

2nd International Conference on

POLLUTION CONTROL AND SUSTAINABLE ENVIRONMENT

October 05-06, 2017 London, UK

Low cost waste tire adsorbents for Hg and Cr uptake from water

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The bad disposition of waste tires in the environment have become a major problem that could led to the release of toxic substances, proliferation of plagues, and uncontrolled incineration; other problem of concern is the liberation of heavy metals like Hg and Cr in waters, from industrial and mining processes, because of their facility to transport through trophic chains, altering the ecosystems and affecting the population that use those waters. A way to contribute in the mitigation of those environmental problems consist in the use of waste tire rubber to produce adsorbents, suitable for the adsorption of heavy metals in contaminated waters; the most frequently used adsorbents are the activated carbons, those materials have very good characteristics, but its production is done at elevated temperatures or using strong reagents that generates effluents. In order to produce adsorbents of lower cost and more friendly with the environment, in this work, three adsorbents were obtained from waste tire rubber, by the combination of thermal treatment at moderate temperatures (673 and 773 K) and oxidation with ozone at ambiente temperature. The samples were characterized by proximate analysis, FTIR, SEM, total acidic and basic groups, and point of zero charge. The adsorption kinetics of Hg and Cr in synthetic aqueous solutions, was studied and the fit of the data to pseudo first and pseudo second order models was evaluated. The combination of thermal treatment at 773 K with ozone oxidation, led to the material with the better adsorption of Hg and Cr.

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