An Efficient Synthesis of Methallyl sulfoxides: Application of Sulfur Dioxide in C-S Bond Formation

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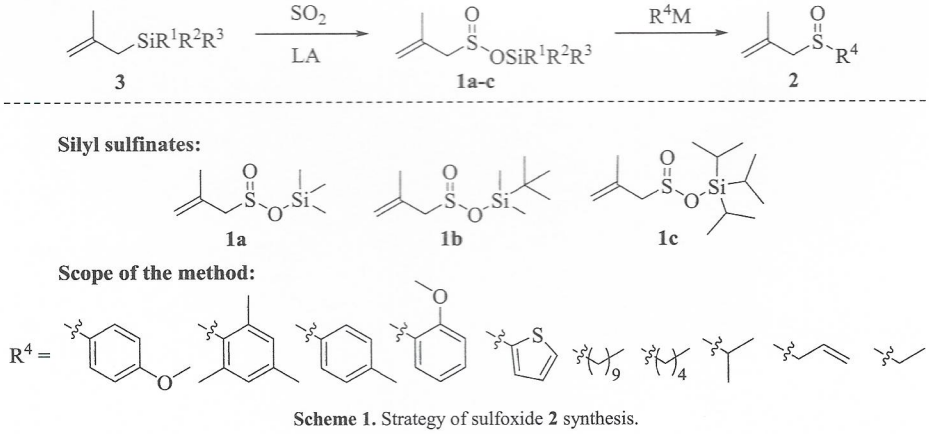
Introduction

Structural motif of sulfoxides is present in many naturally occurring [1] and biologically active compounds [2], that are used as medication [3]. Sulfoxides are also well-recognized synthetic intermediates. They form complexes with transition-metals and are used in catalysis [4]. The most common approaches for synthesis of sulfoxides are oxidation of sulfides and C-S bond formation in nucleophilic substitution reactions [5].

Herein we report an application of silyl sulfinates **1** in the synthesis of variously substituted methallyl sulfoxides **2** (see Scheme 1) [6]. Silyl sulfinates **1** are obtained in sila-*ene* reaction of allylsilanes **3** with sulfur dioxide.

Results and Discussions

In order to optimize the reaction conditions for sulfoxide **2** synthesis we investigated influence of solvent, temperature, organometallic reagent (including Grignard reagents, copper and cerium salts) and Lewis acid (e.g. LiCl, $ZnCl_2$, TMSOTf, TBSOTf, $BF_3{\cdot}OEt_2$) additive on sulfoxide **2** yield. We have also diversified silyl moiety in sulfinate **1** structure, examining trimethylsilyl- (**1a**), *terc*-butyldimethylsilyl- (**1b**) and triisopropylsilyl sulfinate (**1c**) in order to increase the yields of sulfoxides **2**. Experiments with Grignard reagents as nucleophiles and silyl sulfinates **1a,b** as sulfinyl transfer reagents showed the most promising results. The nucleophilic attack of Grignard reagents was accelerated in toluene and in the presence of LiCl or $ZnCl_2$ as Lewis acidic additives. The scope of the method has been demonstrated with the successful incorporation of aryl-, alkyl-, allyl-, and heterocyclic Grignard reagents. Under the given experimental conditions trialkylsilyloxy groups act as good leaving groups. The method described above gives opportunity to synthesize methallyl sulfoxides **2** in up to 83 % yield.



Scheme 1. Strategy of sulfoxide **2** synthesis.

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ABSTRACTS

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