

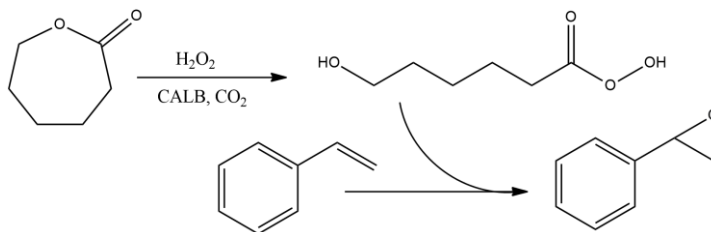
Pressurized Carbon Dioxide and its Role in Peracid Formation for Chemoenzymatic Epoxidation of Styrene using Immobilized *Candida antarctica* Lipase B

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The current most viable method of epoxide synthesis is demonstrated by the Prilezhaev reaction. In that reaction, peracids are essential in the formation of epoxides from alkenes. However, conventional methods of epoxide synthesis involve the use of highly reactive and dangerous peracids such as *m*CPBA. An alternative method of performing the reaction is by *in situ* preparation of peracids derived from other compounds. Epoxides being one of the highly flexible functional groups in industry and research, drive the search for a more sustainable way of preparing peracids¹. From another perspective, enzymes have attracted the attention of organic chemists in catalyzing otherwise difficult reactions. Besides an enzyme's ability to perform selective reactions, it is also an environmentally friendlier alternative to preform organic reactions. For example, a lipase isolated from a yeast *Candida antarctica*, specifically CALB, have shown great feasibility in many reactions. CALB has also demonstrated a unique promiscuity in which it can catalyze perhydrolysis when H₂O₂ is present in the reaction system². This promiscuity enables an *in situ* preparation of peracids to react with alkenes and form epoxides.

In a previous research, carbon dioxide gas was used to expand the solvent in which this reaction occurs, thereby enabling the same or better results with less amount of solvent³. Epoxidation of styrene using ϵ -caprolactone as the peracid donor using CALB and H₂O₂ has been done and resulted in 99% yield in only 1 hour. On the other hand, results show that CO₂ does not only play a role in the expansion of the solvent, but also play an important role in peracid formation by dissolving into carbonic acid and reacting with H₂O₂ to form peroxycarbonate.



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