Fig. 1. Infrared spectrum of tribromophenol bromide.

bonds, respectively, and are very close to the corresponding bands in the spectra of quinone and 2,6-dimethylpyrone, in which the C = O bands are found at 6.01 μ and 5.99 μ and C = C bands at 6.28 μ and 6.21, 6.27 μ ⁴. Thus the infrared spectrum of tribromophenol bromide furnishes conclusive evidence for the quinonoid structure (I a).

Experimental. The tribromophenol bromide was prepared in the usual manner and

purified by crystallization from chloroform. The infrared absorption spectrum was determined, using freshly crystallized material in paraffin oil paste, with a Perkin Elmer infrared spectrometer, Model 12 C, with 67° calcium fluoride prism.

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An Observation on the Parameter α of the Debye-Hückel Formula

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The writer has investigated the dissociation of acetic acid in water solutions of strong 1-1 electrolytes. In this report part of the results obtained is presented.

The investigation was carried out by a method developed by Kilpi¹. The method is based on potentiometric titration of a weak acid with a strong hydroxide, and from the buffer capacity determined at one of the inflexion points of the titration curve the corresponding dissociation constant can be calculated. Eleven different salts were used as electrolytes. The concentrations used are expressed in moles of salt per liter of solution.

From the observations it was found that the negative logarithm of the dissociation constant, pK of acetic acid is an additive

quantity. This was deduced from the invariabilities of

$$pK_{KCl} - pK_{NaCl} = pK_{KNO_3} - pK_{NaNO_3}$$

and

$$pK_{NaClO_4} - pK_{NaBr} = pK_{LiClO_4} - pK_{LiBr}$$

which were found to be true in all cases investigated and being dependent separately on the anions and cations of the co-electrolyte at constant molarity. In the equations the indices refer to the salt, in the solution of which the measurement was performed.

This observation is in good agreement with the specific interionic attraction theory of Brönsted². Recently Olson and Simonson³ have reported on works which have led them to the conclusion, that only the oppositely charged ions influence each other. Combining these two observations, that of Olson and Simonson and of mine, it was possible to alter the orthodox semi-empirical Debye-Hückel formula applied to weak acids into the following form

$$pK = pK_0 - \left(\frac{0.5062 \sqrt{I}}{1 + \alpha_{H(-)}\sqrt{I}} + \frac{0.5062 \sqrt{I}}{1 + \alpha_{Ac(+)}\sqrt{I}} \right) + BI \quad (1)$$

where $\alpha_{H(-)}$ means the parameter, which characterizes the coulombic influence of the anions of the co-electrolyte upon the H-ions and $\alpha_{Ac(+)}$ the parameter, which characterizes the coulombic influence of the cations of the co-electrolyte upon the acetate ions. The following results were obtained at 25°C.

Electrolyte	Ionic strength <i>I</i>	<i>pK</i>	<i>B</i>
KCl	0.999	4.5605	0.2008
KCl	2.693	4.8285	
LiCl	0.999	4.4430	0.1400
LiCl	2.693	4.5835	

Using these values and that for $pK_0 = 4.7570$, determined by Harned and Ehlers⁴, the term *B* in the fourth column was

<i>I</i>	<i>pK</i>	
	usual	Ellila
0.010	4.6715	4.6715
0.100	4.5620	4.5625
0.450	4.5135	4.5145
1.000	4.5605	4.5605
2.000	4.7100	4.7100
3.000	4.8835	4.8835

calculated assuming in the orthodox manner that $\alpha_{H(-)} = \alpha_{Ac(+)}$.

Introducing these results into the equation (1) four equations were obtained. Subtracting from each other those having the same value for *I*, the result was two equations with two variables. When solved, the following values were obtained: $\alpha_{Ac(K)} = 1.755$; $\alpha_{Ac(Li)} = 1.104$ and further $\alpha_{H(Cl)} = 1.377$. When calculated in the usual manner ($\alpha_{H(-)} = \alpha_{Ac(+)}$), one gets the values $\alpha_{KCl} = 1.550$, and $\alpha_{LiCl} = 1.230$.

The table above includes *pK*-values at several ionic strengths in KCl-solution calculated by the usual manner and in the

way presented in this paper. The table indicates, that the method of calculation does not influence the results.

A more detailed report on the work and on the results obtained will be published in the near future in the form of an academic dissertation.

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