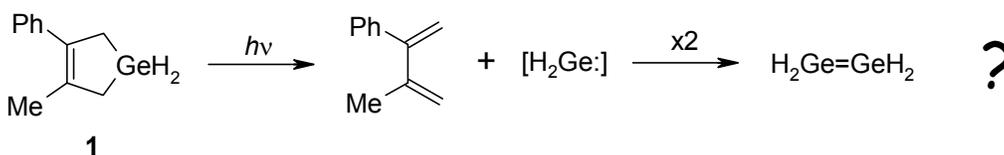


The Direct Detection Of Germylene And Digermene (GeH_2 and $\text{H}_2\text{Ge}=\text{GeH}_2$) in Solution.

Kathryn M. Beleznyay, Cameron R. Harrington, and William J. Leigh

Department of Chemistry, McMaster University, 1280 Main Street West, Hamilton ON L8S 4M1

Germylene (GeH_2), the germanium analogue of methylene, has been studied recently in low temperature matrices and in the gas phase, but never before in solution. Similarly, the germanium analogue of ethene, digermene ($\text{H}_2\text{Ge}=\text{GeH}_2$), has never been observed under any conditions. The purpose of my project was to characterize the reactive intermediates produced upon photolysis of a molecule (**1**) that my group had recently synthesized, with the intent of producing these two species for study in solution by time-resolved spectroscopic methods. Their initial results were promising, but in conflict with published theoretical and experimental work on GeH_2 .



My work involved first synthesizing **1** and its deuterated counterpart, **1- d_2** , characterizing their photochemistry in solution in the presence of typical germylene scavengers such as alcohols, acetic acid, and a conjugated diene, and then studying the reactivity of the transient species produced from the molecule by laser flash photolysis techniques. The results of the acetic acid scavenging experiments will be discussed in detail. While the reaction mixture is very complex, it reveals that GeH_2 is indeed the major germanium-containing product of photolysis of **1**, and more importantly, that other possible germylene species arising from alternate photodecomposition pathways are *not* formed in greater than $\sim 10\%$ yield relative to that of GeH_2 . It also contains the products of a new reaction – H_2 , from reaction of GeH_2 with the carboxylic acid. Finally, I will present the results of laser flash photolysis studies of the reactivity of the transient germylene – which we conclude is indeed GeH_2 – in solution with acetic acid, an alkyne, an alkene, methanol, and its precursor.