

PAPER TITLE

STUDY OF PRETREATMENT IMPACTS ON SUGARCANE BAGASSE AND DURIAN PEEL BY USING RESPONSE SURFACE METHODOLOGY

ABSTRACT

Inappropriate combustion of lignocellulosic biomass plausibly generates environmental problems. Agricultural waste utilization does not only reduce air pollutions but also converts the biomass wastes into value-added products e.g. biofuels. However, the physical and chemical properties of agricultural wastes are the limiting determinants for utilization. Therefore, agricultural wastes e.g. sugarcane bagasse and durian peel were performed with diluted sulfuric pretreatment to break down the lignocellulosic fibrils and to enhance enzymatic saccharification. In this experiment, the optimum pretreatment parameters on sugarcane bagasse and durian peel were temperature (60–140°C), time (20–100mins), and acid concentration (0.5–3.5%) and modified according to Response Surface Methodology (RSM) using Box-Behnken design. Pretreated lignocellulosic samples were enzymatically hydrolyzed after pretreatment and the efficiency of pretreatment were examined according to the reducing sugar concentration. The mathematical model demonstrated the correlation of each pretreatment factor and generated reducing sugars were used to optimize pretreatment conditions. At predicted optimum pretreatment conditions, the results revealed that the reducing sugar of pretreated sugarcane bagasse was obtained as 180.15 mg/g-sugarcane bagasse, 3.06 folds higher than untreated sugarcane bagasse, at pretreatment conditions; 136.08°C, 75.36 minutes, 3.50% and the reducing sugar of pretreated durian peel was acquired as 551.07 mg/g-durian peel, 1.88 folds higher

compared to unpretreated durian peel, at pretreatment conditions; 127.14°C, 74.13 minutes, 2.75%. However, during the pretreatment, some inhibitors obstructing the fermentation process were generated such as Acetic acid, Hydroxymethylfurfural (HMF), and Furfural. This study demonstrated about the pretreatment capability in agricultural waste utilization to further produce biofuels and value-added products.

KEY WORDS: Durian peel / Sugarcane bagasse / Pretreatment / Reducing sugar

/ Response Surface Methodology

