

The Proton Magnetic Resonance Spectrum of 1,2,3,4-Tetrahydronaphthalene Polymer

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The polymerization of naphthalene has been reported by Minato *et al.*¹⁾ The naphthalene polymer was obtained easily by the reaction with anhydrous aluminum chloride. This polymer was estimated to be a 1,2-dihydronaphthalene oligomer. According to the procedure of Minato *et al.*, we also synthesized the naphthalene polymer. The polymer obtained by us was a brown, powdered crystal. This crystal softened and darkened at 50–60°C, melted at about 150°C, and finally carbonized at about 200°C. The molecular weight of the polymer was found to be 1025 by the cryoscopic method. As the molecular weight of (C₁₀H₈)₈ is 1024, the average degree of polymerization is

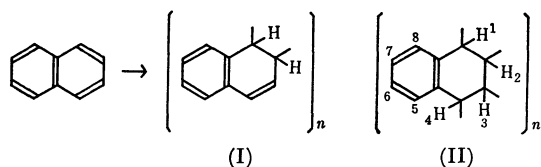


Fig. 1. The structures of the polynaphthalene and the numbering.

8. Figure 1 shows two structures of the polynaphthalene. The (II) structure seems to be more favorable in both stability and the progress of the reaction. The proton magnetic resonance spectrum of the polymer was obtained on a JNM-MH-100 spectrometer.

The peaks at 1.84, 2.83, and 7–9 ppm are ascribed to the hydrogens of the 2,3-, 1,4-, and 5,6,7,8-positions respectively. The sharp peak at 7.19 ppm is suspected to be due to CHCl₃ in the solvent, CDCl₃.

On the other hand, in the NMR spectrum of 1,2-dihydronaphthalene, two peaks have been found, at 5.82 and 6.33 ppm, corresponding to the 3- and 4-positions.²⁾ Therefore, if the 1,2-dihydro-structure predominates in the polymer, two peaks corresponding to the 3- and 4-positions should appear in the range of 5–7 ppm. Moreover, of course, no peak has been found in that range in tetralin.³⁾ Therefore, it seems that the polymer we have obtained has the 1,2,3,4-tetrahydro-structure predominantly.

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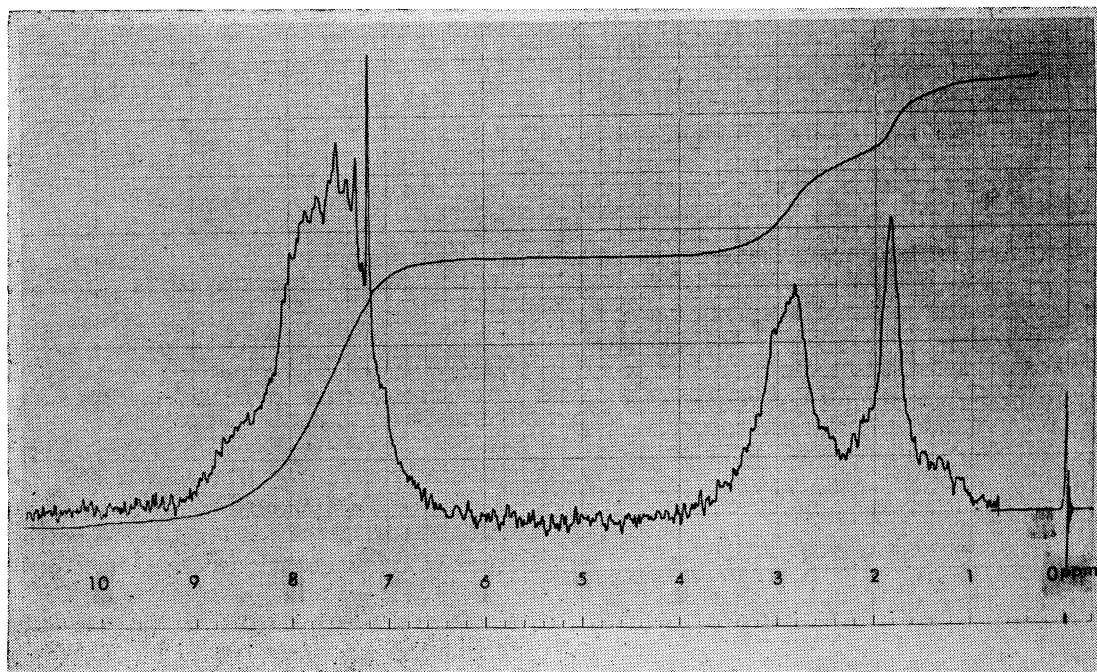


Fig. 2. The NMR spectrum of the polynaphthalene.

Concentration and solvent: about 0.1 mol % in 0.5 ml CDCl₃

Temperature: 70°C

Internal reference: tetramethylsilane

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Manatt, *J. Chem. Phys.*, **53**, 2343 (1970).

3) "High Resolution NMR Spectra Catalog," No. 557, Varian Associates, Palo Alto, Calif.