Gas Phase Studies of Boron, Silicon, and Aluminum -- Relationship to Carbon-Carbon Composition

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Abstract: Work on a number of **boron** hydride anions and cations has been carried out using the unique features of flowing afterglow-selected ion flow tube (FA- SIFF) technology. Reaction of strong base with diborane has allowed the preparation of a number of anionic **boron** hydride clusters. Many of these including B2H3- have been examined in terms of their reaction chemistry (FA- SIFF) and structure (ah initio computation). The fundamental thermodynamic property of gas phase acidity has been measured for several **boron** hydride species by reacting their corresponding conjugate base with a series of reference acids. Nevertheless, the **boron** hydride anions have proved to be surprisingly unreactive, particularly considering their low-valency. As a result, studies on simple **boron** hydride cations like BH2+ were undertaken. This cation is particularly specific in its reactions with D2 and CH4 in contrast to its periodic neighbor CH3+. It reacts with D2 to give predominantly BHD+ and HE) . The reaction potential surface for this and related reactions has been studied by ah initio methods. Electron structure computations have also been carried out in collaboration with Professor M. S. Gordon on various titanium and silicon hydride species. (AN)

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