

ABSTRAK

KARAKTERISTIK EMISI PEMBAKARAN BATUBARA DAN BIOMASSA PELEPAH SAWIT TERTOREFAKSI DENGAN VARIASI *AIR FUEL RATIO* PADA SISTEM *PULVERIZED COMBUSTION*

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Penggunaan energi fosil dapat membuat cadangan energi fosil semakin menipis. Selain itu timbulnya masalah lingkungan seperti efek Gas Rumah Kaca (GRK) yang diakibatkan dari emisi CO₂, yang dihasilkan dari proses pembakaran batubara, dari tiap pembangkit listrik maupun pada industri. Diperlukan suatu cara untuk menekan jumlah emisi karbon, salah satunya dengan menggunakan energi alternatif yang ramah lingkungan, terbarukan (*renewable*), serta berkelanjutan (*sustainable*). Salah satunya energi biomassa pelepah kelapa sawit. Tujuan penelitian ini untuk menentukan emisi terbaik dari tiap pengujian bahan dan mengetahui pengaruh penambahan *excess air* pada pembakaran terhadap emisi yang dihasilkan. Penelitian ini diawali dengan menyiapkan pelepah kelapa sawit tertorefaksi, pelepah kelapa sawit mentah dan batu bara dalam bentuk serbuk ukuran mesh 100. Selanjutnya dilakukan pengujian pengaruh *excess air* terhadap emisi pembakaran yang dihasilkan dengan variasi 0% dan 10% untuk masing masing bahan. Emisi pembakaran diukur menggunakan *gas analyzer*. Hasil penelitian karakteristik emisi terbaik diperoleh pada bahan pelepah sawit tertorefaksi variasi *excess air* 10% dengan nilai CO, CO₂, SO₂, dan NO_x berturut-turut sebesar 3709 ppm, Penambahan *excess air* menyebabkan emisi yang dihasilkan lebih baik ditandai penurunan emisi CO sebesar 22,5 %, penurunan emisi SO₂ sebesar 3,42%, dan penurunan emisi NO_x 2,68 % pada batubara. Pada sampel pelepah penurunan emisi CO sebesar 20,2 %, penurunan emisi SO₂ 3,42%, dan emisi NO_x mengalami penurunan sebesar 13,4 %.

Kata Kunci: Biomassa, Pembakaran, Emisi, *Excess Air*.

ABSTRACT

CHARACTERISTICS OF COAL COMBUSTION EMISSIONS AND PALM FRONT BIOMASS THEOREFACTED WITH VARIATIONS AIR FUEL RATIO ON THE SYSTEM PULVERIZED COMBUSTION

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The use of fossil energy can create fossil energy reserves getting thinner. Apart from that, environmental problems arise such as the Green House Gas (GHG) effect resulting from CO emissions₂, which is produced from the coal burning process, from each power plants and industry. A way is needed to reduce the amount of carbon emissions, one of which is by using environmentally friendly, renewable alternative energy (renewable), as well as sustainable (sustainable). One of them is biomass energy palm fronds. The aim of this research is to determine the best emissions from each material test and determine the effect of additions excess air on combustion of the emissions produced. This research began by preparing oil palm fronds torrefacted, raw palm fronds and coal in powder form with a mesh size of 100. Next, the effect was tested excess air of combustion emissions produced with a variation of 0% and 10% for each ingredient. Combustion emissions are measured using gas analyzer. The best emission characteristics research results were obtained from palm frond material torrefacted variation excess air 10% with CO, CO value₂, SO₂, and NO_x respectively 3709 ppm, Addition excess air causing better emissions, marked by a reduction in CO emissions of 22.5%, a decrease in SO emissions₂ of 3.42%, and reduced NO emissions, 2.68% in coal. In the frond samples, CO emissions decreased by 20.2%, SO emissions decreased₂ 3.42%, and NO emissions_x decreased by 13.4%.

Keywords: Biomass, Combustion, Emissions, Excess Air