ABSTRACTS

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

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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 CH$_3$(CH$_2$)$_{n-1}$XH$_{m-1}$ 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 CH$_3$XH$_{m-1}$ molecules ($n=1$), a linear relationship was found to exist between the frequency and logarithm of the electronegativity $\chi_X$ 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

$$\delta_{\text{CH}_3} = \frac{x_X}{r_{\text{COX}}} + 1366$$

where $r_{\text{COX}}$ is the C-X bond length. This equation holds not only for CH$_3$XH$_{m-1}$ molecules but also for the series (CH$_3$)$_2$XH$_{m-3}$,·····(CH$_3$)$_m$X within the error of ±1%.

Frequency variations due to the change of the carbon number of CH$_3$(CH$_2$)$_{n-1}$ XH$_{m-1}$ molecule ($n \geq 2$) can be interpreted by a modified equation in which the factor $\{(x_0 + 0.40\sigma_0)^{n-2}/r_{\text{COX}}^2\}$ is used instead of $(x_0/r_{\text{COX}}^2)$ in the above equation. Here, $r_{\text{CO}}$ is the C-C bond length, $x_0$ the electronegativity of carbon atom, $\sigma_0$ 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

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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