

ABSTRAK

**PENGARUH VARIASI KATALIS ZEOLIT ALAM TERHADAP NILAI
OCTANE NUMBER FRAKSI AKHIR PRODUK CAIR HASIL PIROLISIS
PLASTIK *LDPE* (*LOW DENSITY POLYETHYLENE*)**

(Shafira Dila Imelda, 69 Halaman, 27 Tabel, 10 Gambar, 3 Lampiran)

Limah plastik *Low Density Polyethylene (LDPE)* merupakan salah satu jenis limbah yang sulit terurai dan dapat menyebabkan pencemaran lingkungan. Salah satu metode pengolahan limbah plastik yang dapat menghasilkan energi alternatif adalah pirolisis, yaitu proses dekomposisi termal tanpa oksigen yang menghasilkan bahan bakar cair. Penggunaan katalis dalam proses pirolisis diharapkan dapat meningkatkan *yield* dan kualitas produk yang dihasilkan. Penelitian ini bertujuan untuk mengetahui pengaruh variasi persentase katalis zeolit alam terhadap *yield* dan karakteristik bahan bakar cair hasil pirolisis limbah plastik *LDPE* pada temperatur 300°C selama 60 menit. Variasi katalis yang digunakan yaitu 0%, 2,5%, 5%, 7,5%, dan 10%. Parameter yang dianalisis meliputi *yield*, densitas, viskositas, titik nyala, dan *Octane Number*. Hasil penelitian menunjukkan bahwa *yield* tertinggi diperoleh pada variasi katalis 7,5% sebesar 11,29%, sedangkan *yield* terendah pada variasi 0% sebesar 9,34%. Nilai densitas yang dihasilkan berkisar antara 0,750464–0,751609 g/mL, viskositas 2,96–3,30 cP, titik nyala 32,2–35,3°C, dan *Octane Number* 90,9–95,3. Hasil pengujian menunjukkan bahwa penambahan katalis zeolit alam dapat meningkatkan efektivitas proses pirolisis dan menghasilkan bahan bakar cair dengan karakteristik yang mendekati bensin komersial.

Kata kunci: Pirolisis, *LDPE*, Zeolit Alam, *Yield*, *Octane Number*.

ABSTRACT
THE EFFECT OF NATURAL ZEOLITE CATALYST VARIATIONS
ON THE OCTANE NUMBER OF THE FINAL FRACTION OF LIQUID
PRODUCTS FROM LDPE (LOW DENSITY POLYETHYLENE)

PLASTIC PYROLYSIS

(Shafira Dila Imelda, 69 Pages, 27 Tables, 10 Figures, 3 Appendices)

Low Density Polyethylene (LDPE) plastic waste is one of the waste materials that is difficult to decompose naturally and can cause environmental pollution. One method of plastic waste treatment that can produce alternative energy is pyrolysis, a thermal decomposition process without oxygen that produces liquid fuel. The use of catalysts in the pyrolysis process is expected to improve the yield and quality of the product. This study aims to determine the effect of natural zeolite catalyst percentage variation on the yield and characteristics of liquid fuel produced from LDPE plastic waste pyrolysis at a temperature of 300°C for 60 minutes. The catalyst variations used were 0%, 2.5%, 5%, 7.5%, and 10%. The analyzed parameters included yield, density, viscosity, flash point, and Octane Number. The results showed that the highest yield was obtained at 7.5% catalyst variation with 11.29%, while the lowest was obtained at 0% with 9.34%. The density values ranged from 0.750464–0.751609 g/mL, viscosity ranged from 2.96–3.30 cP, flash point ranged from 32.2–35.3°C, and Octane Numbers ranged from 90.9–95.3. The results indicate that the addition of natural zeolite catalyst can improve the pyrolysis process and produce liquid fuel with characteristics close to commercial gasoline.

Keywords: *Pyrolysis, LDPE, Natural Zeolite, Yield, Octane Number*