

crystallographically independent C(OH)COOH halves are planar within the experimental errors of the structure analyses. The tartaric acid analysis is not sufficiently precise to distinguish between the C—O bond-lengths, but the valency angles in this compound and the measurements of both angles and bond-lengths from racemic acid show that the OH groups are *trans* related (II). A similar planar configuration (III) is also found for the tartrate ion in Rochelle salt⁵.

Altogether, there are nine independent determinations in which the C(OH)COOH or C(OH)COO—group is planar. The arguments from the van der Waals forces alone are against the planar arrangement, since it contains an oxygen-to-oxygen approach of 2.65 Å., which could be extended to 2.95 Å. by a rotation about the C—C bond, without decreasing other intramolecular distances to less than that value. These measurements provide a body of experimental evidence which cannot be ignored, and some interaction other than the oxygen-to-oxygen repulsion is necessary to account for it. There can be no possibility of intramolecular bonding through the hydrogen atom as, for example, in salicylic acid⁶, for not only would the COH angle be less than 70° but also the rational interpretation of the intermolecular distances in these crystal structures requires the hydrogen bonding to be between the oxygen atoms in adjacent molecules. The simplest interpretation within the framework of present knowledge of forces between non-bonded atoms in the same molecule is that there is, in the crystalline state at least, a significant electrostatic attraction between the hydroxyl and carbonyl oxygen atoms.

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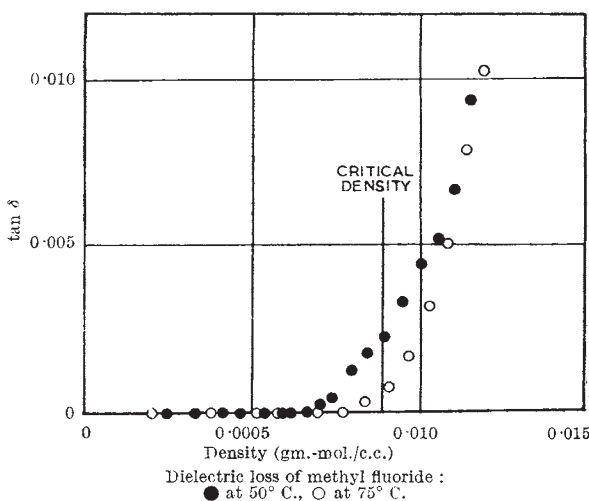
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Dielectric Loss in a Polar Gas near its Critical Point

In the course of some measurements of the dielectric polarization of compressed methyl fluoride, we have noticed the appearance of strong dielectric absorption near the critical point. The absorption increases rapidly with the density of the gas and it rises with increasing frequency over the range we investigated (1–5 megacycles).

Using the apparatus described elsewhere¹, we have measured the loss factor at 1 Mc./s. and at the temperatures 50° C. and 75° C. The range of density covered was 0.001–0.012 moles/c.c. and the pressures were between 30 and 120 atmospheres. The critical data for methyl fluoride² are: T_c , 44.55° C.; P_c , 58.0 atm.; ρ_c , 0.00883 moles/c.c. Our results are shown in the accompanying graph, where the tangent of the loss angle is plotted against the density of the gas.

A remarkable feature of the results is the suddenness with which the dielectric loss develops as the density of the gas approaches the critical value. The absorption is almost certainly associated with the energy expended in rotating the dipolar molecules and it might be expected to conform to Debye's



theory³. The bulk viscosity of supercritical methyl fluoride is not known, but that of carbon dioxide⁴ shows no singularity at the critical density; if methyl fluoride were to behave similarly, the Debye theory would call for a monotonous variation of $\tan \delta$ with density. This is obviously not the case.

A plausible interpretation of the results is that the rapid increase in power loss is brought about by a fairly sharp transition from a state in which the ellipsoidal molecules are rotating freely to one in which they are aligned like cigars in the way that Hirschfelder and his colleagues⁵ picture them in the critical state. This sort of change would not necessarily be reflected in the bulk viscosity.

A fuller account of these measurements will be published later.

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Isolation of Nitrifying Organisms and Oxygen Supply

In a communication, "Isolation of the Nitrifying Organisms from Soil"¹, Dr. Howard Lees stated that he believed that he obtained a pure culture of *Nitrosomonas* with his percolator method. The only one who, so far, has got a pure culture of *Nitrosomonas* without any microbiological technique has been Bonazzi. Lees ascribes the success of this technique to the good aeration the percolator method provides to the culture. Bonazzi also aerated his cultures, but he hesitates to ascribe his success only to aeration. This experience led Lees to the conclusion that the well-known difficulties encountered in getting pure cultures