

The Basicity of Silylamines and Alkylamines: An Equilibrium Study of the Competitive Borane Adduct Formation

Gerald Huber, Hubert Schmidbaur*

Anorganisch-chemisches Institut der Technischen Universität München,
Lichtenbergstrasse 4, D-85747 Garching, Germany

Z. Naturforsch. **53 b**, 1103–1108 (1998); received July 21, 1998

Silylamines, Alkylamines, Borane Adducts, Amineboranes, Basicity Studies

In order to investigate the Lewis acid/base chemistry of silylamines in solution, the equilibrium reactions of $\text{Me}_3\text{SiNMe}_2 / \text{Me}_3\text{SiNMe}_2(\text{BH}_3)$ and different amines $\text{NR}_3 / \text{amineboranes } \text{NR}_3(\text{BH}_3)$ were monitored by ^1H NMR spectroscopy in C_6D_6 and CDCl_3 at 60°C . For the equilibrium of the reference silylamine/-borane and $\text{Me}_3\text{CNMe}_2 / \text{Me}_3\text{CNMe}_2(\text{BH}_3)$ values $K = 0.35$ ($\Delta G = 3.1 \text{ kJ mol}^{-1}$) in C_6D_6 and $K = 0.50$ ($\Delta G = 2.0 \text{ kJ mol}^{-1}$) in CDCl_3 have been estimated, showing that both the silylamine and the C/Si-analogous organic amine have very similar donor properties. Small amines like NMe_3 proved to be much more powerful donors than the silylamine $\text{Me}_3\text{SiNMe}_2$, whereas bulky amines are less efficient donors, indicating that steric effects play an important role. The formation of BH_3 adducts of Me_2NSiH_3 and $(\text{H}_3\text{Si})_3\text{N}$ which could not be followed experimentally owing to the low stability of the products, has been studied by quantum chemical calculations. A comparison with data for $\text{Me}_3\text{N}(\text{BH}_3)$ shows that the silylamines are poorer donors, but the reason for this remains unclear.

* Reprint requests to Prof. Dr. H. Schmidbaur.