

Infrared Spectroscopy as Tool for Evaluating The Effect Of pH in the Purification of Bioactive Compounds From Corn Steep Water

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Abstract

The use of agro-industrial streams as corn steep waters (CSW) is an interesting alternative to obtain cost-competitive and value-added biosurfactants, since they are produced by spontaneous fermentation of corn during the steeping process (Vecino et al., 2014). Additionally, these CSW are composed mainly by water, solids, lactic acid, sugars and lipids, among other compounds (Hull et al., 1996). On the other hand, membrane technology is proposed as an ecofriendly technology for biosurfactant recovery; however, these CSW is a complex fermented stream. For that reason, CSW should be pre-treated before applying membrane processes. Thus, in this work, the composition changes of CSW, after acidification or basification processes, were evaluated by means of Fourier-Transform Infrared spectroscopy. CSW was provided from FeedStimulants company, diluted up to 50 g/L and then centrifugated for solids removal. The initial pH of CSW was around 4. Then, one sample of CSW was acidified using 1M H₂SO₄ up to pH=2 and another one was basified up to pH=6 with 1M NaOH. The FTIR analysis were carry out before and after pH adjustment using a Nicolet 6700 Spectrometer. Comparing the 400 to 4000 cm⁻¹ region, the spectra from basic CSW presented a similarity of 89.6% in comparison with raw CSW (without pH change); whereas the acidic CSW showed 44.6% of match. This means that the functional groups of the CSW are modified when the sample is acidified, providing more defined bands in the 1700-1500 cm⁻¹ region. These bands indicate the presence of protein-related weak bands. In this way, the presence of these proteins, in the acidic CSW, could be an indicator of purify biosurfactants. Therefore, before membrane application for biosurfactant recovery, it would be recommended the acidification of CSW in order to obtain a stream more concentrated in biosurfactants.

Keywords: corn stream, acidification, basification, biosurfactants, membrane technology

References

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