Abstract

Biocatalysis is a process that uses e.g. enzymes to catalyze chemical reactions. Lipases are commonly used enzymatic proteins in catalytic research. They are characterized by high catalytic activity (enantioselective and lipolytic activity). The enantioselective activity enables catalyzing reactions, e.g. kinetic resolution of racemic mixtures of chemical compounds to obtain optically pure enantiomers, while the lipolytic activity allows hydrolytic decomposition of triglycerides of fatty acids.

The research presented in this doctoral thesis concerned the evaluation of enantioselective activity (in the kinetic separation of (R,S)-1-phenylethanol) and lipolytic activity (by hydrolysis of triglycerides of ω3/ω6/ω9 fatty acids) of lipases from *Burkholderia sp.* (Lipase Amano PS from *Burkholderia cepacia*, APS-BCL) and *Aspergillus sp.* (Amano Lipase A from *Aspergillus niger*, AA-ANL). The immobilization process on polymer supports was carried out to increase the catalytic parameters of lipases.

The results indicate high enantioselective and lipolytic activity of APS-BCL in the free form, high enantioselective activity, and slightly lower lipolytic activity in the immobilized form compared to the free form. On the other hand, the enantioselective activity of the AA-ANL reached a low value for both the free and immobilized form, while the lipolytic activity in the immobilized form significantly increased compared to the free form. The conducted experiments showed the positive role of lipases in catalyzing reactions of pharmaceutical importance. The catalytic models designed as part of research, the so-called "catalytic triangles" can be the basis for pharmaceutical research on an industrial scale.

Keywords: lipase, polymeric supports, catalytic activity, (*R,S*)-1-phenylethanol, unsaturated fatty acids

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