

The birefringence of crystalline carbonates, nitrates and sulphates

In two very interesting papers (*Proc. R. Soc.*, vol. 105, p. 370, and vol. 106, p. 346, 1924) Prof. W L Bragg put forward an explanation of the strong birefringence exhibited by the crystalline carbonates and nitrates. Expressed very briefly, his theory is that in the carbonate and nitrate ions the oxygen atoms are situated in one plane around the central carbon or nitrogen atom, as the case may be, and that, as the result of this arrangement and of the mutual influence of the electric doublets induced in the atoms by the field of the light-waves, the refractivity of the group depends to a marked extent on the direction of the light-vector. The refractive indices of the crystal were successfully computed on this basis. The crystalline sulphates are known, on the other hand, to have a very weak birefringence, and the suggestion was made that very probably the oxygen atoms are arranged tetrahedrally round the sulphur atom in the sulphate ion group, thus making it optically isotropic.

Very interesting evidence regarding the birefringence of the nitrate and sulphate ions is furnished by some recent observations on the scattering of light by concentrated acids and their aqueous solutions made in the present writer's laboratory by Mr S Venkateswaran. The light scattered by dust-free nitric acid is found to be nearly unpolarised, indicating an extremely large anisotropy for the nitric acid molecule and for the nitrate ion. Concentrated sulphuric acid and its aqueous solutions, on the other hand, polarise the scattered light nearly completely, indicating that the sulphate ion is nearly isotropic optically. We have thus a striking confirmation of Prof. Bragg's views.

Observations on the scattering of light by concentrated solutions of salts and by organic vapours containing the groups in question have been undertaken. One may venture confidently to predict the results to be expected.

C VRAMAN

210 Bowbazaar Street
Calcutta, India
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