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This Week's Citation Classic®

Robinson R A & Stokes R H. *Electrolyte solutions. The measurement and interpretation of conductance, chemical potential and diffusion in solutions of simple electrolytes.* London: Butterworths, 1959. 571 p.
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This work describes the best techniques of its time for the study of the classical physical chemistry of electrolyte solutions. The theoretical interpretation is developed in detail and extensive tables of thermodynamic and transport properties are included. [The *SCI*® indicates that this book has been cited in over 6,730 publications.]

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I was a student of R.A. Robinson in Auckland from 1936 to 1939, and we made extensive use of the isopiestic vapour pressure technique that had been developed there by Sinclair and Robinson and also conducted a number of electromotive force (EMF) studies. I left for Australia in 1946 and Robinson went to the University of Malaya soon after, but we continued collaboration. Perhaps our most important joint work at that time was the thermodynamic treatment of the effect of ionic solvation on activity coefficients.[1] The resultant paper did much to make the idea of ionic hydration respectable. After three decades in which electrolyte studies had been dominated by the Debye-Hückel theory and had been largely concerned with very dilute solutions, it provided a rationale for the behaviour of relatively concentrated solutions of practical importance.

During 1948-1949 in Cambridge, England, I developed the magnetically stirred diaphragm cell method for the study of diffusion and applied it to a number of electrolyte solutions. Soon after my return to Western Australia, Robinson asked me to join him in writing a textbook on electrolytes that had been commissioned by Butterworths. The collaboration was carried out almost entirely by mail between Perth and Singapore, except for a visit of two weeks that he made in the later stages.

His original outline seemed to me too much like the classic work of H.S. Harned and B.B. Owen,[2] perhaps not surprisingly since Robinson had spent some years at Yale and was a profound admirer of Harned. I proposed the pattern of alternate chapters on experiment and theory, which was adopted. We also resolved to include in the book only those experimental techniques that we had used ourselves, so that we could write from firsthand experience. An incidental result of this was that I went into high-precision conductance measurements during the writing of the book and also made some contributions to the theory of the electrophoretic effect.[3]

Another guiding principle was that we would include, as tables and appendices, all the formulae, physical constants, and other numerical data that we continually found a need for in our own research. By thus writing what was primarily a handbook for our own use, we produced a work that other serious researchers have also found very useful and continue to find useful after the lapse of 30 years. Though the techniques are still referred to,[4] a majority of the citations have always been to the 90-plus pages of tabulated properties in the appendices. These were tedious to evaluate (with a manually operated mechanical calculator) and to proofread, but they provide an illustration of what Sir R. Watson-Watt[5] once called the "goodness of measured fact."

Robinson died in 1979, and I have worked almost entirely on the thermodynamics of nonelectrolyte mixtures since 1968, but I am proud to have been associated with him in writing *Electrolyte Solutions*.

1. **Stokes R H & Robinson R A.** Ionic hydration and activity in electrolyte solutions. *J. Amer. Chem. Soc.* 70:1870-8, 1948. (Cited 320 times since 1955.)
2. **Harned H S & Owen B B.** *The physical chemistry of electrolytic solutions.* New York: Reinhold, 1958. 803 p. (Cited 3,525 times.)
3. **Stokes R H.** The electrophoretic corrections to the diffusion coefficient of an electrolyte solution. *J. Amer. Chem. Soc.* 75:4563-6, 1953.
4. **Weingartner H, Braun B M & Schmoll J M.** Determination of transference numbers with ion-selective electrodes. *Transference numbers and activity coefficients of concentrated aqueous solutions of sodium fluoride.* *J. Solut. Chem.* 16:419-32, 1987.
5. **Watson-Watt R.** In my experience. *The Listener* 40:681-3, 1948.

14/4