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Biochar production from agro-industrial wastes and its application in water treatments

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Human activities lead to water resources pollution. Nitrate is one of the water pollutants that is a significant environmental problem all around the world that provide a serious threat to human health. Also, the eutrophication is accelerated by increasing of nitrate concentration in water sources [1-2]. Hence, removal of nitrate from water and wastewater resources is important significantly. It is important to provide a simple, inexpensive, effective and environmentally-frindly methods for removal of nitrate [3]. Adsorption proccess is one of the effective methods for removal of water pollutants including nitrate, which has received more attention in recent decades. In thise regards, many natural and synthetic sorbents have been proposed, such as activated carbon, biochar, zeolites, nano composites and etc. Biochar is a charcoal-like material that is produced by decomposition of biomass (residues of agricultural and agro-industrial activities) at high temperatures. Application of biochar as a low-cost adsorbent to wastewater treatment was reported in 2009 for the first time. Since then, the application of biochar in this field has expanded rapidly and attracted increasing attention [4]. This study investigate biochar production by decomposition corn cobs at 600 ºC for 2 hours. Then, magnetic biochar nanocomposites were synthesized using the co-precipitation method with different types of functional groups. The structural features of the produced sorbent was considered by XRD, FTIR, SEM and sorbtion-desorption of N_2. Finally, The produced sorbent applied for removal of nitrate from water in batch adsorption system successfully. According to the obtained results, magnetic biochar with highly porous structure, large surface area, and high ion exchange capacity is a good candidate for water and wastewater treatment.

Keywords: Water treatment, nitrate, adsorption, biochar, magnetic biochar

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