

very small as can be seen below from a calculation for the two 1G 's.

	Ostrofsky	Laporte	Difference	Per cent.
Mean value	20126.5	20126.5	0	0
${}^1G_+$	25490.2	24526.5	+963.7	4
${}^1G_-$	14762.8	15726.5	-963.7	

The error is about 4 per cent. This is practically negligible. Hence calculations for the other pair are not made. But it might be noted that in all future calculations Laporte's formulæ might be used. The formulæ given by the author for d^4 s also might be modified accordingly.

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1. Laporte Otto, *Phy. Rev.*, 1942, 61, 302, 305.
2. Ostrofsky, *Ibid.*, 1934, 46, 604.
3. Ramakrishna Rao, V., *Ind. J. Phys.*, 1948, 22, 429.

ELASTIC CONSTANTS OF LITHIUM FLUORIDE

LITHIUM FLUORIDE is an ionic cubic crystal but its elastic constants as determined by Schæfer and Bergmann (1938), do not satisfy Cauchy's relation $C_{12} = C_{44}$. Sundara Rao (1949) has recently found better agreement but even according to him, C_{12} and C_{44} differ by as much as 16%. An exceptionally clear and artificially grown crystal was put at my disposal by Prof. Bhagavantam and it was thought desirable to repeat the measurements.

Sections (001) and (011) of different thicknesses (1.790 to 1.983 mm.) have been cut from this sample and used. Ultrasonic velocities in these plates are determined by the wedge method, using frequencies in the range 1 to 12 mc./sec. and the elastic constants are evaluated in the usual manner. The density of the substance as determined by the author is 2.635 gm./cm.³, and agrees well with the average value 2.640 given in Landolt-Börnstein Tables (1927). The bulk modulus K along with the elastic constants (10^{11} dynes/cm.²) and the elastic coefficients (10^{-13} cm.²/dyne) are given below.

No.	Observer	C_{11}	C_{12}	C_{44}	S_{11}	S_{12}	S_{44}	K
1	Schæfer & Bergmann	11.8	4.34	6.28	10.6	-2.85	15.9	6.82
2	Sundara Rao	11.9	4.58	5.42	10.7	-2.97	18.5	7.02
3	Author	11.9	5.38	5.34	11.7	-3.64	18.7	7.55
4	Slater	8.55

The author's values for C_{11} and C_{44} are in good agreement with those of Sundara Rao while that for C_{12} is higher. According to the present measurements, Cauchy's relation is satisfied to a high degree of accuracy. It is interesting to note that the author's value for K is nearer Slater's (1931) value determined by direct experiment.

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1. Landolt-Börnstein, *Physikalisch-Chemische Tabellen*, 1927, Erg. Bd., 1, 5, 176.
2. Schæfer & Bergmann, see "Ultrasonics" by Bergmann, 1938, 180.
3. Slater, J. C., see "The Physics of High Pressure" by Bridgman, 1931, 163.
4. Sundara Rao, R. V. G., *Curr. Sci.*, 1949, 18, 336.

RAMAN SPECTRUM OF METHYL METHACRYLATE GLASS

THE Raman spectrum of methyl methacrylate both in the liquid form and as glass has been investigated by Hibben¹ to elucidate the mechanism of polymerisation, but unfortunately, no photograph of the spectrum was reproduced. As a large transparent rectangular specimen of methyl methacrylate glass (plexi-glass) supplied by the Imperial Chemical Industries Ltd., was available in the laboratory, the author undertook an investigation of its Raman spectrum. The specimen not being transparent in the ultra-violet region, its spectrum had to be excited by using the visible radiations of the mercury arc. The spectrum exhibited weak fluorescence between λ 4200 to λ 5000, but satisfactory spectrograms were obtained by using a filter of a strong solution of sodium nitrite.

In the photograph (Fig. 1), taken with a Hilger 2-prism spectrograph, after twelve hours' exposure, fifteen Raman lines are easily discernible, the frequency shifts being 231 (0,d), 295 (0,d), 360 (1,d), 491 (1,d), 606 (3), 817 (7), 982 (4,b), 1129 (1), 1176 (0) 1455 (5), 1598 (1), 1729 (5) 2876 (0), 2934 (3), 3001 (1) cm.⁻¹ The figures

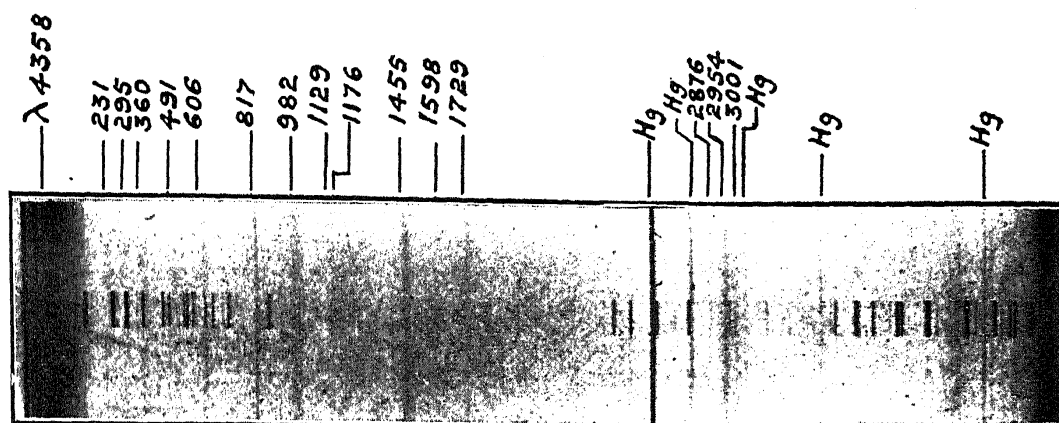


FIG. 1. Raman spectrum of plexi-glass.

in brackets represent rough estimates of the relative intensities of the lines. $b =$ broad, $d =$ diffuse. Besides confirming the frequency shifts already reported by Hibben, the three lines 231, 1176 and 1598 have been recorded for the first time. The appearance of the 1598 line in the spectrum of plexi-glass is very significant. It is in all probability due to $C=C$ oscillation. The spectrum of methyl methacrylate liquid exhibits a line at 1638 cm.^{-1} corresponding to $C=C$ oscillation. Its absence in the spectrum taken by Hibben led him to conclude that the coupling of the molecules on polymerisation took place by the breaking of the $C=C$ double band. This conclusion has to be revised in the light of the present investigation.

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SPECTRUM OF MONOBROMOBENZENE

FOLLOWING the work on the ultra-violet absorption spectrum of iodobenzene,¹ that of bromobenzene was studied under similar conditions. The absorption bands extending from $\lambda 2300$ to $\lambda 2350$ consist of about 150, appearing in a number of groups. As reported earlier by Walerstein² and also referred to by Spomer and Teller,³ the spectrum is a combination of the allowed transitions due to C_{2v} symmetry of C_6H_5Br and of the forbidden transitions of the benzene structure. The totally symmetri-

cal carbon vibrations of 933, 963 and 1020 in the upper state, the difference frequency 60 are evident in the structure of one set of the intense groups. The second set of intense bands displaced by about 520 cm.^{-1} is also obtained. In addition, as observed in similar spectra of aniline,⁴ phenol,⁵ fluorobenzene,⁶ several of the intense heads show a splitting into doublets with an average separation of about 6 cm.^{-1} . An additional difference frequency 221 cm.^{-1} , not reported previously, is also established. The most intense band of the group in the region near $\nu 38900$ corresponds to $(0+966+932)$, while the overtone $(0+2 \times 1020)$ is absent.

Full details will be reported elsewhere.

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GEOGRAPHICAL INVESTIGATION OF THE GOKALPUR LAKE NEAR JUBBULPORE

THE important lake, situated north of Gokalpur village, is about two miles E.N.E. of Jubbulpore, over 1,300 feet above sea level and is put to multipurpose use. There is a depression, forming a natural rock basin in the granitic country with blocks of granite rising in some places above its surface. The north and the west are bounded by granitic hills, while on the north-west there is a natural