

Effect of oil palm biomass cellulosic content on nanopore structure and adsorption capacity of biochar

ABSTRACT

The influence of biomass cellulosic content on biochar nanopore structure and adsorption capacity in aqueous phase was scarcely reported. Commercial cellulose (100% cellulose), oil palm frond (39.5% cellulose), and palm kernel shell (20.5% cellulose) were pyrolyzed AT 630 °C, characterized and tested for the adsorption of iodine and organic contaminants. The external surface area and average pore size increased with cellulosic content, where commercial cellulose formed biochar with external surface area of 95.4 m²/g and average pore size of 4.1 nm. The biochar from commercial cellulose had the largest adsorption capacities: 371.40 mg/g for iodine, 86.7 mg/L for tannic acid, 17.89 mg/g for COD and 60.35 mg/g for colour, while biochar from palm kernel shell had the least adsorption capacities. The cellulosic content reflected the differences in biochar nanopore structure and adsorption capacities, signifying the suitability of highly cellulosic biomass for producing biochar to effectively treat wastewater.

Keyword: Cellulosic content; Biochar; Pyrogenic nanopores; Adsorption capacity