

Letter to the Editor

Comments on "Bromide ion quenching of micellized hydrocarbon fluorescence: a search for effects of emitter lifetime on the quenching behaviour"

In a study of the quenching by bromide ions of the fluorescence of aromatic hydrocarbons in cetyltrimethylammonium bromide micelles, Burrows *et al.* [1] have interpreted the results obtained for partially solubilized probes in terms of eqn. (1):

$$\left(\frac{I_0}{I}\right)_{\text{total}} = 1 + A[\text{Br}^-] + \frac{B[\text{Br}^-]}{1 + K[\text{Br}^-]} \quad (1)$$

where A and B are the products of the Stern–Volmer terms in eqns. (2) and (3) and the fraction of probe molecules in the aqueous phase and the micellar phase respectively:

$$\left(\frac{I_0}{I}\right)_{\text{aq}} = 1 + K_{\text{sv}}[\text{Br}^-] \quad (2)$$

and

$$\left(\frac{I_0}{I}\right)_{\text{mi}} = 1 + \frac{K'_{\text{sv}}nK[\text{Br}^-]}{1 + K[\text{Br}^-]} \quad (3)$$

Equation (1) predicts, at high values of $[\text{Br}^-]$, a linear dependence of $(I_0/I)_{\text{total}}$ on $[\text{Br}^-]$ independent of the values of A , B and K . This behaviour is contrary to that expected for a probe distributed in two phases that can only be partially quenched in one of them (the micelle) even at infinite bromide ion concentration (ref. 1, eqn. (3) and Fig. 2). The set of equations eqns. (2) and (3) leads to

$$\left(\frac{I_0}{I}\right)_{\text{total}} = (I_0)_{\text{total}} \left\{ \frac{(I_0)_{\text{aq}}}{1 + K_{\text{sv}}[\text{Br}^-]} + \frac{1 + K[\text{Br}^-]}{1 + K[\text{Br}^-](1 + K'_{\text{sv}}n)} (I_0)_{\text{mi}} \right\}^{-1} \quad (4)$$

Equation (4) is noticeably different from eqn. (1).

(1) A plateau is predicted at high bromide ion concentrations, as has been observed in several systems [1 - 3].

(2) Equation (4) includes, through the factors $(I_0)_{\text{aq}}$ and $(I_0)_{\text{mi}}$, not only the fractions of molecules in each phase but also the fluorescence quantum yields in the respective phases.

E. A. LISSI and E. B. ABUIN

Departamento de Química, Facultad de Ciencia, Universidad Técnica del Estado, Santiago (Chile)

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- 2 H. D. Burrows, S. J. Formosinho, M. F. J. R. Paiva and E. J. Rasburw, *J. Chem. Soc., Faraday Trans. II*, **76** (1980) 685.
- 3 E. A. Lissi and E. B. Abuin, unpublished results on the fluorescence of naphthalene in cetyltrimethylammonium bromide micelles as a function of added bromide.

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