Competing reactive intermediates in stereoselective glycosylation reactions

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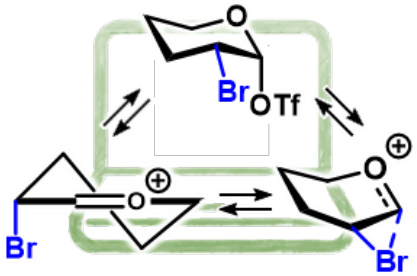
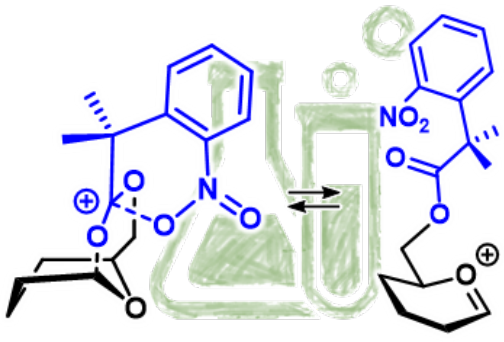
The stereoselectivity of the glycosylation reaction strongly depends on which reactive intermediates can form from the parent glycosyl donor.[1] These reactive intermediates generally can rapidly interconvert and each intermediate participates in a unique reaction pathway. The competition between the various pathways dictates the overall stereoselectivity of the glycosylation reaction.[2] We have studied these scenarios through a combinatory approach of experimental and computational chemistry. We will here present our recent results on the stereodirecting effect of C-2-halogens. Upon activation of 2-halo glycosyl donors oxocarbenium ions and halonium ions may form. The ratio between these cations depends on the hyperconjugative capabilities of the halogen and the ring strain in the halonium ions.[3] We also report on our studies on glycosyl donors bearing distal acyl groups. [4] These donors can form both oxocarbenium ions and bridged dioxolenium ions and the competition between these drives the stereoselectivity of the reaction.[5] The stereodirecting capacity of these groups can be further tuned through functionalization. The 2,2-dimethyl-2-(*ortho*-nitrophenyl)acetyl protecting group provides stereoselective reactions through the formation of dioxolenium ions stabilized by nitro-participation. These 'double participation' dioxolenium ions are in competition by direct stabilization of the oxocarbenium ion by the nitro-moiety.[6] The characterization of these competitive reaction pathways will enable the rational design of synthesis routes towards complex oligosaccharides.





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