

Developing sustainable activated carbons for improved pharmaceutical compounds removal from urban wastewaters in the framework of LIFE IMPETUS project

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Water treatment technologies improvement is the key to face current water quality challenges (2030Agenda). A challenge in wastewater treatment and water reuse relates to the presence of micropollutants in raw water, the latter often related with pharmaceutical compounds (PhCs). Although WWTPs are crucial barriers against PhCs, many of these compounds are resistant to conventional treatments, thus cost-effective and resource efficient solutions based on existing infrastructure are essential.

LIFE Impetus project (LIFE14 ENV/PT/000739) aims at demonstrating feasible measures for improving the control of PhCs in urban wastewater treatment plants (WWTPs) with conventional activated sludge (CAS) treatment. Namely, strategies based on chemically enhanced barriers, with adsorbent and/or coagulant addition, are underway. New powdered activated carbons (PACs) are being developed from industrial wastes available in Portugal (cork, carob processing residues and pinion shell) by chemical and steam activation. The novel biomass-derived PACs (apparent surface areas > 1000 m²/g) are being benchmarked against commercial counterparts. Selected lab-made PACs were already used in laboratory tests assessing the competitive adsorption of a short-list of representative PhCs (diclofenac - DCF, carbamazepine - CBZ and sulfamethoxazole - SMX). Adsorption studies were conducted in synthetic inorganic matrix and in real wastewater effluents from one of the CAS-WWTPs selected as case study. For the carob-derived PAC, 10 to 20 mg/L are needed to attain, in 5 h of contact time, 80% removal of the target PhCs in the mixed liquor of that WWTP.

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