Lipases have been widely applied in the manufacture of food products and in some areas of the industry, nowadays they are used in synthetic organic chemistry catalyzing the hydrolytic/esterification reactions under very mild conditions in the field of protecting groups or enantiomer resolution.
In this study, the commercial lipase from bacterium Pseudomonas fluorescens was immobilized using the sol-gel process into organosilicate materials with propyl, octyl or phenyl substituents. The highest hydrolytic activity was found in the enzyme on the octyl-derived carrier. The immobilized enzymes differ in their hydrolytic activities on 4-nitrophenyl esters of various lengths. Subsequent experiments revealed quite good pH stability of the enzymes in a buffer (incubations in pH 3 through pH 11), as well as good temperature stability in isooctane (incubations at up to 100 °C). The majority of organic solvents seem to have no substantial effect on the lipase activity.
The biocatalytic properties were studied on a model compound from the group of the acyclic nucleoside analogues – 9-(2',3'-dihydroxypropyl)adenine (DHPA). It was found for example that the best acyl donors are vinyl esters, that the lipase shows a preference towards longer vinyl esters, that the reaction proceeds faster in non-polar solvents or that it is possible even under the conditions where the substance is completely insoluble. The attempts for the esterification of other acyclic nucleoside analogues were unsuccessful, and so it was in the case of enantioselective esterification of DHPA.
Satisfactory results were obtained also during the acylation reactions of the second model compound 2-phenylpropanol. For example, in the reaction leading to a benzoate ester the lipase was found to prefer the S enantiomer to a certain extent.

(In Czech)

Keywords: sol-gel, chromatography, immobilization, bioorganic chemistry