$f = 4.8 \times 10^9$ cps is $\alpha = 7 \times 10^3$ cm^{-1}, while for carbon tetrachloride at $f = 3.2 \times 10^9$ cps we have $\alpha = 2 \times 10^4$ cm^{-1}.

Recently Cummins, Knable, and Yen[6] carried out a precise experimental investigation to determine the broadening of the Rayleigh line (width of the central fine-structure component) in a dilute solution of polystyrene, and check the feasibility of determining the dimensions of macromolecules from such measurements.

The use of very narrow spectral lines for the excitation of scattering makes it possible to ascertain quantitatively, from measurements in the fine structure components, the attenuation of hypersound, the temperature conductivity, and also the diffusion and dimensions of molecules in solutions.

In conclusion, the authors thank V. P. Zaĭtsev for making possible work with mirrors of multilayer dielectric coating, and E. V. Tiganov for participating in the measurements.

[1)] Absorption of artificially generated sound of frequency $\sim 10^9$ cps was investigated in liquid mercury[1] and recently in liquid water[2].

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INVESTIGATION OF THE EXCITATION THRESHOLD OF INDUCED RAMAN SCATTERING

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THE existence of a definite excitation threshold is one of the important peculiarities of induced Raman scattering. However, no measurements of the thresholds have been made as yet. In the literature there is only a qualitative indication by Stoicheff[1] that the excitation threshold is lower for CS_2 than for benzene and CCl_4, and is in turn lower for benzene than for CCl_4. Inasmuch as data on the excitation threshold of induced Raman scattering are of considerable interest, we have undertaken a measurement of this quantity to determine its dependence on the parameters of the ordinary Raman scattering lines.

The induced Raman scattering was excited by a ruby generator with pulsed Q switching by a rotating prism. Particular attention was paid in the measurements to strict standardization of all the experimental conditions. To measure the threshold, the beam of the exciting radiation was attenuated with a stack of glass plates placed in front of the cuvette with the investigated liquid. By varying the number of plates we could change in small steps the intensity of the incident radiation, the "threshold" being taken to be the minimum intensity at which induced Raman scattering was still observed. This method, having the advantage of great simplicity, gave a measurement accuracy sufficient for practical purposes (about 10%).

The induced Raman spectra were photographed with a diffraction-grating spectrograph of approximately 13 Å/mm dispersion. Several series of experiments were carried out for each substance. The parameters of the lines in the spectra of ordinary Raman scattering (integrated intensity I_∞, width δ, degree of depolarization ρ) were measured with a photoelectric spectrometer of approximately 5 Å/mm dispersion, with the 4358 Å mercury line used to excite the spectra.

The data obtained for several liquids are listed in the table. The data for the threshold π are given for the first Stokes line. The measurement unit is chosen to be the threshold for benzene.

Substance	$\Delta\nu$, cm^{-1}	δ, cm^{-1}	ρ	I_∞	I_∞/δ	$1/\pi$
Benzene	992	1.8	0.96	1	1	1
Pentadiene-1, 3	1655	15	0.31	1.6	0.2	0.5
3-methyl butadiene-1, 3	1638	7	0.21	1.3	0.3	0.5
Carbon disulfide	656	1	0.25	1.6	3	1.6
Styrene	998	2	—	0.7	0.6	0.5
	1602	3	—	0.9	0.6	—
	1634	3	—	1.6	0.9	0.9

The data obtained allow us to draw the following conclusions:

1. In the induced Raman spectra, the lines of compounds with conjugated C=C bonds are excited in the vicinity of 1600 cm^{-1} with sufficiently low threshold. The substances we investigated comprise a new class of compounds active in induced Raman scattering, whose π-electrons are not in ring systems. We note that the lines we investigated had a considerable intensity both in the ordinary Raman scattering spectra and in the infrared spectra.

2. The threshold of induced Raman scattering is determined essentially by the intensity of the line in the ordinary Raman scattering, with the degree of depolarization apparently playing an insignificant role. The reciprocal of the threshold is roughly determined by the line intensity per unit width, but no strict proportionality of these quantities is observed. This may be connected with the fact that our intensity data pertain to the 4358 Å exciting line, whereas in induced Raman scattering the excitation was by the 6943 Å line. It is well known that the dependence of the intensity of the Raman scattering lines on the excitation wavelength differs somewhat for different substances (see, for example, [2]). Nor can the influence of the difference in the shapes of the compared lines be disregarded.

Attention is called to the rapid growth of the line intensity in induced Raman scattering when the excitation energy is slightly above threshold.

3. In the spectrum induced Raman scattering of styrene we observed simultaneously during each flash two lines, 998 and 1634 cm^{-1}. The 1602 cm^{-1} line, which has the same intensity as the 998 cm^{-1} line, was not observed. We find this observation important, since it is still being stated in the literature that only one frequency and its harmonics appear each time in induced Raman scattering.

In conclusion we are grateful to P. A. Bazhulin and A. M. Prokhorov for interest in this work.

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