Association of Metallurgical Engineers of Serbia
Faculty of Technology and Metallurgy, University of Belgrade
Institute for Technology of Nuclear and Other Mineral Raw Materials
Institute of Chemistry, Technology and Metallurgy
Vinca Institute of Nuclear Sciences
Serbian Foundrymen's Society

MME SEE 2019

Metallurgical & Materials Engineering Congress of South-East Europe

BOOK OF ABSTRACTS

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Content

GRAPE POMACE HYDROCHARS AS POTENTIAL ADSORBENTS OF Cd(II) AND Al(III) FROM AQUEOUS SOLUTIONS

Jelena Petrović[1], Marija Petrović[1], Marija Mihajlović[1], Marija Kojić[1], Marija Koprivica[1], Zorica Lopičić[1], Jelena Milojković[1]

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Recently, there is a growing interest in the utilization of waste biomass to curb its potential negative impact on the environment, which includes CO_2 emission and various types of soil pollution. Simultaneously, the development of thermochemical technologies for conversion of waste biomass into valuable materials becomes very attractive. Hydrothermal carbonization is proposed as a promising and highly effective technology in this field.

In this paper, grape pomace was hydrothermally carbonized at 220 and 240°C to explore the potential application of derived hydrochars (HC-220 and HC-240, respectively) for removal of Cd(II) and Al(III) from aqueous solutions. Obtained preliminary results showed that adsorption capacities achieved using the HC-220 were 65.25 mg/g for Cd(II) and 17.13 mg/g for Al(III). On the other hand, the HC-240 showed smaller capacities for both examined materials (24.25 mg/g for Cd(II) and 9.0 for Al(III)). Differences in the structural properties of hydrochars produced at different carbonization temperatures could be a reason for this observation. Literature data states that higher temperature causes the formation of energy-dense coal-like hydrochars with dominant aromatic structure. Therefore, material obtained at 240°C had less functional group on its surface and more aromatic structure compared to the HC-220, and thus less electron donating sites for metal ions adsorption.

Results from this paper suggest that the grape pomace could be a promising precursor for the production of low-cost hydrochars for adsorption of Cd(II) and Al(III) from wastewaters. Besides, results can be further used for the optimization of the HTC process parameters to find the most adequate reuse of the waste grape pomace.

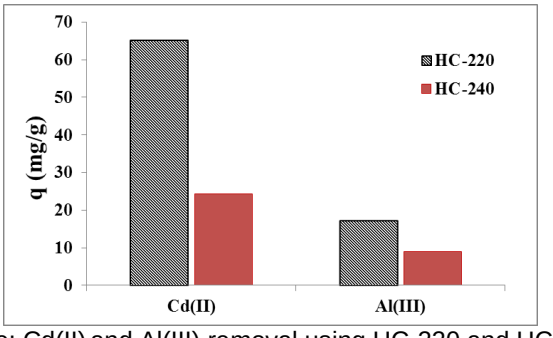

Figure: Cd(II) and Al(III) removal using HC-220 and HC-240

Keywords: Hydrothermal carbonization, Hydrochar, Adsorption, Cd(II), Al(III)