

Accepted Manuscript

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PII: S0304-4165(15)00267-6
DOI: doi: [10.1016/j.bbagen.2015.10.003](https://doi.org/10.1016/j.bbagen.2015.10.003)
Reference: BBAGEN 28299

To appear in: *BBA - General Subjects*

Received date: 11 August 2015
Revised date: 23 September 2015
Accepted date: 7 October 2015



Please cite this article as: Watson Loh, César Brinatti, Kam Chiu Tam, Use of Isothermal Titration Calorimetry to Study Surfactant Aggregation in Colloidal Systems, *BBA - General Subjects* (2015), doi: [10.1016/j.bbagen.2015.10.003](https://doi.org/10.1016/j.bbagen.2015.10.003)

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Use of Isothermal Titration Calorimetry to Study Surfactant Aggregation in Colloidal Systems

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Abstract

Background: Isothermal titration calorimetry (ITC) is a general technique that allows for precise and highly sensitive measurements. These measurements may provide a complete and accurate thermodynamic description of association processes in complex systems such as colloidal mixtures.

Scope of the review: This review will address uses of ITC for studies of surfactant aggregation to form micelles, with emphasis on the thermodynamic studies of homologous surfactant series. We will also review studies on surfactant association with polymers of different molecular characteristics and with colloidal particles.

General significance: ITC studies on the association of different homologous series of surfactants provide quantitative information on independent contribution from their apolar hydrocarbon chains and polar headgroups to the different thermodynamic functions associated with micellization (Gibbs energy, enthalpy and entropy). Studies on surfactant association to polymers by ITC provide a comprehensive description of the association process, including examples in which particular features revealed by ITC were elucidated by using ancillary techniques such as light or X-ray scattering measurements. Examples of uses of ITC to follow surfactant association to biomolecules such as proteins or DNA, or nanoparticles are also

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