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Short Communications

Association of Ammonium Bromide in Acetone

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Ammonium bromide shows considerable ion-pair formation in anhydrous acetone even at high dilutions. For an electrolyte concentration of 1×10^{-4} M more than 50 % of the ions are associated into ion-pairs. This conclusion rests upon measurements of electrolytic conductivity performed in connection with a kinetic investigation.[1]

In the present communication conductivity data at 25°C over a concentration range of 3×10^{-5} to 2×10^{-4} M for the salt are reported.

Reagents. Ammonium bromide (Carlo Erba, *pro analysi*) was dried at 110°C for 2 h. Acetone with an electrolytic conductivity of less than 1.5×10^{-8} Ω^{-1} cm^{-1} was prepared from *pro analysi* acetone (Merck) according to Ref. 2.

Conductivity measurements. Determinations of electrolytic conductivity at 25.00 ± 0.01°C were performed using a Leeds and Northrup 4666 conductivity bridge as described in Ref. 3. Corrections for the electrolytic conductivity of the solvent were applied.

Results. Molar conductivities, Λ, at different salt concentrations, c, are quoted in Table 1. A maximum ammonium bromide concentration of 2×10^{-4} M was used because of the limited solubility of this salt in the solvent concerned.

The ion-pair association constant, K_A, and the molar conductivity at infinite dilution, Λ_0, were calculated from the data in Table 1 by means of the Shedlovsky method according to a computer programme previously described.[4] The permittivity, $\varepsilon = 20.7$, and the viscosity, $\eta = 0.00316$ P (1 P = 10^{-1} kg m^{-1} s^{-1}), for the solvent were used. For the ion-size parameter, $\mathring{A} = 1.48 + 1.95 = 3.43$ Å, *cf.* Ref. 5, this procedure yielded $K_A = 32\,860 \pm 430$ M^{-1} and $\Lambda_0 = 190.9 \pm 2.8$ Ω^{-1} cm^2 mol^{-1}, where uncertainties quoted are standard deviations.

Table 1. Molar conductivities of ammonium bromide in acetone at 25°C.

$c \times 10^4$ M	Λ Ω^{-1} cm^2 mol^{-1}	$c \times 10^4$ M	Λ Ω^{-1} cm^2 mol^{-1}
Run A		Run B	
2.043	62.77	2.055	62.61
0.8209	86.94	0.8478	85.38
0.6560	94.38	0.6207	95.68
0.5893	97.83	0.5238	101.94
0.4217	108.89	0.4318	107.47
0.3275	117.36	0.3816	111.68

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