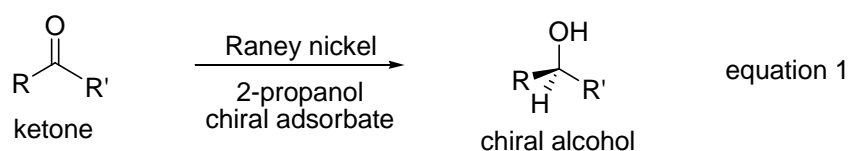


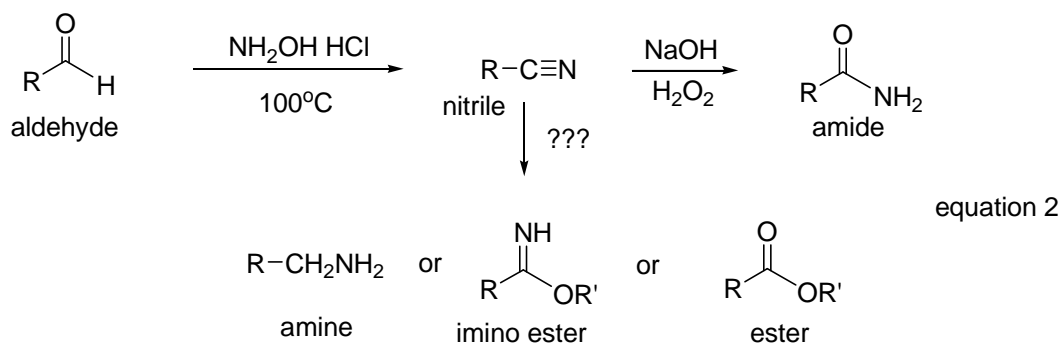
A Green Approach To Synthetic Method Development

Robert C. Mebane URP 2010 (robert-mebane@utc.edu)

Project 1: For several years my research has focused on synthetic method development. My previous students have shown that Raney nickel in refluxing 2-propanol is an effective catalytic system for the reduction of a variety of functional groups including aryl alcohols¹, iodolactones², alkyl nitriles³, aldehydes⁴, and ketones⁵. Given the recent success of reducing ketones, I would like to explore if this reduction can be performed in an asymmetric manner to give chiral secondary alcohols. To test this hypothesis, we will modify the surface of the Raney nickel by adsorbing inexpensive chiral substances (e.g. tartaric acid) prior to performing the reductions (equation 1). The progress of the reaction and any asymmetric induction in the product alcohols will be monitored by GC-MS using a chiral GC column.



Project 2: Several summers ago, Sam Chill and I discovered that nitriles can be conveniently prepared from aldehydes using hydroxylamine hydrochloride in dimethyl sulfoxide solvent. We extended this methodology to a one-pot tandem synthesis of amides from aldehydes. Two summers ago, Patrick Siler extended this methodology to the facile one-pot synthesis of ethyl esters starting with aldehydes. This past summer, Virgilio Gozum discovered that nitriles can be prepared from aldehydes in a solvent-free reaction. For future work I would like to see if we can extend this solvent-free reaction into a one-pot conversion of aldehydes into other functional groups such as amines, imino esters, and esters.



The student involved in this project will make extensive use of the Department's GC/MS and FT-NMR systems. Furthermore, the student will have an opportunity to present their work at a professional meeting.

References

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