

The Gelation of Aluminium Soaps in Hydrocarbons

III. Gelation in Low Molecular Solvents

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The gelation of aluminium hydroxide distearate in hexadecane has previously been investigated by means of infrared spectroscopy and rheological measurements¹ and the results have been related to the transitions of the pure soap.² The results showed that the gelation could take place first at the temperature where the methylene groups in the hydrocarbon chains had reached a high mobility, as shown by the disappearance of the infrared absorption of the rocking vibration of these groups. The penetration of the soap by the solvent molecules gave a disturbance of its structure causing a transition to a state stable above 150°C for the pure soap.

Low molecular solvents such as benzene and carbon tetrachloride give gels with aluminium hydroxide distearate at much lower temperatures. In this case, it is obviously possible for these small molecules to penetrate the soap structure without an increase in mobility of the hydrocarbon chains of the soap. On the other hand, this penetration should cause changes in the structure, which would be visible in the infrared spectra of the soap. These changes would be easiest observed in the absorption of the OH groups of the soap, since the transition around 150°C changes these absorptions to a very high degree.²

Spectra of gels of aluminium hydroxide distearate in carbon tetrachloride have been recorded, together with spectra of the solid soap, as films after evaporation of the solvent and heating to different temperatures in a vacuum.

The spectra exhibit changes similar to those at the transition point about 150°C for the pure soap. The intensity of the absorption decreases, and a slight broadening occurs which can be observed in Fig. 1. Very little change occurs in absorption of the soap when the solvent is evaporated. More considerable changes occur first after heating to 110°C, which is a temperature where the increased mobility of the hydrocarbon chains have made transitions of the soap structure possible.

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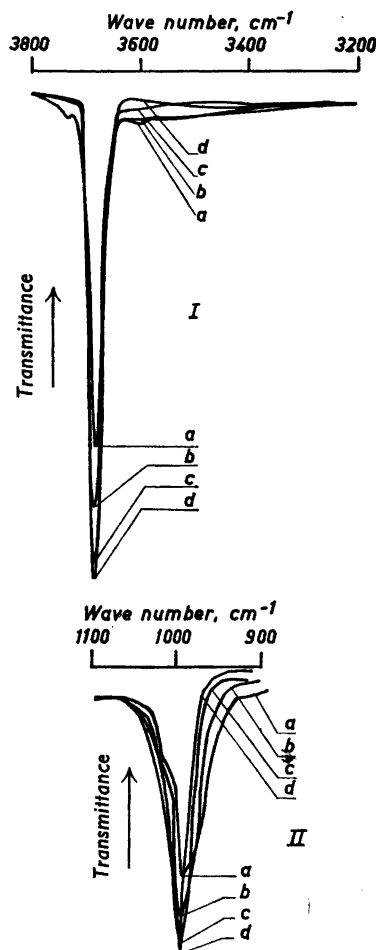


Fig. 1. The infrared transmittance of the valence (I) and deformation (II) vibration of the OH group of aluminium hydroxide distearate gels in carbon tetrachloride with different treatment. *a*. Gel in carbon tetrachloride. *b*. The solvent evaporated at 60°C in N₂. *c*. Solid film from *b* heated to 110°C in a vacuum. *d*. Solid film from *c* heated to 160°C in a vacuum.

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1. Friberg, S. *Acta Chem. Scand.* **19** (1965) 883.
2. Friberg, S. *Arkiv Kemi. In press.*

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