Molecular Structure of Dimethylaluminium Hydride Dimer by Electron Diffraction

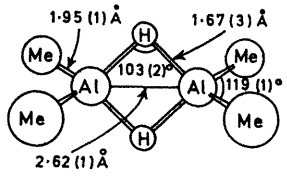
By G. A. ANDERSON, A. ALMENNINGEN, F. R. FORGAARD, and A. HAALAND*
(*Department of Chemistry, University of Oslo, Blindern, Oslo 3, Norway*)

Summary The molecular structure of dimethylaluminium hydride dimer has been determined by means of gas phase electron diffraction.

WHILE dimethylaluminum hydride is trimeric in hydrocarbon solutions at 20 °C, its vapour at 80 °C consists of a mixture of trimeric dimeric species and at 170 °C consists of dimeric species only.[1]

We have determined the molecular structure of the dimer using gas-phase electron diffraction by recording the electron scattering pattern from the vapour with a source temperature of 75 °C (corresponding to a vapour pressure of 35 mm[1]) and a nozzle temperature of 170 °C.

The scattering pattern thus obtained was consistent with a dimer concentration of 100%. The molecular structure and the molecular parameters obtained at the present stage of refinement are shown in the Figure (estimated standard deviations in parentheses).



FIGURE

The Al–H bond distance is similar to the Al–H bond distance in crystalline AlH_3 where each aluminum atom is surrounded by six hydrogen atoms at the corners of an

octahedron, 1·72(1) Å.[2] The Al–Al bond distance, the terminal Al–C bond distance and the C–Al–C valence angle are equal to the corresponding parameters in dimeric trimethylaluminum.[3,4]

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