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Magnetic biochar from different feedstocks for the removal of chromium (VI) from aqueous solutions

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Chromium is a toxic metal found in industrial wastewater and mainly from mining, electroplating, and leather tanning activities. Cr(VI) is one of the most hazardous chemicals, which can cause carcinogenic, teratogenic, and mutagenic threats to humans. Sorption is one of the methods employed for the removal of Cr(VI). Activated carbon is a suitable sorbent for the removal of chromium but it is associated with a high production cost and a difficulty for regeneration. Biochar is a carbon-rich product of pyrolyzed biomass under limited oxygen conditions. It has demonstrated a strong ability to sorb various pollutants in water due to the high specific surface area, pore structure, and functional groups. In this study, biochar from two different feedstocks, namely malt spent rootlets (MSR) and olive kernels, were examined for the removal of Cr(VI) from aqueous solutions. Magnetic modification of biochar was carried out by two methods (a) microwave synthesized magnetic biochar microparticles and (b) mixing of magnetic iron nanoparticles and biochar in methanol solution. Batch experiments were conducted in order to investigate the effect of biomass origin and magnetic modification method on chromium sorption.