

On a Width of Polarized Line of Raman Scattering of Benzene in Solution.

I.P. Kleyner^S and Sh.B. Amonov^C
*Samarkand State Architectural and
Civil Engineering Institute
Faculty of Physics, 703047
Samarkand, Lolazor str., 70, Uzbekistan
kleyner-sh@rambler.ru*

We have investigated the concentration dependence of the width of the polarized line ($\nu=992\text{ cm}^{-1}$) of benzene in solutions with heptane and dimethylsulfoxide. In solutions with heptane, we observed a monotonous decrease in the width of the 992 cm^{-1} line with diluting the benzene. For the extremely diluted solution the width of the line is 1 cm^{-1} that is 2,4 times less than the width of this line in pure benzene. In solutions with dimethylsulfoxide, while diluting the benzene, the width of the 992 cm^{-1} line decreases to $2,2\text{ cm}^{-1}$ (at 0,3 m.f. of benzene), and with further dilution the width of the line increases to $2,6\text{ cm}^{-1}$ that is a little more than the line's width in pure benzene.

The observed behavior of concentrational dependence in these solutions may be explained by two factors, which determine the width of the polarized line of Raman scattering: by exchange of vibrational quanta between the benzene molecules, which interact with each other, and by presence of the solvent. In the extremely diluted solution (0,02 m.f. of benzene) with the mentioned solvents, as well as with a dozen of other ones, we studied the role of solvent in broadening the line.

For inert (with respect to benzene) solvents it is characteristic to see a decrease in the line's width (992 cm^{-1}) of benzene (comparing with pure benzene). Moreover, there is a correlation between the change of the line's width and the density of solvent. Presence or absence of the dipole moment of the solvent's molecule, as well as difference in the polarizability, plays no role in determining the width of the line.