

## Accepted Manuscript

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PII: S0167-7322(18)30279-4  
DOI: doi:[10.1016/j.molliq.2018.04.090](https://doi.org/10.1016/j.molliq.2018.04.090)  
Reference: MOLLIQ 8993  
To appear in: *Journal of Molecular Liquids*  
Received date: 30 January 2018  
Revised date: 11 April 2018  
Accepted date: 17 April 2018

Please cite this article as: V. Canale, R. Germani, G. Siani, A. Fontana, P. Di Profio , Fractional ionization and size of cetyltrialkyl ammonium bromide and hydroxide micelles as a function of head-group lipophilicity and temperature. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Molliq(2017), doi:[10.1016/j.molliq.2018.04.090](https://doi.org/10.1016/j.molliq.2018.04.090)

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# Fractional Ionization and Size of Cetyltrialkyl Ammonium Bromide and Hydroxide Micelles as a Function of Head-Group Lipophilicity and Temperature

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## ABSTRACT

We have measured the diffusion coefficients,  $D$ , of aqueous micelles formed by cetyltriethyl-, cetyltripropyl- and cetyltributyl-ammonium bromides (CTEABr, CTPABr and CTBABr, respectively) and cetyltriethyl- and cetyltripropyl-ammonium hydroxides (CTEAOH and CTPAOH, respectively) by dynamic light scattering (DLS) at several temperatures from 15 to 55°C and a range of surfactant (0.01 - 0.05 M) and salt (0.02 - 0.06 M NaBr; 0.05 - 0.3 M NaOH) concentrations. From values of  $D$ , we derived the respective fractional ionization values of micellar surfaces. For surfactants with bromide counterion we obtained fits of the diffusivity data using the linear interaction/DLVO approach, thus yielding estimates of the micellar hydrodynamic radius,  $R_h$ , and the micellar fractional ionization,  $\alpha$ , which ranged from 0.26 to 0.35. For CTEAOH and CTPAOH, the fits appeared to be poorly sensitive to changes in the London-Van der Waals interactions, as expressed by the Hamaker constant, and only a large fractional ionization could account for the observed diffusivities.

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