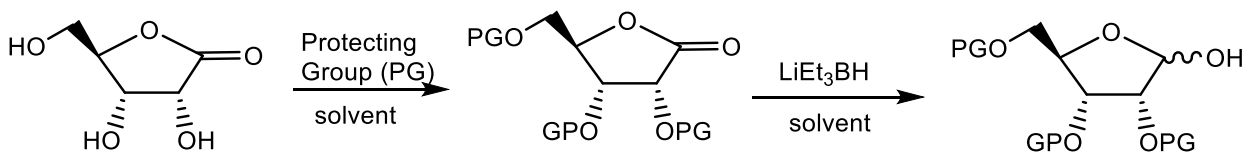
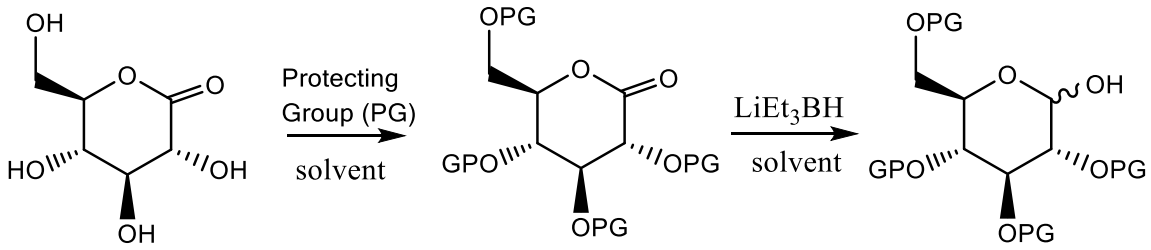
Andersson Sanchez

Final Abstract/Summary

Reduction reactions are an important area of study in organic synthesis and are used to synthesize a variety of compounds. In particular, the reduction of lactones to their respective lactols or hemiacetals is important for the synthesis of biologically active modified carbohydrates which are often used in drug design. The reduction of the sugar-based lactones to their respective lactols with lithium triethyl borohydride ($LiEt_3BH$) will be the focus of this project. The efficiency of this reagent to reduce sugar lactones to sugar hemiacetals (lactols) will be studied under different reaction parameters to develop an efficient protocol for its uses. The parameters will include temperature, solvent, time and amount of reducing agent for the reductions using the $LiEt_3BH$. The lactones that will be used in this project are D(-)-gulonic acid γ-lactone, D-(+)-ribonic γ-lactone, and delta-gluconolactone. These lactones will then be modified by introducing protecting groups at their free hydroxyl sites. The protecting groups that will be used in this project are isopropylidene, benzoyl, benzyl, acetyl, trityl, and silyl based (TMS and TBDMS). A basic scheme is provided below for ribonolactone:

A basic scheme is provided below for gluconolactone:





The protection of the free hydroxyl groups from the original sugar lactone will allow for the efficient reduction of the modified lactone with the reducing agent. The developed protocols for this reducing agent will serve as an efficient pathway for the formation of sugar hemiacetals from sugar lactones. This is important because the effectiveness of this reagent has not been studied in much detail and its reduction for sugar lactones has not been published. The information provided from this project can lead to applications in sugar chemistry and in the synthesis of important intermediates used for the design of anticancer drugs.