

Mechanistic Insight into the S_N1 side of Benzylidene-Directed Glycosylations by Cryo-IR Spectroscopy

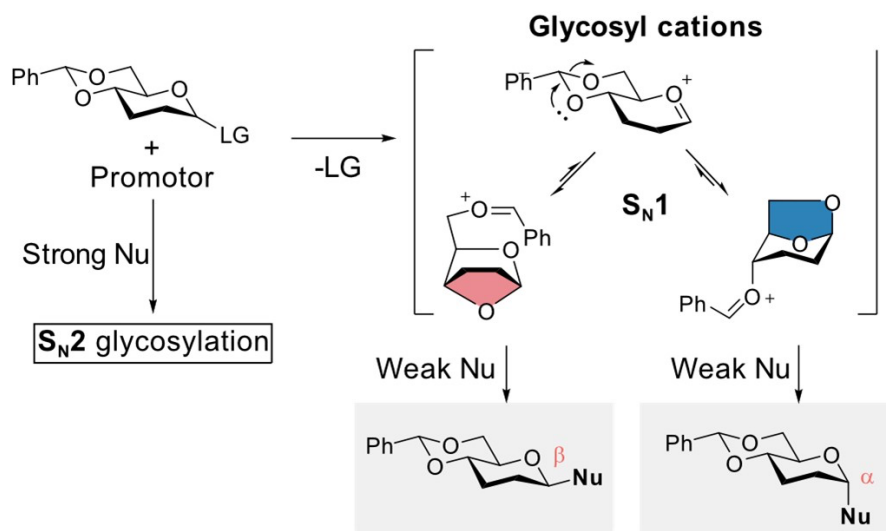
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4,6-O-benzylidene directed glycosylation is one of the most promising approaches to construct 1,2-cis glycosidic bonds. However, the S_N1-side is mechanistically poorly understood due to its instability and extremely short lifetime of its intermediate – the glycosyl cation. Herein, we report an integrated strategy of cryogenic ion infrared spectroscopy and computational calculation to unravel the structure of glycosyl cations. Our results first confirm an unexpected intermediate rearrangement on 4,6-O-benzylidene glycosyl donors that leads to an energetically more stable anhydro cations. The structure of the glycosyl cation correlates with the stereoselective outcome in glycosylations via a dissociative (S_N1) mechanism. These discoveries illustrate a brand-new pathway in reaction mechanisms and provide crucial insight to origin 1,2-cis glycosylation.

Postulated Mechanism for Rearrangement and Glycosylation Reaction



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