GENERATION OF GLYCOSYLIUM IONS IN SUPERACID: ENZYMATIC RELEVANCE AND SYNTHETIC POTENTIAL

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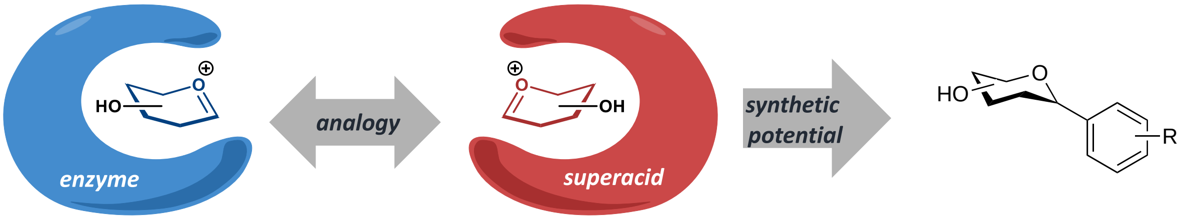
The hydrolysis of glycosides is a biochemical transformation that occurs in all living organisms, catalyzed by a broad group of enzymes, including glycoside hydrolases. These enzymes cleave the glycosidic bond via a transition state with substantial oxocarbenium ion character, resulting in short-lived oxocarbenium ion-like species [1]. While such transient species have been inferred through theoretical studies [2] and kinetic isotope effect measurements [3], their direct spectroscopic characterization remains challenging [4]. Here, we exploit a superacid environment to generate, accumulate, and fully characterize nonprotected glycosylium ions using low-temperature NMR spectroscopy, supported by DFT calculations. Additionally, QM/MM MD simulations reveal that the properties of these glycosyl cations in superacid closely resemble those within the active sites of glycosidase enzymes, particularly in terms of conformation and anomeric charge distribution [5]. Finally, the synthetic potential of these glycosylium ions is illustrated through the one step synthesis of *C*-aryl glycosides starting from simple glycosides.



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