THE *N*-HETEROCYCLIC CARBENE CONTROLLED DEHOMOLOGATION OF ALDOSES

Markus Draskovits, Christian Stanetty, Hubert Kalaus and Marko D. Mihovilovic

Institute of Applied Synthetic Chemistry, TU Wien, Getreidemarkt 9/163, Vienna, Austria,
markus.draskovits@tuwien.ac.at

Despite carbohydrates being Nature's largest chiral pool, only a comparably small set of representatives, is readily available to date. In our research, we focus on the development of new synthetic methodology for the interconversion of abundant sugars to more exotic ones by targeting the reactivity of the aldehyde moiety.[1,2] In our current study, we investigate the organocatalytic anomeric activation with *N*-heterocyclic carbenes (NHCs) as promising highly carbonyl selective reagents (see Figure 3).

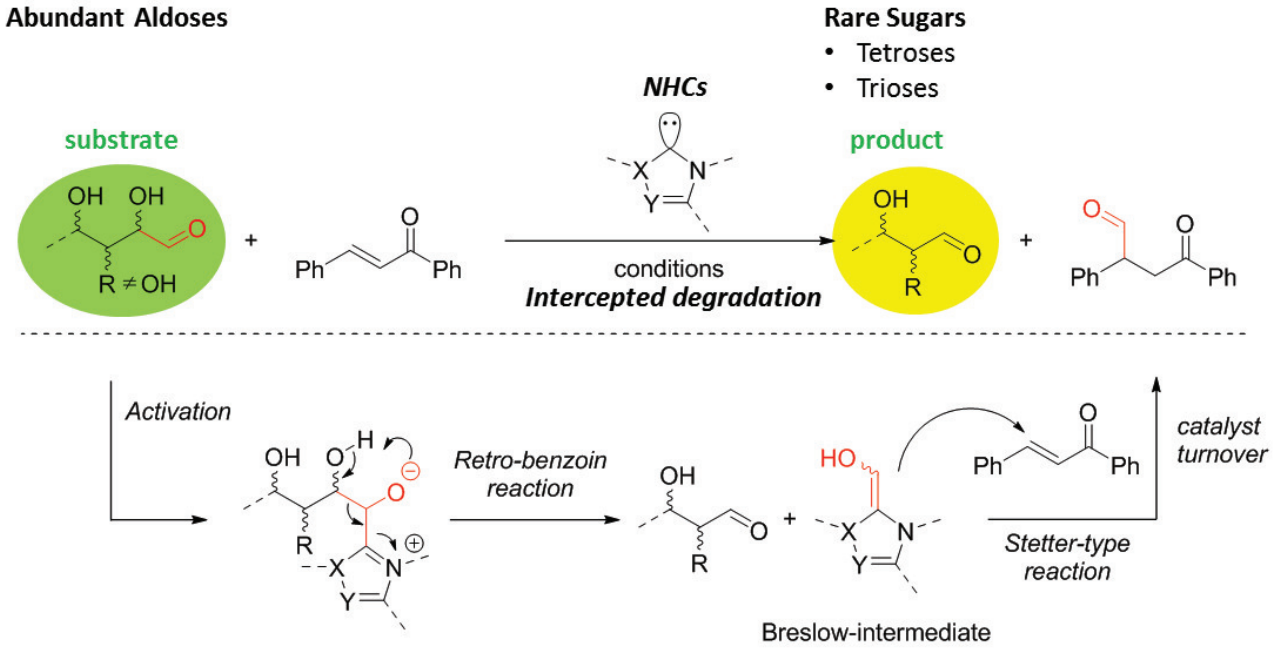

Figure 3 NHC controlled dehomologation of aldoses

Building on the recently reported sacrificial degradation of aldoses[3], we set out to develop a methodology for an intercepting degradation (by replacing specific OH groups) to allow for the isolation of defined sugar derivatives with shortened chain length.

Upon successful proof of concept with 3-*O*-Bn-D-glucose, we are currently investigating this new and complex transformation. We are optimizing for ideal reaction conditions as well as governance of both the catalyst's and the sugar substrates' structure. Aiming for an efficient screening, we developed a robust and quantitative method for the analysis of the observed mixtures of reducing sugars which is based on solid phase extraction (SPE), derivatization and calibrated GC-analysis. Therewith, we could achieve time resolved analysis of the reaction targeting to pin down kinetic as well as thermodynamic influences.

We discovered a crucial follow-up reaction, which can be suppressed or even enhanced by the right combination of catalyst and substrate and also identified parameters, which need to be controlled to allow for fast and clean conversions. We are *en route* to better understand the selective interaction between NHCs and aldose's aldehyde function of which we expect great gain of knowledge and application for within the realm of synthetic carbohydrate chemistry and beyond.

[1] M. Draskovits, C. Stanetty, I. R. Baxendale, M. D. Mihovilovic, *J. Org. Chem.* **2018**, *83*, 2647-2659;
[2] C. Stanetty, I. R. Baxendale, *Eur. J. Org. Chem.* **2015**, *2015*, 2718-2726.J. Zhang, C. Xing, B. Tiwari, Y. R. Chi, *J. Am. Chem. Soc.* **2013**, *135*, 8113-8116.
[3] J. Zhang, C. Xing, B. Tiwari, Y. R. Chi, J. Am. Chem. Soc. 2013, 135, 8113-8116.