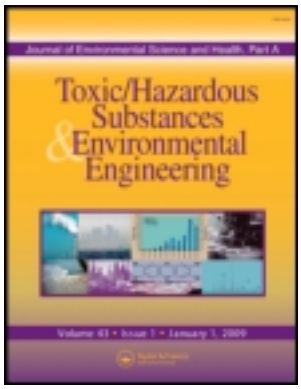

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The use of cork waste as a biosorbent for persistent organic pollutants-Study of adsorption/desorption of polycyclic aromatic hydrocarbons

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Abstract

The aim of this study is to determine the sorption-desorption behavior of a mixture of thirteen aqueous PAHs on cork waste at a particle of size 0.25–0.42 mm obtained from the remains of cork strips. The final purpose is to use this natural adsorbent as an alternative to activated carbon in an innovative approach for the removal of this class of toxic compounds, and significantly reduce the regeneration costs of the process. The chemical composition of the selected cork revealed that suberin (38.5 %) and lignin (31.6 %) were the main structural components of the cell wall. The high efficiency of cork as a biosorbent of PAHs is shown by the fact that just over 80 % of adsorption occurred during the first two minutes of contact time. Both Freundlich's and Langmuir's isotherms gave good fits to the sorption process. The highest adsorption affinities were exhibited for pyrene, anthracene, and phenanthrene. Desorption studies indicate a high degree of irreversibility for all PAHs, and especially so in the case of high molecular PAHs. The correlation with KF and low molecular weight PAHs was the most significant. The quantity of cork required to reduce water pollution was estimated to be between 3 and 15 times less than the quantities required in the case of other materials (i.e. aspen wood and leonardite). This study demonstrates for the first time that cork is a potential biosorbent for PAHs and may have relevance in the future treatment of PAH-contaminated waters.