Determination of the Diffusion Coefficients of Tl^+, As^{3+}, Phenol, and Quinolin-8-ol using the Polarized Light Interference Method

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Summary The diffusion coefficients of thallium(I) and arsenic(III) ions, phenol, and quinolin-8-ol were determined in media suitable for their coulometric determination.

AN independent determination of diffusion coefficients is required in some electrochemical measurements. We have now determined the diffusion coefficients for thallium(I), arsenic(III), phenol, and quinolin-8-ol, in suitable media, by the polarised light interference method.

TABLE
Determined diffusion coefficients

	$D \times 10^5$/cm^2 s^{-1}	Medium
Thallium(I) ions	1·61 ± 0·06	1 N-KNO_3
Arsenic(III) ions	0·99 ± 0·02	0·2 M KBr, 1 M H_2SO_4
Quinolin-8-ol	0·75 ± 0·03	0·2 M KBr
Phenol	1·00 ± 0·02	0·2 M KBr

The procedure and apparatus used have been described previously.[1] The results are given in the Table.

Very dilute solutions of the studied substances were prepared using a procedure common to measurements in multicomponent mixtures,[2] so that the differences in the concentrations of the other components in the solutions above and below the diffusion interface is zero.

The measured values, especially the changes in the distances among the interference bands with time,

$$(2x_j)^2 - (2x_{j+k})^2 = f(t),$$

indicate that the results obtained are reliable. Since these functions are linear for the studied species and very good agreement was found between values obtained for thallium(I) ions using this method and polarographic measurements,[3] $-D_{Tl+} = 1{\cdot}65 \times 10^{-5}$ cm^2 s^{-1}, the results can be considered to be satisfactory.

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