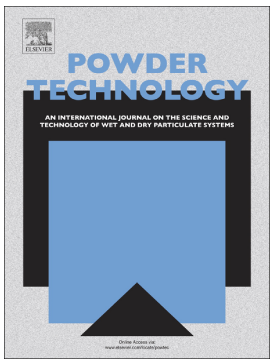

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PII: S0032-5910(18)30189-X
DOI: doi:10.1016/j.powtec.2018.03.005
Reference: PTEC 13236

To appear in: *Powder Technology*

Received date: 29 August 2017
Revised date: 28 January 2018
Accepted date: 7 March 2018

Please cite this article as: Jiangdong Dai, Ling Qin, Ruilong Zhang, Atian Xie, Zhongshuai Chang, Sujun Tian, Chunxiang Li, Yongsheng Yan , Sustainable bovine bone-derived hierarchically porous carbons with excellent adsorption of antibiotics: Equilibrium, kinetic and thermodynamic investigation. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Ptec(2017), doi:10.1016/j.powtec.2018.03.005

Sustainable Bovine Bone-Derived Hierarchically Porous Carbons with Excellent Adsorption of Antibiotics: Equilibrium, Kinetic and Thermodynamic Investigation

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Abstract

Here, we reported the preparation of hierarchically porous carbons with ultrahigh surface specific area using bovine bone (a renewable organic-organic hybrid biomass, contains inorganic hydroxylapatite and organic collagen protein) as starting material *via* a simple self-template carbonization and *in-situ* alkali-activation route. Adjustment of activation temperature and activator dosage could easily controlled pore structure. The macro-meso-micro hierarchical porous carbon produced at 850 ^{o}C with the mass ratio of 1:3 for bovine bone-derived carbon: alkali exhibited a very high BET surface area of 3231.8 m^2 g^{-1} and total pore volume of 1.976 cm^3 g^{-1}, showing the excellent adsorption capacities and fast removal rates for sulfamethazine (SMZ) and chloramphenicol (CAP) antibiotics. The maximum monolayer adsorption capacities were 1194 mg g^{-1} for SMZ and 1240 mg g^{-1} for CAP at 318 K, respectively. Thermodynamic analysis confirmed that the adsorption process was spontaneous and physisorption adsorption was dominate. The advantages of thermal and chemical stability, great absorbability, quick binding and easy preparation provided the possibility for various wastewater treatment.

Keywords: Bovine bone; Hierarchical Porous Carbon; Antibiotic Removal; Self-Template; Alkali-Activation;

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