

Torrefaction of Mangrove Wood by Introducing Superheated Steam for biochar production

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Abstract. Torrefaction by superheated steam is carried out over mangrove wood as raw material in a Rotary Kiln Carbonizer. Mangrove wood was obtained from Kuala Sepetang, Malaysia. The process to produce biochar still applies the traditional method which requires 60 days in hot air. The torrefaction process using superheated steam is carried out at 300°C by manipulating the operating time at 30, 60, 90 and 120 min. The calorific value for raw mangrove wood to solid char product raised from 16.7 MJ/kg up to about 30 MJ/kg. The highest HHV was 29.7 MJ/kg after 60 min torrefaction. The carbon element increases from 47.4% to above 70%. For bio-oil product, the superheated steam torrefaction produces a variety of acids, alcohols, ketones, and aldehydes, while the traditional method produces a liquid that contains acetic acid, butanoic acid, and phenol. Torrefaction of mangrove wood by superheated steam significantly reduced the biochar production period and increased the calorific value.

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