
Iron Catalysis for the Chemoselective Oxidation of Unprotected Sugars

Laure Benhamou*¹, Sébastien Comesse¹, Catherine Taillier¹, Vincent Dalla¹, David Branquet¹, Mohamed Vall Sidi Boune¹, and Nicolas Hucher¹

¹Université Le Havre Normandie – Normandie Université – France

Résumé

We introduce an **innovative catalytic approach for oxidizing unprotected sugars using an iron catalyst** in contrast to conventional methods relying on halogenated reagents or precious metals.(1,2) Even though organometallic catalysis has already been described for this transformation, these methods rely on the use of precious metals such as palladium,(3) rhodium,(4) or ruthenium.(5) Our method involves a transfer hydrogenation process, where dihydrogen is formally transferred from a monosaccharide to an acceptor.(6)

The Knölker complex,(7) known for its ability to oxidize alcohols into ketones and more recently, diols into lactones,(8) was selected as the catalyst for our transformation. This procedure enables the chemoselective oxidation of the anomeric position of various unprotected carbohydrates into lactones (delta & gamma lactones) without requiring a strong oxidant. Notably, high yields of sugar lactones were isolated without the need for chromatographic techniques.

By carefully selecting the acceptor, we successfully reduced the amount of acceptor needed for the reaction to proceed without compromising the equilibrium shift. Finally, we capitalised on the difference in reactivity between hexoses and pentoses and devised a method to selectively oxidize pentoses from a sugar mixture upgrading a pentose into a lactone while leaving the hexoses mostly untouched.

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*Intervenant