

Effect of washing pre-treatment of empty fruit bunch hydrogel biochar composite properties as potential adsorbent

ABSTRACT

Hydrogel biochar composite (HBC) showed a great potential as effective organic contaminant removal in various wastewater and gas treatment. The effectiveness is depending upon quality of biochar used during the preparation of the HBC. In this work, pre-treatment of the biochar samples (EFB in this case) through washing was investigated. The raw EFB biochar was prepared using microwave assisted pyrolysis under 1,000 W for 30 min under N₂ flow with 150 mL/min. The prepared biochar is chemically treated using either acid solution (HCl) or oxidising agent (H₂O₂) to enlarge the pores and remove impurities. The biochar is then polymerised by using acrylamide (AAm) as monomer, N,N'-methylenebisacrylamide (MBA) as crosslinker and ammonium persulfate (APS) as initiator to form the treated hydrogel biochar composite (EFB-HBC). The H₂O₂ treated biochar [EFB-HBC (P100)] shows better porosity compared to HCl treated biochar [EFB-HBC (H100)] where EFB-HBC (P100) has higher surface area (1.5997 m² /g) compared to EFB-HBC (H100) (1.2562 m² /g). The HBC is porous and carbonaceous material with 21 % and 31 % of carbon content in EFB-HBC (P100) and EFB-HBC (H100) which have potential as an adsorbent in wastewater and gas treatment.

Keyword: Hydrogel biochar composite (HBC); Washing pre-treatment; Potential adsorbent