Synthesis of 3-hydroxy-2-(trimethylsilyl)phenyl trifluoromethanesulfonate as a versatile intermediate in preparative organic chemistry

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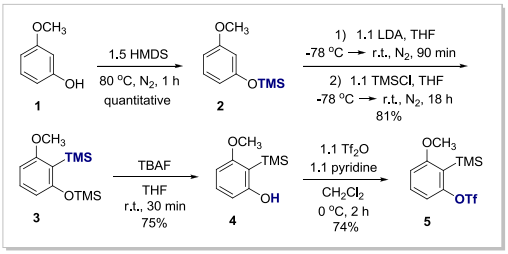
INTRODUCTION

Owing to the considerable importance of benzyne as highly reactive intermediate in organic chemistry, with applications in total syntheses[1] and in preparations of functional materials,[2] we intend to synthesize the 3-hydroxy-2-(trimethylsilyl)phenyl trifluoromethanesulfonate (**6**), envisioning the employment of such aryne precursor in reactions of insertion into sigma bonds, in cycloaddition reactions and in the total synthesis of bioactive natural products.

RESULTS AND DISCUSSION

Initially, we employed the synthetic route described in the literature to produce the silylaryl triflate **5** (**Scheme 1**).[3]

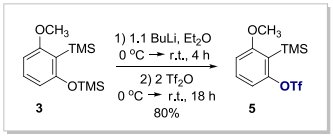
Scheme 1. Synthetic route for producing the compound **5**.



The protection of 3-methoxyphenol (**1**) with hexamethyldisilazane (HMDS) resulted in the silylated compound **2** in a quantitative yield. Treatment of the compound **2** with lithium diisopropylamide (LDA) and subsequent reaction of the carbanion formed with trimethylsilyl chloride (TMSCl) resulted in the formation of the disilylated compound **3** in an isolated yield of 81%. The compound **3** had its phenolic hydroxyl group deprotected in the presence of tetrabutylammonium fluoride (TBAF), resulting in the compound **4** in a 74% yield. Then, leaving the phenolic compound **4** to react with triflic anhydride (Tf_2O) in the presence of pyridine, we obtained the silylaryl triflate **5** in a 75% yield (**Scheme 1**).

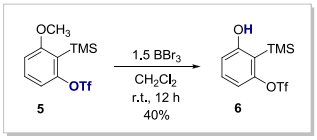
After disclosing that the intermediate **4** is unstable, we decided to produce the compound **5** (from **3**) by the sequence of reactions outlined in **Scheme 2**.[3]

Scheme 2. Reactions for obtaining compound **5**.



The 2-(trimethylsilyl)aryl triflate **5** had its phenolic hydroxyl group deprotected in the presence of boron tribromide,[4] giving 3-hydroxy-2-(trimethylsilyl)phenyl trifluoromethanesulfonate (**6**) in an isolated yield of 40% (**Scheme 3**).

Scheme 3. Deprotection for obtaining compound **6**.



The compound **6** can be considered an important building block in organic synthesis and may find application in the preparation of substances of interest.

CONCLUSION

The reactions for the synthesis of 3-hydroxy-2-(trimethylsilyl)phenyl trifluoromethanesulfonate (**6**) resulted in good yields, except for the last step of the synthesis that will be further optimized. All produced compounds (**2**-**6**) had their structures determined by the following analyses: GC-MS, IR, ^{1}H NMR, ^{13}C NMR and HRMS (when necessary).

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