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Structure of Solutions of Strong Electrolytes in N-Alcohols and Water

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Curves have been taken at various conditions of specific volume, temperature and pressure over the isothermal diagram. It is found that as the specific volume is increased, the diffraction pattern changes from one typically liquid to one typically gaseous, with patterns in between having similarities to both liquid and gas curves. This change is not abrupt, but takes place gradually, and at specific volumes well into what is commonly known as the gaseous region.

The results indicate that there is no sharp transition as the gaseous state is approached, and that the cybotactic groups appear in regions commonly known as gas if the specific volume is kept near to that of a liquid.

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STRUCTURE OF SOLUTIONS OF STRONG ELECTROLYTES IN N-ALCOHOLS AND WATER

G. W. STEWART

Although great advances have been made in the adoption of theory to the conception of the structure of electrolytes, it has been shown by Fowler and Kramers in an exact statistical treatment that the current theories are significant largely from an empirical point of view. Any theory which uses only Coulomb forces and not all of the molecular forces, must be inadequate. The structure of electrolytes remains one of the challenging problem at the present time. The method of x-ray diffraction is crude and is not very promising as a method of attack, yet the evidence which might be accumulated thereby is important. Experiments conducted in this laboratory indicate at present the following:

(1) That in the solution of LiCl in alcohol, there is a combined liquid structure much as if liquid alcoholate were thoroughly mixed with the n-alcohol, the two forming a single cybotactic structure.

(2) With some strong electrolytes in water LiCl, MgCl₂, (NH₄)₂ SO₄, NH₄Cl, and NaCl, the results point to a similar single liquid structure, this being a combination of the equivalent of two liquids.

(3) But in the case of LiCl in water, the result may be accounted for by assuming a submicroscopic emulsion consisting of a LiCl-H₂O structure in water as a solvent. Such a curious

phenomenon has already been observed by Herkert K. Ward with cyclohexane in benzene. Just to what extent these phenomena may be said to be representative is not known.

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COMPARISON OF X-RAY DIFFRACTION IN
H₂O AND H₂¹⁸O

G. W. STEWART

It is to be assumed that the forces in a molecule are approximately invariant for an isotopic change in mass. Consequently the x-ray diffraction curves for H₂O and H₂¹⁸O, determined by the structure of the corresponding liquid, may be expected to be nearly alike. Experiment by x-ray diffractions shows this to be the case, for the differences are well within experimental error and are not as much as 1% over the greater part of the diffraction-intensity-angle curves.

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HYPERFINE STRUCTURE AND THE DEPOLARIZATION OF RESONANCE RADIATION BY A MAGNETIC FIELD

A. ELLETT

The depolarization of Sodium D line resonance radiation resulting from the Larmor precession of the excited atoms has been carefully determined by a photographic method. Results are compared with a former visual determination (Jour. Opt. Soc. 10, 427, 1925). The effect of hyperfine structure and especially of the degeneracy due to the finite breadth of adjacent hyperfine levels is discussed following Breit, Rev. Mod. Phys. 5:91, 1933, especially Section 4, p. 117 ff.

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