

The Far Infrared Spectra of Trimethylaluminum

By Teiichiro OGAWA, KOZO HIROTA and KUNIO FUKUSHIMA

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The peculiar structure and the high reactivity of trimethylaluminum has provided a very interesting subject for chemists. The vibrational spectra of this molecule have been measured by several authors. Hoffmann,¹⁾ for instance, has published his extensive investigation of the infrared and Raman spectra in the region above 400 cm^{-1} . The infrared measurement was extended to the region from

400 to 120 cm^{-1} by the present authors.²⁾ Recently Gray,³⁾ and Onishi and Shimanouchi⁴⁾ have described the infrared spectra in the region above 280 cm^{-1} .

As to the assignments of the spectra, however, Hoffmann and Gray gave contradictory views; therefore, in order to settle the problem, observation in the far infrared region has had to be carried out. In the present communication, the far infrared spectra of

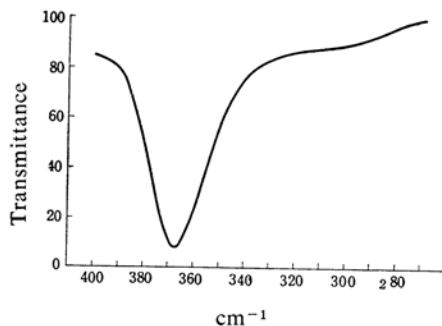


Fig. 1. The far infrared spectra of trimethylaluminum in the 400 to 270 cm^{-1} region. A band lies at 367 cm^{-1} .

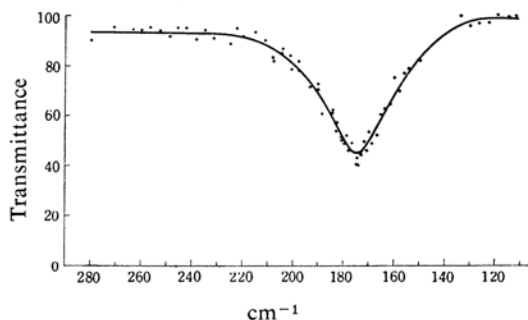


Fig. 2. The far infrared spectra of trimethylaluminum in the 280 to 110 cm^{-1} region. A band lies at 175 cm^{-1} .

1) E. G. Hoffmann, *Z. Elektrochem.*, **64**, 616 (1960).

2) T. Ogawa, K. Hirota, T. Imanaka, K. Fukushima and T. Miyazawa, International Symposium on Molecular Structure and Spectroscopy, A309, Tokyo, September, 1962.

3) A. P. Gray, *Can. J. Chem.*, **41**, 1511 (1963).

4) T. Onishi and T. Shimanouchi, *Spectrochim. Acta*, **20**, 325 (1964).

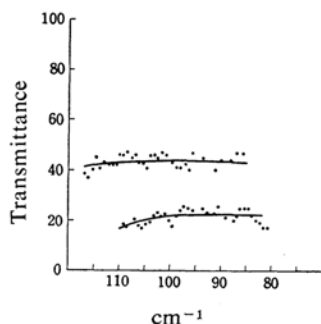


Fig. 3. The far infrared spectra of trimethylaluminum in the 120 to 85 cm^{-1} and 110 to 80 cm^{-1} region. Any band is not observed.

trimethylaluminum will be reported.

Commercial trimethylaluminum (Ethyl Corporation, New York) was purified by vacuum distillation and then transferred into a liquid cell made of two polyethylene films 0.5 mm. thick. This cell was then kept by itself in a vacuum of about 10^{-2} mmHg for several days. The infrared spectra in the 700~270 cm^{-1}

region were measured by a Perkin-Elmer Model 221 spectrophotometer with CsBr optics, and the spectra in the 500~65 cm^{-1} region, by a Perkin-Elmer Model 201C far infrared spectrometer. The spectra in the region above 400 cm^{-1} were also measured by a Nippon Bunko Model DS402G spectrometer and found to be similar to those described in the literature.^{1,3)}

The observed spectra are shown in Figs. 1, 2 and 3. The thickness of the sample is not the same in all measurements but greater in the longer-wavelength region. Two absorption bands were found at 367 cm^{-1} and 175 cm^{-1} in the observed far infrared region.

*Department of Chemistry
Faculty of Science
Osaka University
Nakanoshima, Osaka
(T. O. & K. H)*

*Institute for Protein Research
Osaka University
Kita-ku, Osaka
(K. F.)*