

be designated as polar and non-polar. The polar character of the valency in the majority of salts is definite; there is experimental evidence for the transference of electrons in these substances. The non-polar forces are particularly in evidence in the linkings of organic compounds, and it is extremely unlikely that transference takes place to an appreciable extent here. Without entering into a discussion of the nature of the non-polar forces, which may be electromagnetic, there are two explanations which may be given of the undoubted positive and negative relationships of groups in organic compounds. In the first place, there may be a partial transference of an electron between the group and the residue of the molecule, or alternately there may be a varying concentration of polar molecules in the typically non-polar substance.

I venture to put forward a plea for the consideration of this second possibility. An equilibrium may be imagined to exist between the polar and non-polar substances which will be affected by the temperature, solvent in which it is dissolved, etc. Thus, in an organic substance AX the equation,



may represent this kind of equilibrium, and the more electronegative the group X the more will this reaction proceed to the right. In those substances where the stability of the non-polar arrangement is very great, the occurrence of both forms, $\overset{-}{\text{A}}\overset{+}{\text{X}}$ and $\overset{+}{\text{A}}\overset{-}{\text{X}}$, will be possible, and in the presence of a suitable solvent these may give rise to the respective ions. This view is in agreement with the occurrence of a group in some compounds with an electropositive, and in others with an electronegative tendency. The ease of replacement of the group X by another group will be determined by the concentrations of the polar body, the polar state being the active form of the substance. These concentrations may be so small as to escape the ordinary methods of measurement, and yet be sufficiently great to explain the velocity of the chemical action.

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The X-ray Structure of Potassium Cyanide.

WRITING in a contemporary (J.A.C.S., Feb. 1922), Richard M. Bozorth gives details of X-ray investigations into the crystalline structure of KCN, and corroborates the view expressed in a letter to this journal (NATURE, Aug. 11, 1921, vol. 107, p. 745) that the underlying structure is the face-centred cube. He gives 6.55 Å as the length of its edge, which agrees very well with the 6.54 Å furnished by my measurements. He goes further in that he assigns definite positions to the carbon and nitrogen atoms and questions the opinion, expressed by Langmuir, that these constituent atoms of the CN radicle have a common outer electron shell.

Bozorth's conclusions are, to a certain extent, based on the assumption that the relative intensities of the spectra would fall off in a normal manner if the structure were quite like that of NaCl, that is, if the carbon and nitrogen atoms formed a single cluster of electrons which occupied the same position in the KCN structure as the chlorine atom does in NaCl. He publishes no numbers representing the observed intensities, but gives 100 : 10 : 3 as the relative values of the [100], [200], and [300] reflections that would be required to satisfy the requirements of his particular structure. My own measurements gave 16-17

as the relative value to be assigned to the [200] reflection, and the corresponding figure for NaCl is 20. Now the fact that KCN has a lower fusing-point than NaCl suggests that even at ordinary temperatures the heat vibrations are of unusual amplitude, and this in itself affords a ready explanation of the fact that the intensities of the spectra die away more rapidly than is normally the case. The probable electron distribution in a composite CN radicle is another important factor which would cause the normal sequence to fall off rapidly.

Bozorth gives 1.15 Å as the distance between the centres of the carbon and nitrogen atoms, and 3.0 Å as the distance between either of these and the potassium atom. He treats the carbon and nitrogen atoms as though they were of the same size, but he does not state whether or not the inter-nuclei distance is to be taken also as the effective diameter. In one case his figures would give 4.85 Å as the diameter of the potassium atom compared with 4.15 Å, which represents, probably to within 0.03 Å, its value in the other ionised salts in which it occurs (W. L. Bragg, *Phil. Mag.*, Aug. 1920). If, on the other hand, 4.15 Å be accepted as its diameter in KCN—and measurements on NaCN justify this procedure—then Bozorth's figures would give 1.85 Å as the effective diameters of both carbon and nitrogen; W. L. Bragg's values are 1.54 Å and 1.30 Å respectively.

Fortunately, there is outside evidence which bears directly on this question. From viscosity measurements A. O. Rankine has found (Proc. Roy. Soc., July 1921) that the C_2N_2 molecule behaves in collision like two overlapping hard spheres, each having the size of a bromine atom. The diameter of the bromine atom is 2.38 Å, and that of a Langmuir CN radicle, as provided by X-ray measurements, is 2.39 Å.

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Sex Change in Mollusca.

WITH reference to Dr. R. Spärck's statement (NATURE, October 7, p. 480) that the male stage in the oyster is due to the coldness of the temperature, it should be pointed out that in various hermaphrodite mollusca, such as Helix and Arion, the reason for the passage of the indifferent epithelial cell, either to oogonium or spermatogonium, is at present unknown. Older authors considered that those cells near yolk, or near a superior nutritive radius became eggs, and that those less exposed to steady streams of nourishment became spermatocytes.

More recent work has shown that the matter is very deep-seated, and such a conclusion as the above cannot be taken as representing the real state of affairs. I have found that oocytes appear in regions of the ovotestis which are scantily provided with yolk, and that sperm cells appear in regions rich in nutriment.

Whether temperature has anything to do with this has not yet been ascertained, but experiments are now in progress, which should settle the question.

In the case of Saccocirrus it has been shown that spermatocytes caught up and enclosed in yolk cells have their metabolism so altered that they assume the appearance of oocytes, together with nucleolar extrusions characteristic of the typical oocyte.

But in Helix two epithelial cells side by side often metamorphose, one into an oogonium, another into a spermatogonium, and one seems obliged to believe that factors other than temperature or abundance of nutriment are concerned.

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October 7.