Organoaluminium and -gallium Lewis-Acid Adducts of Tetramethylmethylenediamine

Norbert W. Mitzel and Christian Lustig

Westfälische Wilhelms-Universität Münster, Institut für Anorganische und Analytische Chemie, Corrensstr. 30, D-48149 Münster, Germany

Reprint requests to Prof. Dr. N. W. Mitzel. Fax +49(0)251 83 36007. E-mail: Mitzel@uni-muenster.de

Z. Naturforsch. **59b,** 1532 – 1539 (2004); received August 31, 2004

Dedicated to Professor Hubert Schmidbaur on the occasion of his 70th birthday

The compounds Me_3Al-$Me_2NCH_2NMe_2$-$AlMe_3$ (**1**) and Me_3Ga-$Me_2NCH_2NMe_2$-$GaMe_3$ (**2**) were prepared by reacting $Me_2NCH_2NMe_2$ (TMMDA) with two equivalents of the metal trialkyls in hydrocarbon solutions. With the ether adduct $Me_3Ga{\cdot}OEt_2$ $Me_2NCH_2NMe_2$ reacts to give the mono-adduct $Me_2NCH_2NMe_2$-$GaMe_3$ (**3**). These compounds were characterized by NMR spectroscopy (^{1}H, ^{13}C and ^{27}Al) and by elemental analyses. Crystal structure investigations show **1** and **2** to be monomeric and to a adopt a *trans*,*trans*-conformation for their M-N-C-N-M backbones. **3** is also monomeric in the solid state, but adopts a *cis*,*trans*-conformation. Tetramethylformamidinium chloride and also chlorotetramethylformamidinium chloride reacts with lithium aluminium hydride to give the mono-adduct $[Me_2NCH_2NMe_2$-$AlH_3]_2$ (**4**), which is dimeric and can be regarded as a double TMMDA adduct to Al_2H_6 with five-coordinate Al atoms. *Ab initio* calculations on the MP2/6-311G** level of theory have been performed for the model compound H_3N-$H_2Al(\mu$-$H)_2AlH_2$-NH_3 to obtain its molecular structure and vibrational spectrum for comparison with **4** and for the assignment of its vibrational spectrum.

Key words: Aluminium, Gallium, Aminal Adduct, Crystal Structure, *ab initio* Calculations