

Study of Emulsions Stability Using a Biosurfactant from *Y. Lipolytica* (IMUFRJ 50682)

J.R. Trindade¹, M.G. Freire^{2,S}, P.F.F. Amaral³, M. A. Z. Coelho³, J.A.P. Coutinho² and I.M. Marrucho^{1,C}

¹*CICECO, Chemistry Department, Universidade de Aveiro, Aveiro, Portugal
imarrucho@dq.ua.pt*

²*Departamento de Química, Campus Universitário de Santiago, Universidade de Aveiro, Aveiro, Portugal*

³*Departamento de Engenharia Bioquímica, EQ / UFRJ, Centro de Tecnologia, Rio de Janeiro, Brazil*

Bioemulsifiers present advantages over chemical commercially surfactants such as: lower toxicity, higher biodegradability, better environmental compatibility, higher foaming, higher selectivity and specific activity at extreme temperatures, pH levels and salinity. These interesting properties allow its use in foods, cosmetics and pharmaceutical products.

Yarrowia lipolytica is an industrial yeast able to secrete a wide spectrum of organics acids, and commercially important enzymes. It is strictly an aerobic yeast known as one of the n-alkane assimilating yeasts capable of oxidising very efficiently hydrophobic substrates, like fats, oils, alkanes and fatty acids.

Cirigliano and Carman [1] have previously identified a surfactant activity in a *Y. lipolytica* oil medium. In the present work, the stability of the emulsions formed by Yansan, a biosurfactant produced by *Y. lipolytica* (IMUFRJ50682) [2], using glucose as a carbon source was studied. The stability provided by this emulsifier was compared with two other polysaccharide based biosurfactants available (xanthane and arabic gum). The stability of emulsions of four distinct organic phases (C16H34, C6F14, C7H8, C8H10) at 15% (w/v) and 30% (w/v), in combination with the three emulsifiers at 0.6% (w/v), and at two different pH's (pH=3.0 and 7.0) was investigated. The temperature was kept constant at 28°C and the study was performed periodically for an average time of 60 days. The stability loss of the emulsions was studied by image analysis. Optical microphotographs were obtained, with an optical microscope equipped with a digital camera. Each image was then analyzed and the droplet size quantified with an image analysis program developed in Matlab® 6.1 for that purpose [3].

The aging mechanisms depend on the surfactant, on the organic phase, and on the pH of the buffer medium. Yansan composed emulsions tend to loose stability by coalescence. The emulsions droplet size composed with this surfactant are more homogeneous and in some cases smaller, when compared with the commercially emulsifiers, providing a higher stability of the emulsions.

- [1] M.C. Cirigliano and G.M. Carman, *Appl. Environ. Microbiol.* **48**, 747-750 (1984).
- [2] P.F.F. Amaral, J.M. da Silva, M. Lehocky, A.M.V. Barros-Timmons, M.A.Z. Coelho and J.A.P. Coutinho, *Production and characterization of a biosurfactant from Yarrowia lipolytica. Process Biochem.* (Submitted) (2005).
- [3] M.G. Freire, A.M.A. Dias, M.A.Z. Coelho, J.A.P. Coutinho and I.M. Marrucho, *J. Colloid Int. Science.*, **286**, 224 (2005).