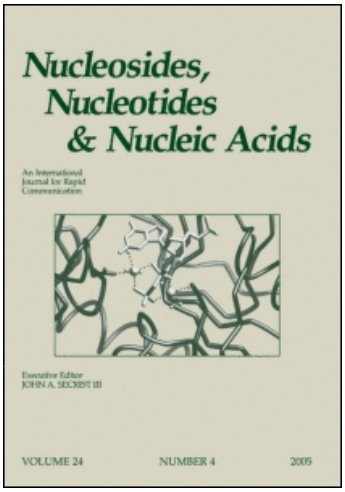

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Oxidation-Reduction Sequence for the Synthesis of Peracylated Fluorodeoxy Pentofuranosides

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OXIDATION-REDUCTION SEQUENCE FOR THE SYNTHESIS OF PERACYLATED FLUORODEOXY PENTOFURANOSIDES

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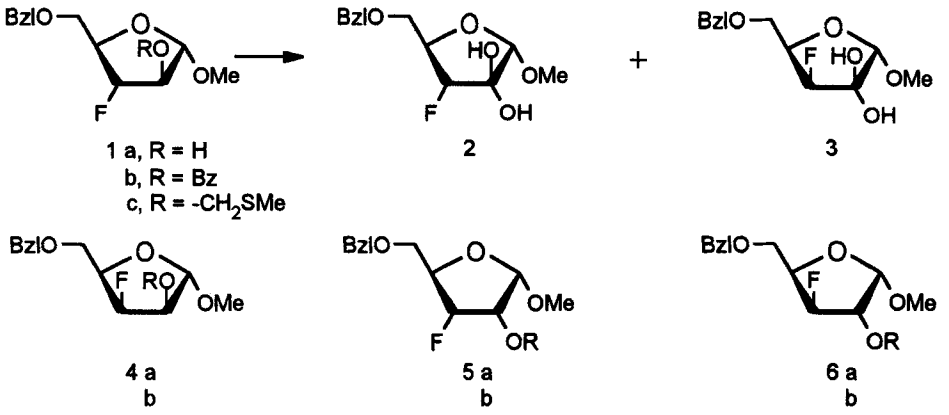
Abstract. Oxidation of **1a** with DMSO-acetic or trifluoroacetic anhydride led to the formation of a mixture of epimeric *gem*-diols **2** and **3** in the ratios of ≈3:1 and ≈7:1, respectively. Reduction of this mixture with $NaBH_4$ followed by benzoylation and chromatography afforded **4a** and **5a**.

A careful study of oxidation of **1a** with DMSO-acetic anhydride at room temperature showed that a mixture of epimeric *gem*-diols **2** and **3** is formed in ratios of 2:1 to 4:1 (^1H and ^{13}C NMR) (*cf.* [1]). Reduction of the crude **2** and **3** with $NaBH_4$ in benzene-ethanol mixture (4:1 to 1:1) followed by benzoylation and chromatography afforded pure riboside **5b** (43-52%) and lyxoside **4b** (9-15%); in some experiments, arabinoside **1b**, 2-O-methylthiomethyl derivative **1c**, and xylosides **6a/b** were also isolated.



The use of sodium borodeuteride as a reducing agent at the second step of the reaction sequence afforded 2(R)- and 2(S)-deuterio derivatives of **4b** and **5b**, respectively. No deuterium was found according to ^1H NMR data in compound **1a** that was isolated from the reaction mixture; xyloside **6a** was not isolated in this experiment. From these results, it may be reasonably concluded that reduction of ketone **2** proceeds stereoselectively *via* attack by BH_4^- at the less hindered β-face of the sugar ring leading to

exclusive formation of riboside **5a** (isolated as benzoate **5b**). Surprisingly, isomeric ketone **3** undergoes predominant attack at the α-face of the sugar ring suggesting negligible steric and/or electronic hindrance of methoxy group.

Oxidation of arabinoside **1a** with DMSO-trifluoroacetic anhydride[2] in CH_2Cl_2 followed by quenching with triethylamine at -78 °C afforded the mixture of *gem*-diols **2** and **3** in ratios of 6:1 to 8:1. Thus, the tendency toward epimerization at C3 was reduced under these oxidation conditions. Reduction of the crude **2** and **3** with $NaBH_4$ led to the isolation of **5b** in 75% yield. There was not observed a decrease in the yield of **5b** in larger scale preparations (*ca.* 5 g of **1a**). None of the corresponding β-anomers of **1-6** was detected in mixtures of *gem*-diols as well as in either of the purified products under all oxidation-reduction conditions investigated. Thus, this oxidation-reduction sequence offers a useful alternative to the previously described two-step route for the preparation of **5b**[3].

It should be pointed out that a mixture of *gem*-diols **2** and **3** was also obtained upon oxidation of lyxoside **4a**.

The assignments of configuration for all the compounds that were synthesized were based primarily upon ^{13}C NMR data, taking into account previous empirical correlations of the effect of configuration of vicinal substituents in the furanose ring on the $\delta^{13}C$ values of the atoms bearing these groups[4].

Starting from **4b**, 9-(α-D-lyxofuranosyl)adenine (α-*lyxo*-A)was prepared (47%; combined) essentially as described earlier[3]. The structure of α-*lyxo*-A was proved by UV, CD, and ^1H NMR data. As reported for 9-(α-D-lyxofuranosyl)adenine[5], α-*lyxo*-A displays the positive B_{2u} Cotton effect; in contrast, envelope centered at 212 nm is negative.

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