SHORT COMMUNICATIONS

Polymerization of Acetone

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Recently, Kargin[1] found that acetone was polymerized by magnesium metal which was condensed on glass surface cooled with liquid nitrogen.

The present author found that acetone was also polymerzed by *n*-butyl lithium, triethyl aluminum and other organometallic compounds. A solution of *n*-butyl lithium or triethyl aluminum in *n*-hexane or tetrahydrofuran was added into acetone monomer at $-70\sim-78°C$ and at a pressure of 3~5 mmHg, and allowed to stand in a sealed tube for 72 hr.

The reaction mixture became a slightly viscous liquid when it polymerized, and the product was poured into *n*-hexane. The white waxy polymer which precipitate from the liquid was collected by filtration. The polymer was soluble in methanol, chloroform and dioxane etc. The relative viscosity η_{rel} of reaction solution in acetone was 0.18 at 15°C.

The polymer decomposed gradually when it was exposed to air for several hours. The polymer melted in a capillary tube partially at a temperature of 60~70°C and began to decompose with foaming at about 230~235°C. The infrared spectrum in Nujol mull was shown in Fig. 1. The characteristic absorption bands appeared at 985 and 855 cm^{-1}. No absorption band near 1750 cm^{-1} due to the carbonyl group was observed, while the absorption band due to the C–O–C linkage[2,3] appeared. The infrared spectrum in hexachlorobutadiene was shown in Fig. 2, and the absorption band due to the CH_3–C linkage was observed at 2900 and 1440 cm^{-1}. The absorption band at 3450 cm^{-1} seemed to be due to hydroxyl group, and it may be occurred by polymer end group, because the polymer was of a low molecular weight.

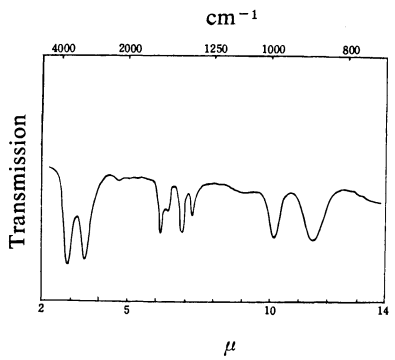

Fig. 1. Infrred spectrum of acetone polymer (in nujol mull).

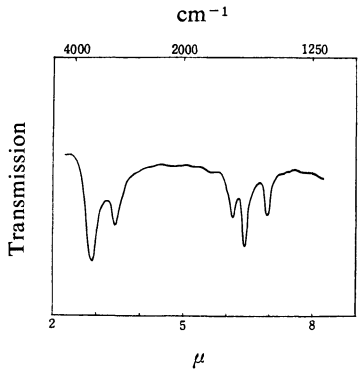

Fig. 2. Infra-red spectrum of acetone polymer (in hexachlorobutadiene).

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1) B. A. Kargin et al., *Vysokomol. Soed.*, 3, 426 (1961).

2) L. J. Bellamy, "The Infra-red Spectra of Complex Molecules", John Wiley and Sons, Inc., New York (1954), pp. 101, 104.

3) G. M. Barrow and S. Searles, *J. Am. Chem. Soc.*, 75, 1175 (1953).