Catalytic Hydrogenolysis of Aryl Ether Substrates

Alex Brown
Washington University in St. Louis

Follow this and additional works at: https://openscholarship.wustl.edu/wuurd_vol12

Recommended Citation
https://openscholarship.wustl.edu/wuurd_vol12/21

This Abstracts A-I is brought to you for free and open access by the Washington University Undergraduate Research Digest at Washington University Open Scholarship. It has been accepted for inclusion in Volume 12 by an authorized administrator of Washington University Open Scholarship. For more information, please contact digital@wumail.wustl.edu.
Catalytic Hydrogenolysis of Aryl Ether Substrates

Alex Brown

Mentor: John Bleeke

The goal of our work is to replicate the procedure for the selective catalytic hydrogenolysis of aryl ethers as determined by preliminary research done at the University of Illinois by the Hartwig lab. Upon confirming the procedure, we hope to further test its efficacy on larger aryl ether substrates, and eventually Lignin. The importance of this project would be adding further knowledge to the existing literature on this topic. The belief in the scientific community is that selectively cleaving Lignin could lead to products that can be utilized as alternative fuel sources, which would have a significant impact on future options for combating the ongoing climatic change that our planet faces. We used commercial ether substrates, homogenous Ni-catalysts, N-heterocyclic Carbene (NHC) ligands, and commercial bulky bases to further investigate the procedure implemented by the Hartwig lab. Our lab’s investigation of small aryl ether substrates produced inconclusive results so far in that phenol products, our target product, were rarely produced by the reaction in combination with all the starting material being used up. In other words, the reaction rarely went to completion. What we know from the results of the reactions is that Benzyl Phenyl Ether (BPE) was a more effective substrate than Diphenyl Ether (DPE) in terms of being selectively cleaved to produce phenol products. More importantly, we have reason to believe that the reaction is capable of running to completion without the use of the NHC ligands. In fact, it is very possible that the NHC ligands blocked the reactions from working as well as we had hoped. Our investigation into this possibility is ongoing. Synthesis of bulkier Ni-catalysts will likely be done for the larger ether substrates like Lignin.