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Title of the doctoral dissertation: **"Studies on the oxidation of cyclic ketones to lactones in the presence of enzymes or metal catalysts"**

In the doctoral thesis, using the principles of "*green chemistry*", five new, effective methods of synthesis of lactones, including optically active forms were developed. These methods rely on the oxidation of cyclic ketones in the Baeyer-Villiger reaction using biocatalysts, such as *Candida antarctica* lipase B (CALB) or cyclohexanone monooxygenase (CHMO) and the metal catalysts in the form chiral complexes of aluminum.

Reactions involving CALB proceeded by chemo-enzymatic version of Baeyer-Villiger reaction. Lipase served as a biocatalyst for the generation of peroxyacid from carboxylic acid or ester and hydrogen peroxide. Peracid created *in situ* served as an oxidant of ketone to a lactone.

Based on the chemo-enzymatic Baeyer-Villiger reaction, two new methods for the synthesis of lactones which differ in the way of immobilization of lipase (immobilization on alkyl-modified silica surface, or in ionic liquid) and a method for the synthesis of chiral lactones involving native enzyme CALB were developed. The asymmetric version of the chemo-enzymatic reaction involved the use of chiral carboxylic acids as racemic mixtures and aqueous solution of native CALB.

In addition, a method of synthesis of chiral lactones in the presence of CHMO and ionic liquids was presented. As a competitive method for the enzymatic synthesis of chiral lactones, the chemical version of the asymmetric Baeyer-Villiger reaction involving aluminum complexes with biaryl ligands and ionic liquids has been developed.

In conclusion, effective methods for the synthesis of chiral and achiral lactones in the Bayer-Villiger oxidation of cyclic ketones were developed. They are characterized by high yields and enantioselectivities of obtained lactones, mild reaction conditions and the ability of effective recycle of the catalyst.

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