

Fig. 1

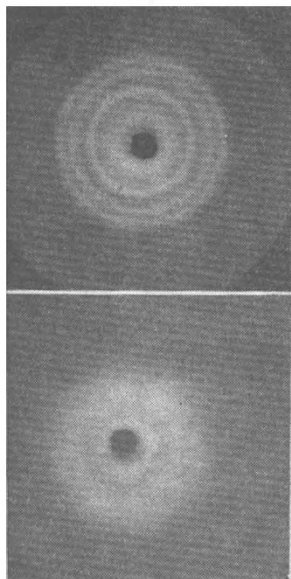


Fig. 2

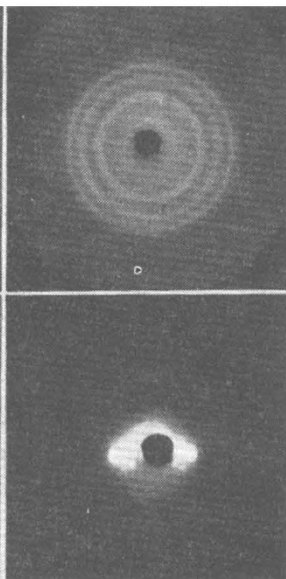


Fig. 3

Fig. 4

centration of the intensity of the rings to a few points on the circumference. The diameters of the rings, on which the intensity maxima are formed, are the same as the diameters in the previous crystalline forms, indicating that the basic molecular structure is the same. It will be seen that the maxima are not so sharp as the rings shown, for example, in Fig. 2; in aligning the molecules along the length in cold-drawing, some of the distortion marking the shock-cooled material is retained.

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¹ *Nature*, 158, 871 (1946).

² Whinfield, J. R., *Nature*, 153, 930 (1946).

Electrical Conductivity of River, Rain and Snow Water

"THE DATA OF GEOCHEMISTRY", by the late F. W. Clarke, is a mine of information on river waters, their variation with geological formation and Joly's 'cyclic sodium' transported in the air and brought down by rain. These phenomena are simply studied by measurements of electrical conductivity at 0° C. Thus $C \times 10^6$ for Plymouth tap-water varied during 1923-24 from 25 to 28; the values found on July 7, 1923, and September 26, 1923, were 27 and 28—identical respectively with those of July 5, 1945, and September 19, 1945. The pH varied from 6.4 to 6.8 during the year. It was with some surprise that I found rain-water, collected at Downderry on the Cornish coast during a downpour on March 12, 1946, to have a conductivity 24, with pH 6.6. Rain at Plymouth on March 13, 1946, had conductivity 55

and pH 4.0. During the night of September 19-20, 1946, rain at Antony, Cornwall, had conductivity 28, the typical September figure for Dartmoor water. Clean snow at Downderry on January 24, 1947, gave 44, and a Plymouth sample of January 25, 1947, gave 72 for conductivity. The latter was taken from the middle of the snow blanket and was, on thawing, surprisingly sooty. Plymouth rain of January 8, 1947, had conductivity 70, close to that of snow.

The country rain samples, with conductivities 24 and 28, had come with south-westerly air, clean from the sea. Thus Dartmoor water derives almost all its electrolytes from sea-salt, but contains from 3.1 to 3.5 parts per million of silica, and colouring matter equivalent to 0.26-0.40 p.p.m. of the yellowish tint given in the silica reaction. The conductivity of water from a calcareous source is about ten times as great. On diluting sea water with 'conductivity water' of conductivity 1 or less, a curve was obtained relating dilution to conductivity and showing that country rain represents sea water diluted to rather less than 1 in 2,000. The purest British natural water met with was the Aberystwyth town supply, conductivity 19.

Early in July 1945, however, samples of river water were flown to Britain from Ceylon. These were astonishingly pure and gave conductivities 10-20. The error due to solubility of the glass appeared to be negligible, and the purest sample corresponded to sea water diluted slightly less than 1 in 5,000. Since the sea water from the English Channel had salinity 35.2‰, or chlorine 19.4‰, the purest sample, with conductivity 10, contained 3.9 parts per million chloride. The amounts may seem small; but it should be remembered that phosphate in natural waters is reckoned in parts per hundred or per thousand million, and upon these traces the production of all water-living organisms depends.

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Fluorescence of Tungstates and Molybdates

THE tungstates of calcium, strontium, magnesium and zinc, and the molybdates of calcium are known to show luminescence upon excitation by cathode rays or short-wave ultra-violet radiation. It is commonly assumed that this luminescence is characteristic of the tungstate and molybdate groups. If this is true, there must be a reason why other tungstates and molybdates are found to be non-luminescent. Studying a number of different tungstates and molybdates in this Laboratory, we have found this reason to be the temperature-quenching.

Tungstates and molybdates of zinc, magnesium, cadmium, calcium, strontium, barium, lead, lithium and sodium have been prepared by the following method. Oxides or carbonates of the elements mentioned were mixed in stoichiometric proportion with tungstic or molybdic acid and a little water. The mixture was dried on a water bath and fired at temperatures below the melting point of the particular system, but high enough to guarantee good crystallization. These temperatures varied between 530° for lithium molybdate to 1,100° for most of the tungstates. One sample of magnesium tungstate was heated to a higher temperature (1,300° C.) in order to obtain the high-temperature α -form¹.