Not to be communicated for publication

To

The Editor of "Nature"

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Dear Sir,

The well-known phenomenon of birefringence exhibited by liquids in a strong magnetic field points definitely to the magnetically anisotropic nature of the molecules; and the fact by correlating it with the known optical properties of the molecules as determined from observations on light-scattering, it is possible to evaluate the anisotropy numerically. (C.V. Raman and K.S. Krishnan, Proc. Roy. Soc. A, vol. 113, p. 511, 1927). Its physical reality is, however, brought out more forcibly by measurements on magneto-crystallic action. Where all the molecules in the crystal happen to be oriented in the same way, the anisotropy of the crystal as a whole is naturally a measure of that of the individual molecules (K.S. Krishnan

and C. V. Raman, Proc. Roy. Soc. A, vol. 115, p. 549, 1927). Conversely when the anisotropy of the molecules is already known from observations on magnetic birefringence in the liquid state, the measurement of the susceptibility of the crystal in different directions offers a ready method for determining, in certain simple cases, the orientation of the molecules in the crystal. As an example we may cite naphthalene. From the structure of the molecule its magnetic axes are evidently (1) perpendicular to its plane (2) along the line joining its two component rings (3) perpendicular to the above two axes. The measurements of Cotton and Mouton on the birefringence of simple derivatives of naphthalene give us a rough estimate of the relative susceptibilities along these axes as 4 : 2 : 1 (in round numbers). Qualitative observations on the behaviour of naphthalene crystal in a magnetic field have been made by Oxley (Proc. Roy. Soc. A, vol. 98, p. 267, 1921)

and more recently by Bragg (Proc. Roy. Inst. ~~Great Britain~~, vol. 25, p. 161, 1927). The maximum (numerical) susceptibility is found to be along the "b" axis of the crystal, the "c" axis is the intermediate magnetic axis, the ~~minimum~~ susceptibility being numerically a minimum perpendicular to the plane containing the "b" and "c" axes. Some preliminary quantitative measurements were in this laboratory by Mr. Bhagavantam confirm the ~~the~~ above axes and give for the relative susceptibilities along them the ratio 4 : 2 : 1, which is the same as for the molecule. This suggests immediately (1) that all the molecules in the naphthalene crystal are oriented in the same way (2) that the plane of the molecule is perpendicular to the "b" axis of the crystal and (3) the length of the molecule is along the "c" axis. These

conclusions are fully confirmed by the X-ray investigations of Bragg.

210 Bowbazar Street,
Calcutta,
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Yours truly