EVALUASI DESAIN ALAT PIROLISIS SEDERHANA SEKAM PADI (*Oryza sativa* L.) BERBASIS MUTU PRODUK

INTISARI

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Teknologi pirolisis yang efektif dan efisien menawarkan solusi pengelolaan sekam padi. Penelitian ini mengevaluasi desain alat pirolisis sederhana (*fixed-bed reactor* dengan blower) serta menganalisis kinerja teknis berbasis mutu produk. Uji dilakukan sebanyak 5 kg sekam dengan dua perlakuan: blower tetap menyala setelah 300°C (A) dan blower dimatikan pada 300°C (B). Analisis proses meliputi profil suhu pada reaktor-*cyclone*-kondensor-*collector* dan mutu dinilai dari rendemen, kadar air, kadar abu (biochar) serta rendemen, pH, dan densitas (asap cair). Perlakuan A mampu mempertahankan suhu >300°C lebih lama, menghasilkan rendemen asap cair lebih tinggi (15,01%) namun rendemen biochar lebih rendah (24,12%). Perlakuan B menghasilkan biochar lebih banyak (1427,03 gram) tetapi asap cair lebih sedikit (559,6 gram). Rata-rata pH asap cair 3,42 (A) dan 3,53 (B) serta densitas 1,037 g/mL (A) dan 1,044 g/mL (B) memenuhi SNI 8985:2021. Uji t independen menunjukkan perbedaan nyata pada rendemen biochar, rendemen asap cair, kadar abu, pH, dan densitas. Alat mampu memproduksi biochar dan asap cair skala kecil-menengah, meskipun diperlukan peningkatan kontrol suhu, pemurnian, pemeliharaan, dan pemilihan material konstruksi alat.

Kata Kunci: Pirolisis, Sekam Padi, Biochar, Asap Cair, Alat Sederhana.

DESIGN EVALUATION OF A SIMPLE RICE HUSK (*Oryza sativa* L.) PYROLYSIS DEVICE BASED ON PRODUCT QUALITY

ABSTRACT

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Effective and efficient pyrolysis technology offers a viable solution for managing rice husk. This study evaluates the design of a simple pyrolysis apparatus (a fixed-bed reactor equipped with a blower) and analyzes its technical performance from a product-quality perspective. Experiments used 5 kg batches of rice husk under two operating modes: the blower kept on after 300 °C (A) and switched off at 300 °C (B). Process analysis covered temperature profiles across the reactor–cyclone–condenser–collector train, while product quality was assessed by yield, moisture content, and ash content for biochar, and by yield, pH, and density for liquid smoke. Treatment A sustained temperatures >300 °C for longer, yielding more liquid smoke (15.01%) but less biochar (24.12%). Treatment B produced more biochar (1,427.03 g) but less liquid smoke (559.6 g). The mean pH of the liquid smoke was 3.42 (A) and 3.53 (B), with densities of 1.037 g/mL (A) and 1.044 g/mL (B), all complying with SNI 8985:2021. Independent t-tests showed significant differences in biochar yield, liquid-smoke yield, ash content, pH, and density between treatments. The simple pyrolysis device is capable of small-to-medium-scale production of biochar and liquid smoke, although improvements in temperature control, product purification, maintenance, and selection of construction materials are still needed.

Keywords: Pyrolysis, Rice Husk, Biochar, Liquid Smoke, Simple Device.