Synlett M. Pintal Spotlight

Di-*tert*-butylsilyl Bis(trifluoromethanesulfonate)

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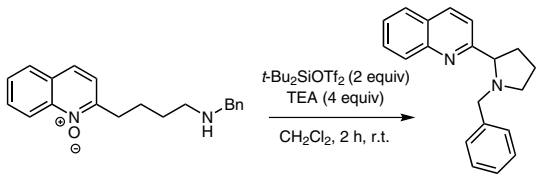
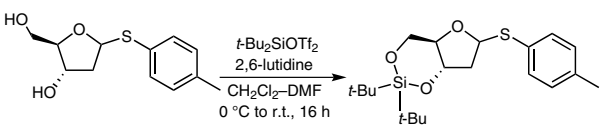
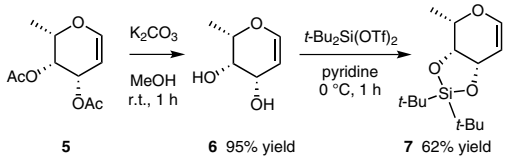
Michalina Pintal was born in 1987 in Tarnogród, Poland. She received her M.Sc. in chemistry from the University of Łódź in 2011. Currently she works towards her Ph.D. under the supervision of Professor Bogusław Kryczka and Dr. Stanisław Porwański at the same university. Her research interests focus on the synthesis of urea derivatives of carbohydrate and azacrown ethers and their complexing properties.

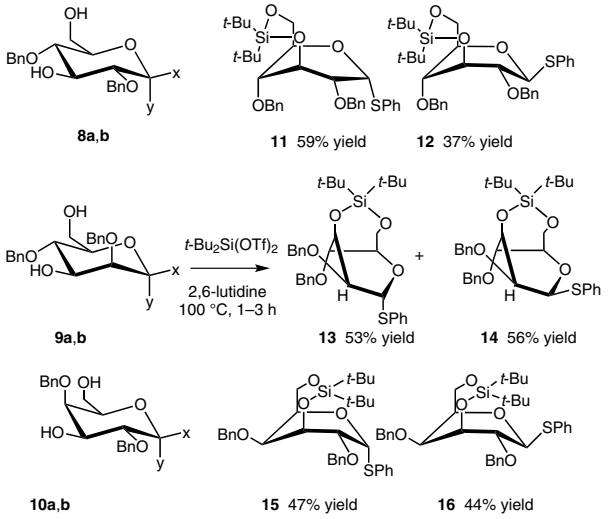
Introduction

Di-*tert*-butylsilyl bis(trifluoromethanesulfonate) is a useful reagent in organic synthesis. It is a colorless to yellow or light brown-yellow liquid with a boiling point of 73–75 °C, it is sensitive towards moisture, corrosive and reacts with hydroxylic solvents. It has been prepared by reaction of di-*tert*-butylchlorosilane with trifluoromethanesulfonic acid[1] but it is also commercially available. It has been applied in intramolecular cyclizations as a novel promoter for a Boekelheide reaction.[2] It acts as protecting group for 1,3-diols to improve yield and stereoselectivity of organic reactions,[3] for 1,2-diols in a synthesis of dienophiles[4] and 1,4-diols to obtain 3,6-bridged glycosyl donors[5] and to receive natural products.[6] Triethylsilyl ether, isopropylidene ketal would perform the same role as the *t*-$Bu_2Si(OTf)_2$; however, their acidic removal could be problematic in some cases.[7] The bridging di-*tert*-butylsilylene can be cleaved to give the corresponding fullerene polyols.[8] Moreover, this reagent is a valuable material for the synthesis of prodrugs of chemotherapeutics.[9]

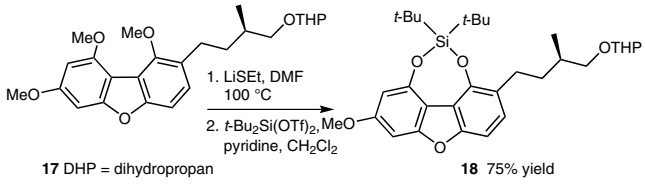
Table 1 Use of Di-*tert*-butylsilyl Bis(trifluoromethanesulfonate)

(A) Massaro and co-workers have treated (aminoalkyl)quinoline *N*-oxide **1** with *t*-$Bu_2Si(OTf)_2$ and triethylamine in dichloromethane to obtain 2-(*N*-benzylpyrrolidin-2-yl)quinoline **2** by intramolecular Boekelheide reaction.[2] The cyclized product **2** was synthesized in 51% yield, which was increased to 75% by using microwave irradiation.	 **1** **2** 51% yield (MW: 75% yield)
(B) Di-*tert*-butylsilyl bis(trifluoromethanesulfonate) is reported to be a useful reagent for the preparation of C3–5-O-silylated 2-deoxythioriboside **4**. This product was formed from the corresponding thioglycoside **3** in the presence of 2,6-lutidine in good yield (83%). The C3–5-O-silylated group of compound **4** influences the stereoselectivity during its glycosylation.[3]	 **3** **4** 83% yield
(C) The electron-rich dienophile **7** was obtained starting from the commercially available peracetyl fucal **5**.[4] Compound **5** was first deprotected and then the hydroxyl groups at C-3 and C-4 of **6** were protected by reaction with di-*tert*-butylsilyl bis(trifluoromethanesulfonate) under mild conditions. Fucal derivative **7** was used in a highly selective Diels–Alder reaction.	 **5** **6** 95% yield **7** 62% yield

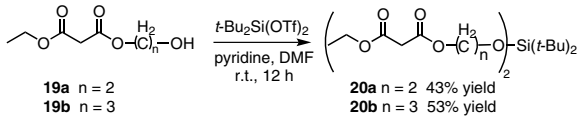
(D) The reaction of 2,4-di-*O*-benzyl-1-thio derivatives of glucose, mannose and galactose **8**–**10** with di-*tert*-butylsilyl bis(trifluormethanesulfonate) in 2,6-lutidine led to 3,6-bridged glycosyl donors **11**–**16** in moderate yields.[5] A number of other bridging reagents were examined but no products were observed.



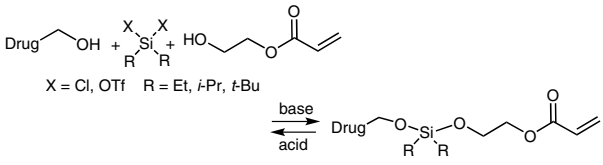
(E) The reaction of substituted dibenzofuran with di-*tert*-butylsilyl bis(trifluoromethanesulfonate) in the presence of a base such as pyridine has given the derivative of dibenzofuran **18**. The reaction was applied to obtain aglycone fulicinerine.[6]



(F) Treating compounds **19a**–**b** (2 equiv) with *t*-$Bu_2Si(OTf)_2$ (1 equiv), Guerra and co- workers have afforded the corresponding bismalonates **20a**–**b**, which they then used for the regioselective bisfunctionalization of C_{60}.[8]



(G) Asymmetric bifunctional silyl ether (ABS) prodrugs of chemotherapeutics (camptothecin, dasatinib, and gemcitabine) were obtained in one step by reacting a dichlorodialkyl silane (*i*-Pr, Et,) or *t*-$Bu_2Si(OTf)_2$ with the pendant alcohol on the chemotherapeutic.[9] This kind of combination of a silyl ether, a chemotherapeutic and a polymerizable monomer ensures protection for the drugs and decreases the rate of degradation.



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