

(5) AB_3 or B_2AC molecules containing 24 valency electrons should be planar in their ground-states, but pyramidal (if stable) in their first excited states. 25-, 26- and 28-electron molecules should be pyramidal in their ground-states, the BAB or BAC angle decreasing as the number of electrons increases.

(6) If X is the centre of the mid-point of the H—H line, the first excited state of the HCHO molecule should have the XCO line bent both in the molecular plane and out of that plane. The distortion is insufficient for the classification of the levels according to the C_{2v} symmetry operations to lose its importance, but sufficient to cause the ν_5b_2 and ν_6b_1 vibrations to appear in the spectrum. It has been possible to give a complete vibrational analysis of the fluorescence bands and make plausible assignments of the long-wave-length absorption bands.

(7) The first excited state of the C_2H_4 molecule should have: (a) one CH_2 group twisted through 90° relative to the other, (b) a pyramidal arrangement of the bonds about each carbon atom. The first excited state of a molecule containing n electrons should have the same symmetry as the ground-state of the similar molecule containing $n + 1$ or $n + 2$ electrons. It therefore becomes possible to confirm these statements concerning the first excited state of C_2H_4 by comparison with what is known of the ground-state symmetry of N_2H_4 .

(8) The first Rydberg state of the CH_3I molecule should have: (a) a considerably decreased HCH angle, (b) the iodine atom off the trigonal axis of the CH_3 group. (a) causes the totally symmetrical CH_3 deformation vibration to appear in the spectrum; (b) causes the ν_{6e} vibration to appear. (a) is particularly striking since the excitation is of an iodine electron which, superficially, one might have expected not to affect the CH_3 group.

(9) The C_6H_6 molecule should be distorted in its first excited states both in the molecular plane and out of that plane. The distortion is insufficient for the classification of the levels according to the D_{6h} symmetry operations to lose its importance, but sufficient to cause the appearance of a wide variety of in-plane and out-of-plane deformation vibrations.

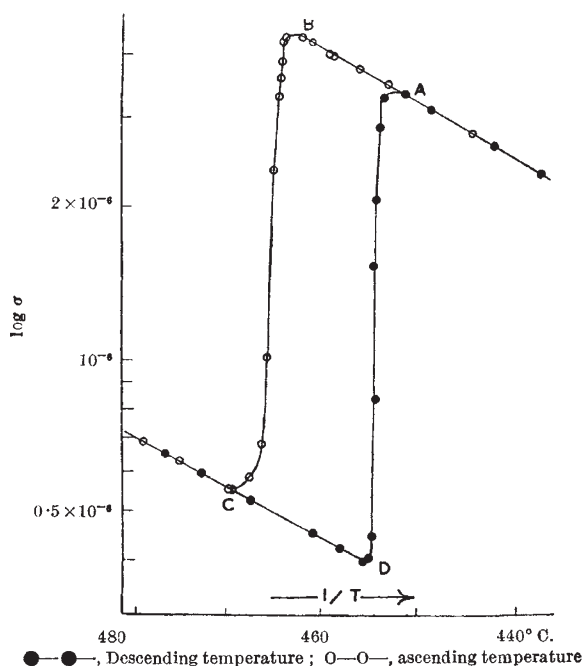
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May 20.

¹ See *Ang. Chem.*, **63**, 439 (1951).

Electrical Conductivity of Cæsium Chloride near the Thermal Transition

At normal temperatures, cæsium chloride is stable in a body-centred cubic lattice, and at higher temperatures in a simple face-centred lattice of the sodium chloride type. When single crystals were heated, it was found, using X-ray techniques, that a sharp transition occurred from one form to the other at 469° . Indications were, however, obtained that certain intensities of X-ray reflexions faded exceptionally rapidly on approaching the transition point¹. This suggested that lattice defects of some kind might be increasing rapidly in number around the transition temperature. If these defects are of the type associated with ionic conductivity in crystals, a marked increase of electrical conductivity should be observed on passing through the transition point.



●—●—, Descending temperature; O—O—, ascending temperature

Measurements have now been made of the conductivity of cæsium chloride crystals in the form of a polycrystalline mass chilled from the melt between two platinum electrodes. Instead of a rise, a steep drop in conductivity is observed on passing through the transition point. Marked hysteresis is observed around the transition; but above and below it the results are quite reproducible (see graph). The temperature coefficient of conductivity is found to be very approximately the same above and below the transition point, so that the steep drop in conductivity on passing to the high-temperature form must be due to the influence of crystal structure on the temperature-independent parameter σ_0 in the semi-empirical expression for the conductivity, $\log \sigma = \sigma_0 - E/kT$. It seems clear that if there is any pre-transition break-up of the lattice, it cannot be of the kind associated with the defects responsible for ionic conductivity. A similar drop in conductivity has been reported for thermal transitions² in mercuric iodide (137° C.) and potassium nitrate (128° C.).

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Aug. 18.

¹ Menary, Ubbelohde and Woodward, *Proc. Roy. Soc., A*, **208**, 158 (1951).

² Jaffray, J., *C.R. Acad. Sci., Paris*, **230**, 525 (1950).

Paper Electromigration of Flavonoids and Sugars using a High Constant-voltage Current

ALL but a few¹ of the numerous reports in the past few years on the application of electromigration or electrophoresis on paper have used a comparatively low voltage. Recently, however, a method of paper electromigration which uses a high constant-voltage current has been developed in these laboratories and