

Biodegradation rate constants in different NF/UF fractions of cork processing wastewaters

Marisa Bernardo^a, Ana Santos^a, Paula Cantinho^a, Miguel Minhalma^{a,b*}

^a*Departamento de Engenharia Química, Instituto Superior de Engenharia de Lisboa (ISEL/IPL),
Rua Conselheiro Emídio Navarro, 1, 1959-007, Lisboa, Portugal*

Tel. +351 218317178; Fax +351 218317267; email: bernardo_marisa@hotmail.com, anacatcs@gmail.com, pcantinho@deq.isel.ipl.pt, mminhalma@deq.isel.ipl.pt

^b*Instituto de Ciência e Engenharia de Materiais e Superfícies (ICEMS/IST/UTL), Av. Rovisco Pais, 1, 1049-001 Lisboa, Portugal*

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ABSTRACT

Cork processing wastewater is an aqueous complex mixture of organic compounds that have been extracted from cork planks during the boiling process. These compounds, such as polysaccharides and polyphenols, have different biodegradability rates, which depend not only on the nature of the compound but also on the size of the compound. The aim of this study is to determine the biochemical oxygen demands (BOD) and biodegradation rate constants (k) for different cork wastewater fractions with different organic matter characteristics. These wastewater fractions were obtained using membrane separation processes, namely nanofiltration (NF) and ultrafiltration (UF). The nanofiltration and ultrafiltration membranes molecular weight cut-offs (MWCO) ranged from 0.125 to 91 kDa. The results obtained showed that the biodegradation rate constant for the cork processing wastewater was around 0.3 d^{-1} and the k values for the permeates varied between $0.27\text{--}0.72 \text{ d}^{-1}$, being the lower values observed for permeates generated by the membranes with higher MWCO and the higher values observed for the permeates generated by the membranes with lower MWCO. These higher k values indicate that the biodegradable organic matter that is permeated by the membranes with tighter MWCO is more readily biodegraded.

Keywords: Cork processing wastewater, Fractionation, Membranes, Biochemical oxygen demand, Biodegradation rate constant

* Corresponding author.