (benzoxonium salts). The research work includes the preparation of mono-quaternary and bis-quaternary derivatives.

The following part of the experimental work focuses on the decontamination capabilities of CAS, the determination of the critical micellar concentration as a fundamental characteristic of these surfactants and the determination of cytotoxicity as their fundamental biological characteristic. Methods for determining the minimum inhibitory and bactericidal concentration on selected planktonic forms of bacteria and determining the minimum biofilm eradicating concentration on two bacterial biofilms were also included as characteristics of potentially decontaminating properties of a biological nature. This work also deals with the evaluation of antiviral activity on murine cytomegalovirus and new type of coronavirus . The above-mentioned determination of the critical micellar concentration is necessary to determine the hydrolytic activity of selected CAS on the model organophosphorus substance fenitrothion.

The prepared substances have certain structural characteristics that are necessary for their antimicrobial and hydrolytic activity. This is mainly the presence of quaternary nitrogen, hydroxyethyl groups and a long alkyl chain (in the case of mono-quaternary derivatives C_{12}-C_{16}, in the case of bis-quaternary derivatives C_8-C_{12}). The most effective substances are the most suitable candidates for the preparation of decontamination mixtures against biological and chemical agents.

Keywords

Synthesis, quaternary ammonium salts, disinfection, decontamination, antimicrobial effect, biofilms