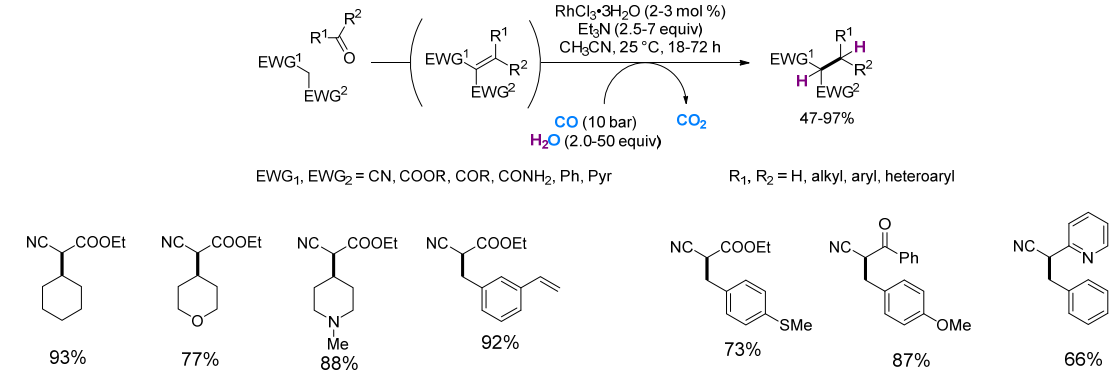
Harnessing the Reductive Power of Carbon Monoxide in Organic Synthesis

Malek Y. S. Ibrahim and Scott E. Denmark

Despite its high reductive power, CO is less utilized in reductive chemical transformations when compared to the traditionally used, less economic reducing agents e.g. $NaBH_4$, $LiAlH_4$, silanes, and Hantzsch ester. This disconnection arises from the lack of enabling processes for the direct use of CO as a terminal reductant in organic synthesis. We successfully demonstrated that CO can be used as a terminal reductant through the Water-Gas Shift Reaction to drive the reductive alkylation of activated methylene compounds and the reductive carbonylation of aryl halides at mild conditions at high atomic efficiency.



Development of Novel Poly(hydroxy urethane) for Light Triggered Oil-core Microcapsules

Ephraim G. Morado and Steven C. Zimmerman

Microcapsules have been utilized for various applications including encapsulation of toxic agents (herbicides and biocides), fragrances, drug delivery, and self-healing materials. Many capsules have been developed to degrade under external stimuli *via* pH, light, temperature, or oxidation. Remote controlled microcapsules are rare in the literature and underdeveloped. Herein, we developed a novel poly(hydroxyl urethane) (PHU) with acid degradable acetal units that depolymerize through a cyclization mechanism generating 5- or 6-membered cyclic acetals and alcohols. This new mechanism allows for rapid polyacetal degradation under anhydrous acidic conditions. Additionally, we developed a remotely-triggered oil-core microcapsule using this PHU chemistry by encapsulating 6 wt.% of a hydrophobic photoacid generator (PAG). Photolysis of PAG-loaded microcapsules resulted in rapid degradation and provided on demand burst release of capsule content.

19