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Mechanism of Peptization of Aluminium Soap Gels in Hydrocarbons

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Two theories of the mechanism of peptization of aluminium soap gels have been given earlier. Gray and Alexander[1] suggested that the peptizing molecule was coordinated preferentially to the metal ion and the polymeric chains were consequently broken. Bauer *et al.*[2,3] gave some years later a new theory by which the peptizer was connected to the carboxyl group of the soap by a hydrogen bond. This reaction induced a disturbancy of the symmetry in the carboxyl ion and changed the absorption in infrared from 6.3 μm (symmetric carboxyl ion) to 5.8 μm (carbonyl absorption of an associated carboxylic acid). The association complex chains were supposed not to be broken, only weakened. Yamamuto[4] has recently published a great many spectra of aluminium soap gels peptized by different compounds and has concluded that the main mechanism must be hydrogen bonding of the peptizer. In the present work gels of very pure aluminiumhydroxide-distearate in dry cyclohexane have been peptized by octadecanoic acid, 1-octadecanol and octadecylamine. The chain length has been the same both of the soap and of the peptizers in order to eliminate the influence of this variable, which can be pronounced.[5] The acid and the alcohol caused only a slight change in the rheological properties of the gels, and the change in infrared spectra can well be explained by the hydrogen bond mechanism. The amine on the other hand made the gel liquid and changed the absorption in infrared in a quite different way. The absorption at 6.3 μm, representing *intermolecular* coordination of the carboxyl ion, did not change to 5.8 μm but to 6.2 μm, which band represents *intramolecular* coordination.

These results give evidence of a new peptization mechanism, where the peptizing molecule changes the coordination of the carboxyl ion. Details of results and of research devices will appear later in a more complete report.

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