Dehydration of D-mannitol: building block for C-nucleoside synthesis

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INTRODUCTION

D-Mannitol 1 is a convenient starting material for organic synthesis because of the homotopic relation between the upper and the lower part of the molecule. For this reason dehydration of 1 via 2-5 hydroxyl groups yields one product only, i.e. 2,5-anhydro-D-glucitol 2. Our interest in 2 and its derivative 5 stems from a possibility of application of the latter for C-nucleoside synthesis. Acid catalyzed dehydration of 1 was performed followed by some manipulations, and permitted isolation of the 2,5-anhydro-4,6-di-O-benzyl-D-glucitol 5, together with 2,6-anhydro-1,3-di-O-benzyl-D-mannitol 7 (or 1,5-anhydro-4,6-di-O-benzyl-D-mannitol due to a symmetry of 1). A structure of 7 was confirmed by x-ray analysis.

RESULTS AND DISCUSSION

Acid-catalyzed dehydration of 1 was realized following patented procedure\(^1\) which we modified to facilitate isolation of the products on a smaller scale.\(^2\) Modification is to subject a crude dehydration mixture to isopropylidenation, and to isolate the main product, 1,3-isopropylidene-D-glucitol, via vacuum dry chromatography\(^3\), instead of high vacuum distillation.\(^1\) Further operations shown in the Scheme 2 permitted isolation of the necessary derivative 5. In some preparations we obtained more polar and highly crystalline compound 7, whose x-ray structure is shown in Picture 1.

Application of 5 to get C-nucleoside analogs will be published in due course.

CONCLUSION

Synthesis of dibenzylated derivative of D-glucitol 5 and of D-mannitol 7 was achieved.

REFERENCES