**Preparation of activated carbon from oil palm fruit bunch for the adsorption of Acid Red 1 using optimized Response surface methodology**

**Abstract**

Oil palm empty fruit bunch (OPEFB); a renewable agricultural waste material’s potential was harnessed for adsorption of Acid Red 1 (AR1). Potassium hydroxide was impregnated on the precursor (OPEFB) for the production of activated carbon through chemical activation method under inert atmosphere of nitrogen. Activation temperature, chemical impregnation ratio (KOH:char) IR, and activation time were the preparation conditions investigated in this study. Central composite design (CDD) was used to develop two models which were used for determination of effects of selected conditions of preparation of OPEFB activated carbon yield and its performance in adsorbing AR1. Adsorption capacity of 197.62 mg/g (98.81%) and 19.12% yield were obtained at activation temperature of 820 OC, IR 2.5 and 140 min. There was good correlation between the experimental results and the predicted models obtained. The Brunauer Emmett Teller (BET) analysis of the activated carbon prepared at optimum conditions had a surface area of 820 m2 /g, total pore volume of 0.52 cm3 /g and scanning electron microscopy SEM was carried out to determine its surface morphology that enhance adsorption of AR1 on OPEFB activated carbon.