<table>
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<th>Inductive Effect of Substituents on the Symmetrical Methyl Deformation Frequencies of Aliphatic Hydrocarbons</th>
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<td>Takenaka, Tohru</td>
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Kyoto University
ABSTRACTS

Inductive Effect of Substituents on the Symmetrical Methyl Deformation Frequencies of Aliphatic Hydrocarbons

Tohru Takesaka

Nippon Kagaku Zasshi (Journal of the Chemical Society of Japan, Pure Chemistry Section), 82, 1309 (1961)

In order to discuss the inductive effect of polar group upon methyl group in a molecule, the symmetrical methyl deformation frequencies \(\delta_{\text{CH}_3}\) of \(\text{CH}_3(\text{CH}_2)_{n-1}X\text{H}_{m-1}\) molecules were measured, where \(X\) represents an atom in groups IV-VII of the periodic table, \(m\) the valence of \(X\) atom and \(n\) the carbon number of the molecule.

For \(\text{CH}_3X\text{H}_{m-1}\) molecules \((n=1)\), a linear relationship was found to exist between the frequency and logarithm of the electronegativity \(x_X\) of \(X\) atom for each row and column of the periodic table. These frequency variations are ascribed to change in the deformation force constants, and can be expressed as

\[
\delta_{\text{CH}_3} = 375 \log \left( \frac{x_X}{\rho_{\text{CH}_3}} \right) + 1366
\]

where \(\rho_{\text{CH}_3}\) is the C-X bond length. This equation holds not only for \(\text{CH}_3X\text{H}_{m-1}\) molecules but also for the series \((\text{CH}_2)_2X\text{H}_{m-2}, \cdots, (\text{CH}_3)_mX\) within the error of \(\pm 1\%\).

Frequency variations due to the change of the carbon number of \(\text{CH}_3(\text{CH}_2)_{n-1}X\text{H}_{m-1}\) molecule \((n \geq 2)\) can be interpreted by a modified equation in which the factor \(\{x_C + 0.40\varepsilon_X \sigma_{n-1}/\rho_{\text{CH}_3}^2\}\) is used instead of \((x_X/\rho_{\text{CH}_3}^2)\) in the above equation. Here, \(\rho_{\text{CH}_3}\) is the C-C bond length, \(x_C\) the electronegativity of carbon atom, \(\varepsilon_X\) the induced charge on the carbon atom adjacent to \(X\) atom, and \(\sigma\) the ratio of the induced charges at any two adjacent carbon atoms in the alkyl chain.

Dielectric Properties of Emulsions. (III)

Dielectric Behavior of W/O Emulsions

Tetsuya Hanai

Kolloid Zeitschrift, 177, 57 (1961)

Dielectric constants and electrical conductivities of W/O emulsions at rest and under shear were measured over a wide range of concentration and at frequencies ranging from 20 cps. to 5 mc.

Striking dielectric dispersions due to the interfacial polarization were observed at high frequency range above 100 kc., while the electrode polarization was found below 1 kc.

It was found that the dielectric dispersions due to the interfacial polarization