

## **Study on the Valorization of Rice Waste Via Torrefaction Method**

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### **ABSTRACT**

Biomass plays a crucial role as the source of renewable carbon which can be utilised in the production of biofuels. However, the raw biomass itself has some undesirable properties such as high moisture content, low energy density and deterioration after a short duration of storing period. Hence, a thermochemical process, known as torrefaction is normally used to preliminary treat the biomass to enhance its physical properties. This study focus on the characterization of the physical properties of the torrefied rice biomass which are rice husk and rice straw under three different temperatures of 220°C, 250°C and 280°C with residence time of 30min. The heating rate was set as 15°C/min after the temperature profile study on the customized reactor was investigated. From the experimental results, it is noticeable that torrefaction enhances the calorific value of the biomass by 3-17% for rice husk and 4-20% for rice straw. The torrefied rice-based biomass also helps to remove the moisture content of raw rice husk and rice straw by 6.5% and 8.3% respectively. The mass yield of the torrefied rice-based biomass is between the range of 78-91% for rice husk and 82-90% for rice straw. Meanwhile, the energy yield for rice husk is in the range of 92-94% and 93-98% for rice straw after torrefaction. This study concludes that 250°C is the optimum torrefaction temperature for the conversion of rice waste into valuable biofuel.

**KEYWORDS:** Biomass, torrefaction, rice husk, rice straw