

## Magnetic double refraction

The action of a strong magnetic field in causing a liquid to become birefringent for light rays transverse to the field was first observed by Cotton and Mouton in nitrobenzene, and was later detected and measured by the same authors in many other carbon compounds of the aromatic series and in some inorganic liquids (*Ann. Phys.* 1913 28 209–243). In a recent paper (C V Raman and K S Krishnan, *Proc. R. Soc. (London) A*, January 1927) it has been shown that the large value of the Cotton–Mouton constant in aromatic compounds indicates that the benzene ring, which is known from observations on light-scattering to be optically anisotropic, has also a very pronounced magnetic anisotropy. Observations on light-scattering in carbon compounds of the aliphatic series indicate that the molecules of these substances are optically anisotropic to an extent which, though smaller than in the aromatic series, is yet very marked (K S Krishnan, *Philos. Mag.* 1925 50 697). It accordingly seemed very probable that the compounds of the aliphatic series should also exhibit magnetic anisotropy and give a measurable double-refraction in strong magnetic fields.

As Cotton and Mouton did not in their papers report any observable magnetic double refraction in carbon compounds of the aliphatic series except in some isolated cases, we decided to make a systematic re-examination of the subject. A large electromagnet capable of giving 25,000 gauss in a column of liquid 32 cm long was available to us. By securing the most favourable optical conditions and taking careful precautions to eliminate any disturbance from the Faraday effect or suspended colloidal particles, we have succeeded in definitely establishing the existence of magnetic birefringence in every one of the liquids examined, the list including many hydrocarbons, alcohols, ethers and esters belonging to the aliphatic series. New pole-pieces are now in course of construction for our electromagnet, with which we hope to reach a field of 40,000 gauss in a liquid column of the same length and to make an extended series of quantitative measurements of magnetic birefringence. There is good reason to believe that such measurements will prove of value in elucidating problems of molecular structure.

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