between the momentary 'opening' of the first grid (or shutter) and the momentary 'opening' of the second grid. As the periodic change of potential across the deflection grids was effected by a commutator of known speed and dimensions, a curve showing the theoretical resolving power may be easily constructed. This theoretical curve is shown dotted in Fig. 1. The close approximation of the experimental to the theoretical curve shows that the method has in practice a high resolving power, and also that,

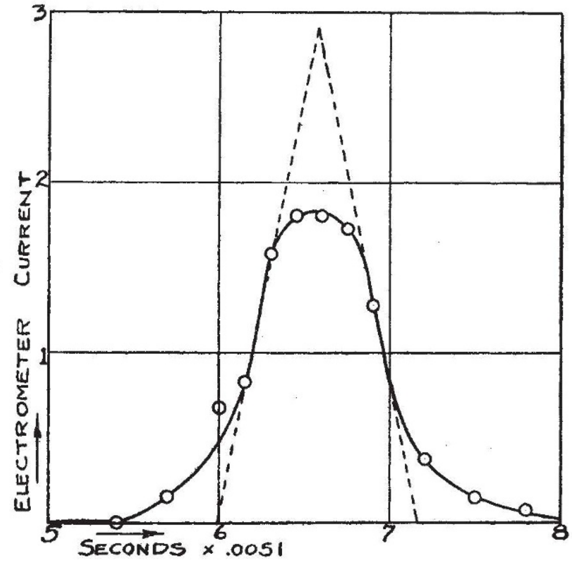

FIG. 1.

at least within narrow limits, all the ions had the same mobility, which is 1·84 cm. per sec. as computed from the curve. The experiments were carried out in moist air at atmospheric pressure, and the initial ionisation was obtained by the action of ultra-violet light on a zinc plate.

Grids for these experiments may be conveniently constructed by first grinding a series of parallel slots in a thin glass plate, then completely silvering the surface of the glass, and finally scraping off the silver where insulation is desired.

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Influence of Temperature on Raman Lines.

IN a letter to NATURE of Oct. 27, 1928, on the influence of temperature on the modified lines in scattered light, Dr. Krishnan reported that with rising temperature the intensity of the anti-Stokes lines was increased relative to that of the Stokes lines, using carbon tetrachloride as the scattering substance. I have examined also the influence of temperature on certain organic liquids and have observed an effect of another kind. When the temperature of the scattering substance is increased, certain Raman lines become very diffuse. Fig. 1 shows the Raman spectrum scattered by toluene at 10° C. and at 100° C., the light source being a mercury lamp. Nearly all the lines which appear in this figure are modified from the strong Hg line, 4359, except 4617·89 and 4589·2, which are modified from the Hg line 4047. Among them it can be seen that the doublet lines $\lambda = 4686{\cdot}82$ and 4683·33 ($\Delta\nu$ from 4359 being 1607·2 cm.$^{-1}$ and 1591·7 cm.$^{-1}$ respectively) become very diffuse at the high temperature. Fig. 2 shows the photomicrometric curve of that spectrum, in which noticeably affected lines are indicated by arrows. The same effect is observed in the scattering by other substances for example, benzene and carbon tetrachloride.

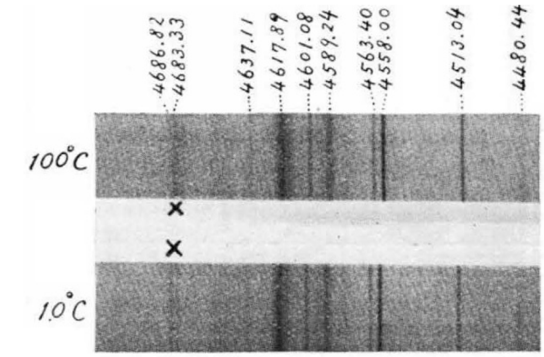

FIG. 1.

Since this broadening of the lines is not common to every line, it does not seem natural to attribute it to the Doppler effect. At all temperatures it is easily noticed with fairly large dispersion that the Raman lines caused by organic substances have several types of structure, that is, very sharp, symmetrically diffuse, asymmetrically diffuse, etc. Also, the broadening effect of temperature is, generally speaking, more noticeable on diffuse lines than on sharp lines. From these facts it does not seem unnatural to suppose that the diffuseness of Raman lines

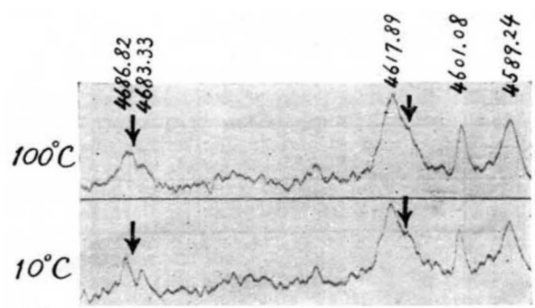

FIG. 2.

is due to molecular rotation and that the increase of temperature accelerates the rotation and causes the broadening of the lines. Further, it is interesting to notice here that in the Raman spectrum of organic substances there very often appear close doublets, and that the influence of temperature is most noticeable upon them. The above-mentioned toluene lines are one example; the doublet in benzene, 4687·10 and 4681·93 ($\Delta\nu = 1680{\cdot}9$ and 1584·4), is another example.

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Sunspots and Pressure.

IN Bombay (Colaba) magnetic data, 1846–1905, Part II. (page 751), Dr. N. A. F. Moos shows that if the annual means of atmospheric pressure at Bombay are smoothed by taking overlapping means of 11 successive years, and if the smoothed 11-year means are placed at the proper epoch, the resulting variation appears to be subject to some slow period secular