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SEPARATION OF NATURAL MONOCYCLIC PHENOLICS USING MICELLAR ENHANCED ULTRAFILTRATION WITH A CATIONIC SURFACTANT

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Abstract

Phenolic compounds are known as recalcitrant pollutants in many industrial wastewaters, e.g. olive mill wastewater. An efficient treatment is therefore needed before the discharge of phenol-containing wastewaters into the environment. The possibility of removing some natural occurring phenolics, namely tyrosol, *p*-coumaric acid and vanillic acid, by micellar-enhanced ultrafiltration (MEUF) using a cationic surfactant, cetylpyridinium chloride (CPC), and polyethersulfone membranes of 20 and 50 kDa molecular weight cut-off (MWCO), was investigated. The effect of the surfactant and the solute concentrations on the retention and the permeate fluxes were studied. The elimination and recovery of the surfactant from the retentate stream under its Krafft point was also investigated. The rejection of vanillic acid and *p*-coumaric acid was higher than the rejection of tyrosol. The CPC was found to contribute significantly to the fouling phenomenon causing about 63% of flux reduction when using 2 CMC (1.8 mM) of the CPC. The increase of the feed concentration from 0.3 to 0.9 g/L (phenolic mixture) decreases the rejection rates from the range of 51-54% to 31-33%. The precipitation of CPC under its Krafft temperature allowed the recovery of about 92% of the initial concentration of CPC from retentate streams. The obtained results showed that the MEUF process can be used efficiently for the recovery of phenolic compounds from wastewaters and that the surfactant can be recovered from the retentate stream and reused.

Key words: cationic surfactant, Krafft temperature, micellar-enhanced ultrafiltration, phenol-containing wastewaters, surfactant recovery

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