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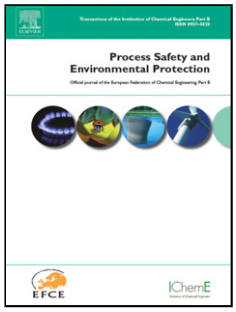

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Pecan Shell based Activated Carbon for Removal of Iron (II) from Fracking Wastewater: Adsorption Kinetics, Isotherm and Thermodynamic Studies

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Abstract:
Pecan Shell Based Activated Carbon (PSBAC) developed in this work had a high specific surface area (1500 m^2/g) and pore volume (0.7 cm^3/g). The maximum adsorption capacity of the PSBAC was found to be 41.66 mg/g at 55 mg/L iron (II), pH = 3, 3 g/L adsorbent dose, at 90 minutes and at 30 °C. Iron (II) adsorption can be best described by the pseudo second order model. The adsorption system was thermodynamically favorable, endothermic and increase in entropy. The experimental data were fitted against common adsorption isotherms and yielded excellent fits in the following order: Temkin > Freundlich > Langmuir.

Keywords: Adsoprtion, fracking water, iron, pecan shells, isotherms, and kinetics

1. Introduction

Natural gas is an environmentally attractive fuel when compared with other hydrocarbon fuels. Shale gas is natural gas produced from shale formations that typically function as both the reservoir and source rocks for natural gas (Yang et al., 2015). In the Year 2000, shale gas only accounted for 1.6% of total natural gas produced in the U.S. However, this percentage has