

Protecting group free transformations of reducing sugars in aqueous solution

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The development of new selective reactions of completely unprotected sugars, particularly in aqueous solution, has become an area of resurgent interest. Seminal studies reported by Shoda¹ and co-workers first introduced the dehydrating reagent 2-chloro-1,3-dimethylimidazolium chloride (DMC) into the carbohydrate field, and revealed its remarkable ability to selectively activate the anomeric hydroxyl group of unprotected sugars in aqueous solution. A series of highly useful protecting group-free processes based on the use of DMC and analogues has since been developed.² I will discuss some of our recent work in this area,³ building on the important developments of Shoda and others, focussing on the application of DMC and analogues for the direct conversion of unprotected sugars into a range of glycosides, glycoconjugates, and even (1-6)-linked disaccharides⁴ without the need for any protecting group chemistry.

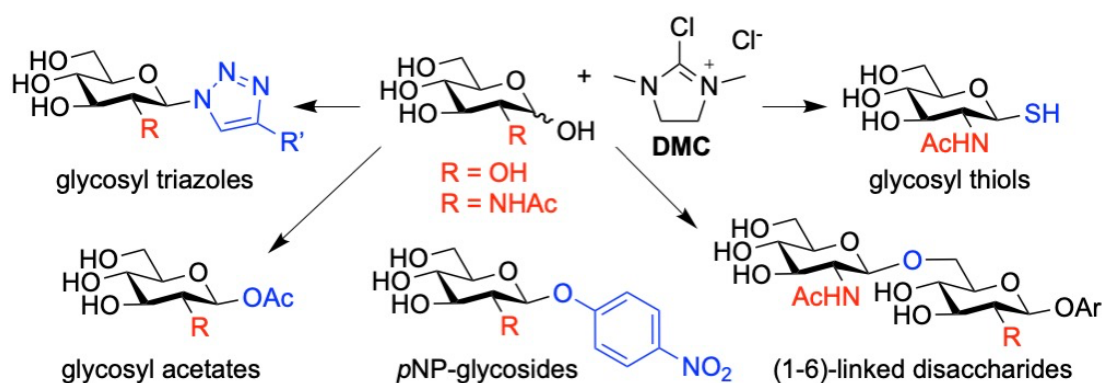


Figure 1: Structural concept of iminosugar based probes.

Bibliographic references:

[1] M. Noguchi, T. Tanaka, H. Gyakushi, A. Kobayashi, S.-i. Shoda (2009) *J. Org. Chem.* (74) 2210–2212.

[2] For a review see: A. J. Fairbanks (2021), *Carbohydr. Res.* (499) 108197.

[3] a) Xin Qiu, A. J. Fairbanks (2020), *Org. Lett.* (22) 2490-2493; b) Xin Qiu, A. J. Fairbanks (2020), *Org. Biomol. Chem.* (18) 7355-7365.

[4] X. Qiu, A. L. Garden, A. J. Fairbanks (2022), *Chem. Sci.* (13) 4122-4130.