

ABSTRAK

Peningkatan penggunaan plastik di Indonesia berkontribusi terhadap bertambahnya volume limbah plastik yang sulit terdegradasi dan berpotensi mencemari lingkungan. Salah satu jenis limbah tersebut berasal dari campuran HDPE (PE) sisa proses pelapisan pipa baja metode 3LPE (*Three Layer polyethylene*). Limbah ini umumnya tidak dimanfaatkan kembali karena telah tercemar oleh material lain. Penelitian bertujuan untuk menganalisis suhu pirolisis terhadap volume, rendemen, karakteristik fisik, serta nilai kalor minyak produk pirolisis limbah campuran HDPE sebagai BBM. Pengambilan data yang digunakan adalah dengan eksperimen pendekatan kuantitatif dari proses pirolisis tanpa udara pada suhu 500°C selama 180 menit menggunakan bahan baku avfal PE sebanyak 2 kg. Minyak hasil pirolisis selanjutnya diuji karakteristiknya meliputi densitas, viskositas/kekentalan, dan nilai kalor. Penelitian menunjukkan bahwa pada saat suhu 500°C diperoleh volume minyak sebesar 250 ml dengan rendemen 11,05%. Minyak pirolisis memiliki densitas 0,924 g/ml, viskositas 0,754 Pa·s, dan nilai kalor sebesar 17.385,67 cal/gram. Secara visual, minyak berwarna coklat gelap, berbau menyengat, bersifat encer, dan mudah terbakar. Temuan ini menunjukkan bahwa limbah campuran HDPE dari proses 3LPE berpotensi dimanfaatkan sebagai bahan bakar alternatif melalui metode pirolisis, meskipun diperlukan peningkatan kualitas agar karakteristiknya mendekati standar bahan bakar konvensional.

Kata kunci: pirolisis; limbah plastik; nilai kalor; densitas; viskositas

ABSTRACT

The increase in plastic consumption in Indonesia has an impact on the increasing generation of plastic waste that is difficult to decompose and has the potential to pollute the environment, one of which is HDPE mixture waste from the 3LPE (Three Layer polyethylene) steel pipe coating process. The waste is generally not reused because it has been contaminated with other materials. This study aims to determine the effect of pyrolysis temperature on the volume, yield, physical characteristics, and calorific value of HDPE alloy waste pyrolysis oil as an alternative fuel. The method used was an experiment with a quantitative approach using the pyrolysis process without oxygen at a temperature of 500°C for 180 minutes with 2 kg of avfal PE raw material. The resulting pyrolysis oil is then tested for characteristics including density, viscosity, and calorific value. The results showed that at 500°C the oil volume was obtained at 250 ml with a yield of 11.05%. Pyrolysis oil has a density of 0.924 gr/ml, a viscosity of 0.754 Pa.s, and a calorific value of 17,385.67 cal/gram. Visually, the oil is dark brown, pungent smelling, dilute, and flammable. These results show that HDPE alloy waste from the 3LPE process has the potential to be utilized as an alternative fuel through the pyrolysis method, although its characteristics still require quality improvement to approach conventional fuel standards.

Keywords: *pyrolysis; plastic waste; caloric value; density; Viscosity*