SYNTHESIS AND CHEMISTRY OF PSICOFURANOSYL AND FRUCTOFURANOSYL NUCLEOSIDES.

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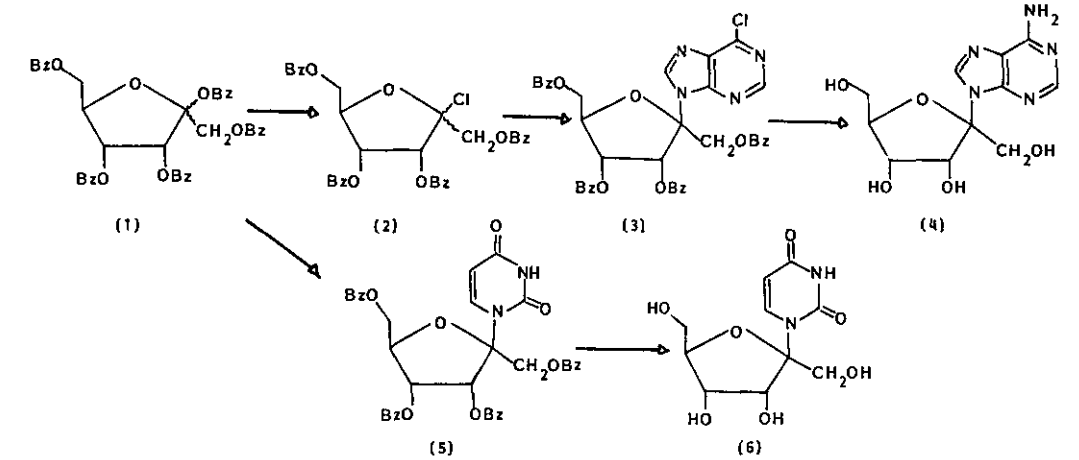
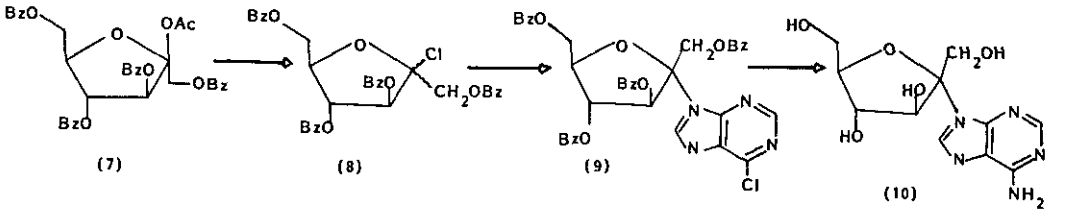
As we became interested in exploring the biological activities of the unknown β-fructofuranosyl nucleosides especially for the evaluation of their antiviral properties, it occurred to us that the β-psicofuranosyl nucleosides should be appropriate starting material for the synthesis of the corresponding β-fructofuranosyl derivatives. This has led us to reinvestigate the synthesis of some ketose nucleosides, since the literature methods of synthesis of this group of nucleosides gave often mixtures of the α and β anomers in low yields. Thus, the condensation of 6-chloro purine with 1,3,4,6- tetra-O-benzoyl-D-psicofuranosyl chloride (2) in nitromethane with mercuric cyanide[1] has provided us selectively with the β-psicofuranosyl-6-chloropurine anomer (3) in 61% yield. It is also worthy to note that the same procedure gave exclusively the α-anomer (9) in 82% yield when 6-chloro purine was reacted with the chlorosugar (8) which was obtained from 2-O-acetyl-1,3,4,6-tetra-O-benzoyl-β-D-fructofuranose (7). Perhaps the later reaction involves an intermediate like a 2,3-O-benzoxoninium ion instead of the 1, 3-O-benzoxoninium ion as should be expected in the synthesis of the β-anomer (3).

It should be added that the condensation of the silylated uracil with the perbenzoylated D-psicofuranose (1) in acetonitrile with stannic chloride[2] gave only the β anomer derivative 5 in 81% yield.

Having obtained the deblocked β-psicofuranosyl-adenine (4) and uracil (6) in high overall yields, we have then proceeded to synthesize the corresponding β-fructofuranosyl isomers through the syntheses of their respective 3',8-O- and 3',2-O-cyclo nucleosides. The results of these studies will be presented in details.



(1) (2) (3) (4) (5) (6)



(7) (8) (9) (10)

References:
1. N. Yamaoka, K.Aso and K. Matsuda, J. Org. Chem. 30, 149 (1965).
2. U. Niedballa and H. Vorbrüggen, J. Org. Chem. 39, 3654 (1974).