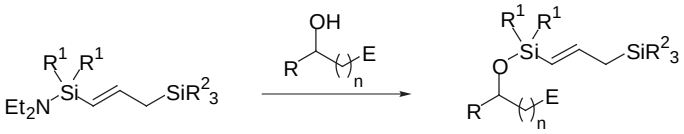
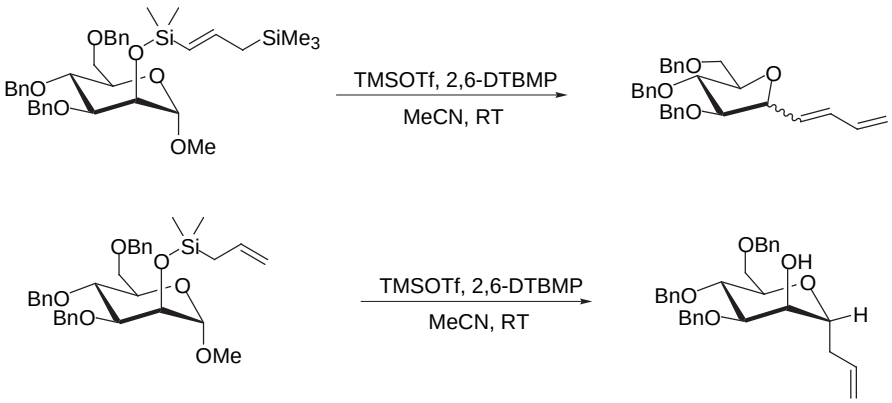
Use of Tethered Allylsilanes in Acyclic Stereocontrol (EPSRC grant GR/N32556)

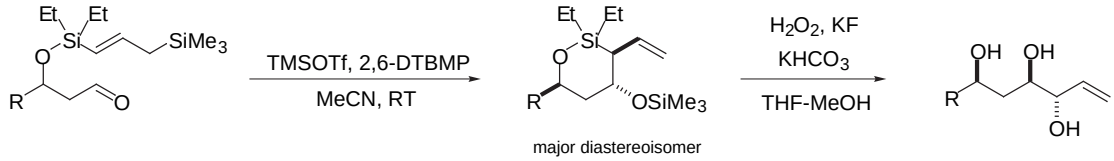
We have prepared a series of novel allylsilanes which possess an (amino)silyl-substituent at the γ-position. The aminosilyl group has been used to tether the allylsilane nucleophile to a range of hydroxy electrophiles.



Tethering two of these allylsilanes to the C(2)OH of a methyl mannoside allowed us to study their application in Intramolecular Aglycon Delivery. Significantly, locating the tether at the γ-position of the allylsilane was crucial for ensuring an *intra*molecular transfer of the appended allyl nucleophile. This was in sharp contrast to an allylsilane tethered through the allylic silicon centre, which provided the α-allyl-*C*-mannosyl product by reaction through an *inter*molecular pathway. Nevertheless, intramolecular allylation using our tethered γ-silyl-substituted allylsilanes still failed to provide the desired β-allyl-*C*-mannosyl product. A mechanism in which the initial carbocationic intermediate collapses by preferential reaction at the silyl tether, rather than at the allylic silicon centre, leading to a cascade of further reactions, has been proposed to account for the formation of the major ring-contracted diene product.



Moving to a 3-hydroxy electrophile significantly improved matters. By careful choice of the size of the ligands at the silyl ether tether (ethyl substituents proved optimal), intramolecular allylation on to a pendant aldehyde provided two out of the four possible oxasilacycle allylation products. Minimisation of dipole moments in the T.S. readily accounts for the excellent levels of 1,3-stereoinduction observed in this reaction, whilst the modest 1,4-stereoinduction can be rationalised on steric grounds. Levels of 1,4-induction can be significantly improved by using the (*Z*)-stereoisomeric allylsilane. The oxasilacycle products are versatile intermediates for further synthetic transformations. So far we have demonstrated that the tether can be cleaved oxidatively to provide a route into stereodefined 1,2,4-triols.



References

J. Beignet, L. R. Cox, *Org. Lett.*, 2003, **5**, 4231-4234.