**Summary:**

Nowadays, the chirality of drugs is an interesting area in the field of designing and marketing of new therapeutic agents. This is particularly evident through the increase in the global trend in the number of new enantiomerically pure drugs approved. The use of biotechnological methods that allow obtaining chirally pure products based on the use of enzymes as enantioselective catalysts seems to be beneficial from an economic and ecological point of view. The biotransformations carried out in this way do not require drastic reaction conditions, which is part of the trends in green chemistry.

The research described in this dissertation focuses on the development of chromatographic separation using chiral stationary phases and UPLC-MS/MS system allowing the simultaneous determination of substrates and products of enantioselective biotransformation, as well as on the kinetic resolution of (*R*,*S*)-atenolol, with the use of lipases from *Candida rugosa* in free and immobilized form, along with the evaluation of their catalytic activity.

In the first stage of the research, the chromatographic separation of (*R*,*S*)-atenolol enantiomers was optimized. For this purpose, commercially available chromatography columns and various mobile phase compositions were tested.

In the next stage of the studies, the kinetic resolution of (*R*,*S*)-atenolol was optimized. Screening tests were carried out, which determined the effect of the reaction environment
(11 organic solvents tested), the effect of the acetyl group donor (comparison of vinyl acetate and isopropenyl acetate), and the effect of protein catalyst (9 commercially available lipases tested) for the biotransformation being developed. As a result of the research, a reaction mixture was proposed that allowed to obtain enantiomerically pure atenolol ester.

The next step of the studies relied on the optimization of lipase immobilization onto the magnetic nanoparticles. For this purpose, a series of tests were carried out, as a result of which 6 magnetic materials were selected on which two different lipase from *Candida rugosa* were immobilized. Then, selected immobilizates were used in the reaction of enantioselective acetylation of racemic atenolol. Due to the fact that the magnetic nanomaterial, to which the enzyme was attached, shows superparamagnetic properties, the protein catalyst was isolated from the reaction mixture and used in subsequent catalytic cycles, thus examining the catalytic activity and operational stability of the lipase.

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