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SORPTION OF SELECTED CHLORINATED SOLVENTS ON PLANT DEBRIS COLLECTED IN A CITY PARK

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Abstract

Debris from deciduous trees in the form of park green waste was investigated as a potential biosorbent for the removal of chlorinated solvents from water. The sorption properties of beech leaves and cupules, oak leaves and acorns, birch leaves and lime leaves (all tree species common for a moderate climate) in a non-modified form were investigated with regard to the removal of perchloroethylene, 1,1,2-trichloroethane and 1,1,1,2-tetrachlorothane. The preliminary results showed that these biosorbents are characterised by very similar sorption properties as well as the surface area and elemental composition. Therefore the sorption capacities and rate constants were determined in the mixture of debris sampled from park green waste. The values of sorption capacity and partitioning coefficient of biosorbent mixture varied from 22.4 to 70 µg g^{-1}, and from 28 to 173 L kg^{-1}, respectively. The pseudo-first order reaction kinetics model was fitted to the experimental data, yielding rate constants in the range 0.0187-0.0223 min^{-1}. Due to the lowest polarity, perchloroethylene was a sorbate with the highest affinity for sorbent surface. The results show that chlorinated solvents can be sorbed on park green waste. Although park green waste displays weak sorption capacity, it might be still an attractive sorbent due to good availability and low cost.

Key words: biosorbents, chlorinated solvents, low-cost adsorbent, sorption

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