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Activated carbon from renewable materials for the removal of organic micropollutants in wastewater

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Organic micropollutants passing wastewater treatment plants can be removed from treated wastewater using activated carbon. However, most commercial activated carbons are produced from fossil coal and other non-sustainable primary materials (feedstocks). We therefore investigated activated carbons produced from woody feedstocks under varying carbonization and activation conditions at pilot scale (100 g/h). The elimination of 15 organic contaminants in biologically treated wastewater was quantified after sorption batch experiments with 11 different activated carbons. Wood based activated carbons removed organic micropollutants including highly mobile ionizable compounds from this wastewater to the same or even higher degree than two commercial activated carbons produced from fossil coal. Our findings indicate that the dosage of water steam during activation determined the performance of the product. In contrast, the type of woody feedstock had less impact on the quality of the activated carbon, as effective removal of organic micropollutants was even achieved when low quality wood was utilized e.g. landscaping wood or compost sieving residues. Our results indicate that wood-based activated carbons can be a green sustainable alternative to activated carbons derived from fossil resources, as they can be produced from wood of very low market value.