BIOCHAR FOR POLLUTANT REMOVAL FROM AQUEOUS SOLUTIONS

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Key Words: biochar, adsorption, biochar

Biochar can be utilised to transfer carbon dioxide from the atmosphere into soils. It can also be used for soil enhancement, due to its attitude to hold water and retain nutrients in soil by adsorbing NH_4^+ and PO_4^{3-} ions. Due to its adsorbing capacity, biochar finds applications in removal of pollutants such as ammonia, mercury and organic compounds from waste water.

In this study, batch adsorption of aqueous ammonia and mercury on olive residue activated char are presented. The diffusion of pollutants inside the biochar pores is also modelled aiming at gaining an insight into the controlling mechanism which regulates the pollutant removal.

Adsorption experiments were carried out using raw olive char, obtained by slow pyrolysis of olive residue at 500C° in a Jiggled Bed Reactor. The char was then activated using carbon dioxide activate (CAC); successively, some of the CAC was treated with a concentrated solution of HNO_3 obtained acid treated char (AAC). Analysis showed that CAC and AAC are characterised by different porosity; those samples were then used to understand the effect of the porosity on the adsorption capacity of the char.

It was found that the adsorption of NH_3 on raw olive char, both CAC and AAC, follows the pseudo second order model. From the knowledge of the kinetics and adsorption isotherms, a model to describe the intra-particle diffusion and adsorption was developed. The suggested model showed convincing results describing the diffusion and adsorption inside row olive char and the carbon dioxide activated char particles. When adsorption of mercury was considered, the second order kinetics model was shown to represent well the experimental data in this case as well. In all cases, since a second order kinetic model well describe the experimental data, is concluded that the formation of complexes during adsorption is a possibility.