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Efficiency of biochar produced from malt spent rootlets to remove mercury and dyes

Charoula Kamenidou (1), Ioannis Manariotis (1), and Hrissi Karapanagioti (2)

(1) University of Patras, Department of Civil Engineering, Patras, Greece (idman@upatras.gr), (2) University of Patras, Department of Chemistry, Patras, Greece

Considerable research effort has been focused on the production of biochar from carbon-rich biomass under oxygen-limited conditions as a mitigation measure for global warming once it is used as a soil amendment. Furthermore, the use of biochar as an added value product, such as sorbent or catalyst, is desirable and could be more profitable. Biochar is obtained from the incomplete combustion of carbon-rich biomass under oxygen-limited conditions. Various organic-rich wastes including wood chips, animal manure, and crop residues have been used for biochar production. The present study presents the findings of an experimental work, which investigated the use of biochar produced from malt spent rootlets (MSR), which is a beer production by-product, to remove Hg(II) and methylene blue (MB) from aqueous solutions. MSR was pyrolyzed at temperatures of 300, 400, 500, 600, 750, 850, and 900oC, under limited oxygen conditions. The increase of temperature resulted in significantly increased BET surface areas. The mercury sorption capacity was affected by pyrolysis temperature, and was increased by increasing the pyrolysis temperature. The maximum sorption capacity was 100-110 mg Hg(II)/g biochar at a temperature range of 750-850oC. The MB sorption capacity of biochar was also affected by pyrolysis temperature.