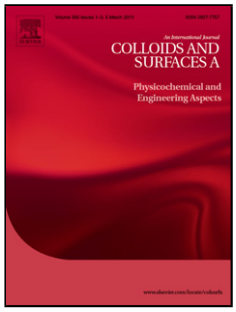

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Authors: D. Morales, J. Miras, M. Homs

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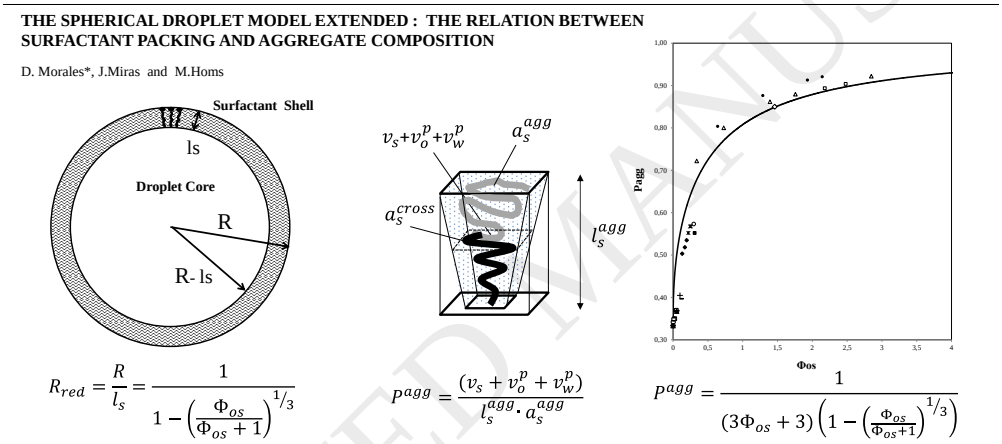
THE SPHERICAL DROPLET MODEL EXTENDED: THE RELATION BETWEEN SURFACTANT PACKING AND AGGREGATE COMPOSITION

D.Morales(*)[1], J.Miras[2] and M.Homs[2]

1 Visiting Researcher. 2 Institute of Advanced Chemistry of Catalonia. Spanish National Research Council (IQAC-CSIC) . Jordi Girona 18-36, 08034 Barcelona, Spain

(*) Corresponding author: Daniel Morales Teixidó *e-mail: moralesqci@yahoo.com*

GRAPHICAL ABSTRACT



Abstract

The classical emulsion droplet models found in the literature are based on a Volume/Area ratio, which gives the minimum droplet size of a monodisperse system at a fixed composition. These models have been revised and summarized into a general equation. Additionally, an alternative model based on a Volume/Volume ratio has been introduced which shows a non-linear behavior between droplet size and composition. At the micellar domain, the introduced droplet model shows a different behavior from the classical approach and also when combined with the flexible surface model or with the Israelachvili packing equation. To understand the differences between models, the packing of surfactant molecules at the droplet interface has been studied as a function of composition. A spherical packing parameter (P^{agg}) has been defined which, as a difference with Israelachvili´s concept, includes the penetration of oil and water molecules into the surfactant palisade layer. It has been described a semi-empirical method to estimate P^{agg} in monodisperse droplet like systems from simple size measurements. On the other hand, an equation showing the relation between P^{agg} and droplet composition has been deduced and applied on