ABSTRAK

Daffa Dimas Biantara : 5223520014 Karakteristik Pembakaran Campuran Biomassa Pada Reaktor Insinerator Tugas Akhir Fakultas Teknik Universitas Negeri Medan 2026.

Penelitian ini bertujuan untuk menganalisis pengaruh variasi *flow rate* udara primer terhadap karakteristik pembakaran campuran biomassa pada reaktor insinerator. Biomassa yang digunakan terdiri dari campuran kayu, bambu, tempurung kelapa, dan kardus dengan massa total 2,05 kg. Variasi *flow rate* udara primer yang digunakan yaitu 20 m^3/jam, 30 m^3/jam, 40 m^3/jam, dan 48 m^3/jam. Parameter pengujian meliputi temperatur ruang bakar (T1), temperatur *cyclone* (T2), lama waktu pembakaran, serta massa residu abu. Hasil penelitian menunjukkan bahwa variasi *flow rate* udara primer berpengaruh terhadap intensitas dan kestabilan proses pembakaran. Variasi 20 m^3/jam menunjukkan kenaikan temperatur yang lebih lambat akibat terbatasnya suplai oksigen, sedangkan variasi 40 m^3/jam dan 48 m^3/jam menghasilkan temperatur yang lebih tinggi namun mengalami penurunan temperatur yang lebih cepat setelah mencapai titik puncak. Variasi *flow rate* 30 m^3/jam menunjukkan karakteristik pembakaran yang lebih stabil dengan pola kenaikan dan penurunan temperatur yang lebih terkendali serta menghasilkan massa residu abu paling rendah sebesar 10 gram. Berdasarkan keseluruhan parameter pengujian, variasi *flow rate* udara primer sebesar 30 m^3/jam merupakan kondisi operasi yang paling optimal karena memberikan keseimbangan antara ketersediaan oksigen, kestabilan temperatur, dan tingkat kesempurnaan pembakaran pada reaktor insinerator.

Kata Kunci : Biomassa, Reaktor insinerator, *Flow rate* udara primer, Karakteristik pembakaran, Residu abu.

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ABSTRACT

Daffa Dimas Biantara : 5223520014. Combustion Characteristics of Biomass Mixtures in an Incinerator Reactor. Final Project. Faculty of Engineering, Universitas Negeri Medan, 2026.

This study aims to analyze the effect of primary air flow rate variation on the combustion characteristics of biomass mixtures in an incinerator reactor. The biomass mixture consisted of wood, bamboo, coconut shell, and cardboard with a total mass of 2.05 kg. The primary air flow rate variations applied were 20 m³/h, 30 m³/h, 40 m³/h, and 48 m³/h. The measured parameters included combustion chamber temperature (T1), cyclone temperature (T2), combustion duration, and ash residue mass. The results showed that variations in primary air flow rate significantly affected the intensity and stability of the combustion process. The 20 m³/h variation exhibited a slower temperature increase due to limited oxygen supply, while the 40 m³/h and 48 m³/h variations produced higher temperatures but experienced a rapid temperature decline after reaching the peak temperature. The 30 m³/h variation exhibited a more stable combustion characteristic with a controlled temperature increase and decrease, and produced the lowest ash residue of 10 grams. Based on all experimental parameters, the primary air flow rate of 30 m³/h was determined as the optimum operating condition, as it provided a balance between oxygen availability, temperature stability, and combustion completeness in the incinerator reactor.

Keywords : *Biomass, Incinerator reactor, Primary air flow rate, Combustion characteristics, Ash residue.*

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