ABSTRAK

CATALYTIC CRACKING LIMBAH PLASTIK *POLYSTYRENE* MENJADI BAHAN BAKAR CAIR MENGGUNAKAN KATALIS BENTONIT

(Muhammad Adhiyan Pramono, 2026, Laporan Skripsi,
Email : adhynprmno66@gmail.com)

Limbah plastik polystyrene (PS) merupakan salah satu jenis limbah yang sulit terurai secara alami sehingga berpotensi menimbulkan pencemaran lingkungan. Salah satu upaya pemanfaatannya adalah mengkonversi limbah tersebut menjadi bahan bakar cair melalui proses *catalytic cracking* menggunakan katalis bentonit. Penelitian ini bertujuan untuk menganalisis pengaruh variasi % katalis bentonit terhadap *yield* serta karakteristik bahan bakar cair yang dihasilkan dari proses *catalytic cracking* limbah plastik polystyrene. Penelitian dilakukan menggunakan 1 kg limbah polystyrene pada suhu operasi 450°C selama 60 menit dengan variasi katalis bentonit sebesar 15%, 20%, 25%, 30%, dan 35%. Produk cair yang dihasilkan dianalisis berdasarkan % *yield*, densitas, viskositas, nilai kalor, dan titik nyala. Hasil penelitian menunjukkan bahwa variasi % katalis bentonit berpengaruh terhadap *yield* dan karakteristik bahan bakar cair. *Yield* tertinggi diperoleh pada penggunaan katalis 15% sebesar 15,8%, sedangkan *yield* terendah diperoleh pada penggunaan katalis 35% sebesar 7,8%. Nilai densitas yang dihasilkan berkisar antara 854,73–906,65 kg/m³, viskositas 3,323–3,976 mm²/s, nilai kalor 34,79–37,15 MJ/kg, dan titik nyala 34,5–41,4°C. Penurunan *yield* pada penggunaan katalis yang lebih tinggi disebabkan oleh terjadinya *secondary cracking* yang mengubah sebagian fraksi cair menjadi gas sehingga jumlah produk cair yang terkondensasi berkurang. Berdasarkan hasil penelitian dapat disimpulkan bahwa penggunaan katalis bentonit sebesar 15% merupakan kondisi optimum untuk menghasilkan *yield* bahan bakar cair tertinggi, sedangkan variasi % katalis berpengaruh terhadap karakteristik bahan bakar cair yang dihasilkan, sehingga penentuan % katalis yang tepat menjadi faktor penting dalam meningkatkan efisiensi konversi limbah plastik polystyrene menjadi bahan bakar alternatif.

Kata kunci: *polystyrene*, *catalytic cracking*, katalis bentonit, bahan bakar cair, *yield*.

ABSTRACT

CATALYTIC CRACKING OF POLYSTYRENE PLASTIC WASTE INTO LIQUID FUEL USING A BENTONITE CATALYST

(Muhammad Adhiyan Pramono, 2026, Thesis,
Email : adhynprmno66@gmail.com)

Polystyrene (PS) plastic waste is a type of non-biodegradable waste that poses significant environmental pollution risks due to its resistance to natural decomposition. One promising approach to its utilization is the conversion of plastic waste into liquid fuel through the catalytic cracking process using bentonite as a catalyst. This study aims to analyze the effect of bentonite catalyst loading on the yield and characteristics of liquid fuel produced from the catalytic cracking of polystyrene plastic waste. The experiment was conducted using 1 kg of polystyrene waste at an operating temperature of 450°C for 60 minutes with bentonite catalyst loadings of 15%, 20%, 25%, 30%, and 35%. The resulting liquid products were evaluated based on yield, density, viscosity, heating value, and flash point. The results showed that bentonite catalyst loading significantly affected both the yield and fuel characteristics. The highest liquid fuel yield of 15.8% was obtained with a catalyst loading of 15%, while the lowest yield of 7.8% was achieved with a catalyst loading of 35%. The density of the liquid fuel ranged from 854.73 to 906.65 kg/m³, viscosity from 3.323 to 3.976 mm²/s, heating value from 34.79 to 37.15 MJ/kg, and flash point from 34.5 to 41.4°C. The decrease in liquid fuel yield at higher catalyst loadings was attributed to secondary cracking reactions, which converted a portion of the liquid fraction into gaseous products, thereby reducing the amount of condensable liquid fuel. Based on these findings, it can be concluded that a bentonite catalyst loading of 15% represents the optimum condition for achieving the highest liquid fuel yield. Furthermore, catalyst loading significantly influences the physicochemical properties of the liquid fuel, indicating that selecting an appropriate catalyst loading is essential for improving the efficiency of converting polystyrene plastic waste into an alternative fuel.

Keyword: *polystyrene, catalytic cracking, bentonite catalyst, liquid fuel, yield*