NOVEL PATHWAY TOWARDS STANNYLATED GLUCALS

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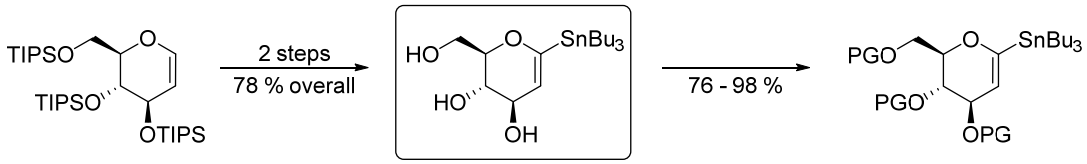
1-Tributylstannyl glycals are commonly used in C-C bond formation [1], mostly as reagents in Pd(0)-catalyzed Stille cross coupling [2,3] as well as stable precursors for lithiated glycals serving as C-nucleophiles [4].

There are three common synthetic pathways towards 1-tributylstannyl glycals: substitution of an anomeric sulfoxide aglycon with phenyl lithium followed by quenching with Bu_3SnCl [5] and radical substitution on a 1-phenylsulfinyl glycal [4]. However, the overall yields of these two methods are rather low due to the long synthetic pathway. The third method, direct lithiation of a suitably protected glycal followed by quenching with Bu_3SnCl [6] is significantly limited by the harsh reaction conditions [5,7].



To overcome this, we developed an efficient deprotection-protection strategy based on a previously published synthesis [6]. Our pathway starts with the TIPS protected glucal, which is easily accessible through the commercially available tri-*O*-acetyl-D-glucal. Stannylation was done by deprotonation with *t*-BuLi and quenching with Bu_3SnCl according to literature [8]. Afterwards the stannylated glucal was fully deprotected. The 1-tributylstannyl-D-glucal turned out to be a shelf-stable compound, which we could purify and fully characterize. Based on this, we could broaden the scale of 1-tributylstannyl glucals by introducing new protecting groups that were not described before (Ac, Bz, MEM). Furthermore we could improve the yield of the known benzyl protected 1-tributylstannyl glucal. Our overall yield is 65% starting from D-glucose. Therefore, regarding synthetic effort as well as yield, our described route outperforms the established sulfoxide route (< 37% over 7 steps, starting from D-glucose) [5].

[1] Y. Yang, B. Yu, *Chem. Rev.* **2017**, 117, 12281–12356.

[2] R. W. Friesen, C. F. Sturino, *J. Org. Chem.* **1990**, 55, 2572–2574.

[3] E. Dubois, J. Beau, *J. Chem. Soc.* **1990**, 1191–1192.

[4] P. Lesimple, J. M. Beau, G. Jaurand, P. Sinay, *Tetrahedron Lett.* **1986**, 27, 6201–6204.

[5] K. Jarowicki, C. Kilner, P. J. Kocienski, et al., *Synthesis* **2008**, 2747–2763.

[6] S. Hanessian, M. Martin, R. C. Desai, *J. Chem. Soc. Chem. Commun.* **1986**, 926–927.

[7] R. W. Friesen, C. F. Sturino, A. K. Daljeet, A. Kolaczewska, *J. Org. Chem* **1991**, *56*, 1944–1947.

[8] K. H. Dötz, F. Otto, M. Nieger, *J. Organomet. Chem.* **2001**, *61*, 1165–1168.