Characterization of ionic nature of biosurfactant extracted from corn steep liquor using ionic exchange resins

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Resins have been used for years for the purification and characterization of ionic substances. The use of these resins allows not only remove impurities or increase the concentration of metabolites from industrial streams, but also allows define their ionic structure. In general, surfactants can be classified as non-ionic, anionic, cationic or amphoteric, what is going to define their future application at industrial scale. For example, anionic surfactants present the greatest wetting and emulsifying properties, while cationic ones have excellent antibacterial properties as well as good emulsifier capacities. Otherwise, amphoteric surfactants, which may have anionic or cationic properties depending on pH, are widely used in personal care products because of their less irritability to skin and eyes in comparison with other types of surfactants. Although in the literature it is possible to find many works about the production and potential application of biosurfactants in cosmetic, pharmaceutical and personal care industries, there are almost not works about the ionic nature of these surface-active compounds. Therefore, the aim of this work is to characterize the ionic nature of the biosurfactant extracted from corn steep liquor in order to define its more adequate application at industrial scale. Biosurfactant was extracted from corn steep liquor using the methodology proposed by Vecino et al. [1], obtaining a biosurfactant extract that was dissolved in water under its critical micellar concentration. After that, Amberlite IRA 400 (an anionic exchange resin) and Amberlite IR 120 (a cationic exchange resin) were added to the aqueous solution, containing the biosurfactant, using a solid:liquid ratio of 1:8. Ionic exchange experiments were carried out at 25ºC and 200 rpm during 16 min. At different intervals of time, samples of biosurfactant solutions were obtained and their surface tensions were measured.

Using Amberlite IRA 400, the results showed, that after 16 min, 100% of the biosurfactant was removed from the solution, thus samples increased their surface tension from 47.7 mN/m up to 72.6 mN/m, the same surface tension as water. Furthermore, the results obtained after using the cationic resin showed that biosurfactant was also partially captured by Amberlite IR 120. Thus it can be speculated that the biosurfactant extracted from corn steep liquor is an amphoteric detergent. This fact could be interesting in terms of stablishing its applications, because, as it was said, amphoteric surfactants are used to diminishing irritating effects of other chemical surfactants in cleansing products.

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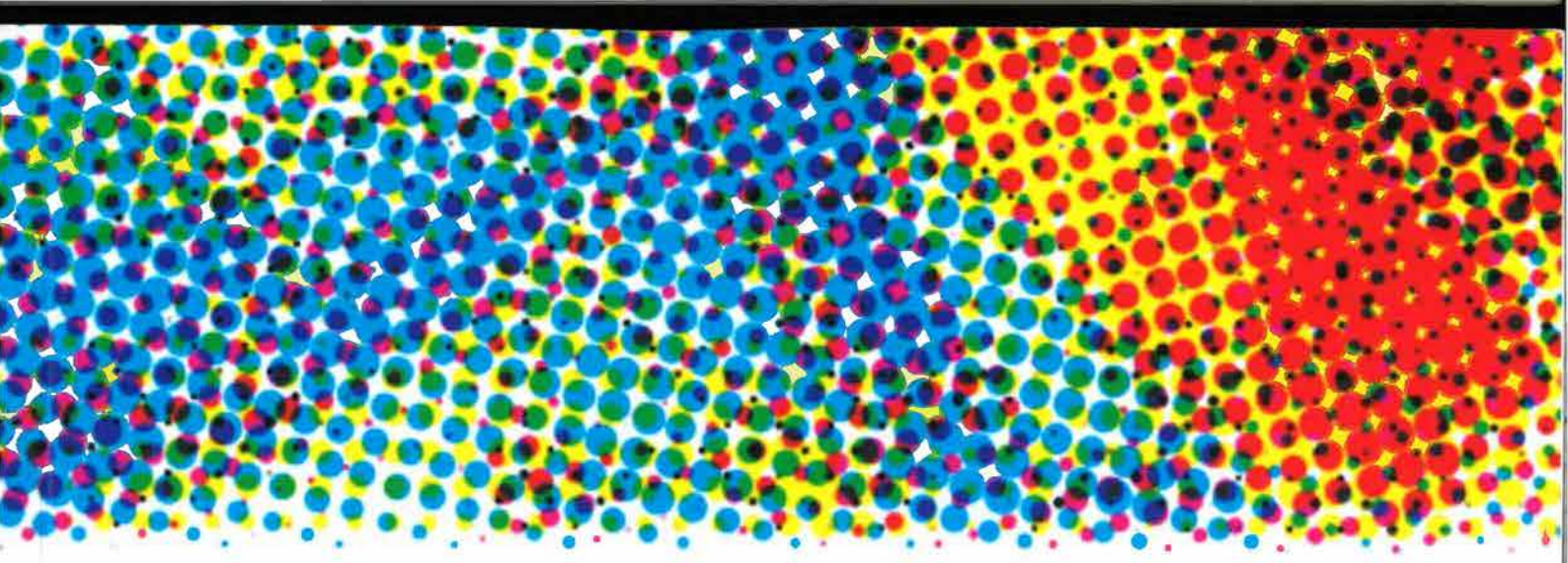
[1] Vecino, X., Barbosa-Pereira, L., Devesa-Rey, R., Cruz, J. M., & Moldes, A. B., Bioprocess and Biosystems Engineering, vol 38 (2015), 1629-1637.



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