INTISARI

Polistirena adalah jenis plastik yang banyak digunakan dalam kehidupan sehari-hari. Penggunaan polistirena seperti untuk dekorasi, kemasan makanan, dan kemasan elektronik. Penggunaan polistirena menjadi masalah bagi lingkungan karena sifat polistirena`sulit didegradasi secara alami. Metode pirolisis dapat dianggap sebagai salah satu metode ramah lingkungan untuk mendaur ulang sampah polistirena. Penelitian ini bertujuan untuk mengetahui pengaruh katalis zeolit alam dan bentonit terhadap pirolisis polistirena. Percobaan dilakukan dalam proses *batch*, alat pirolisis terdiri dari reaktor silinder dengan pemanas listrik, kondensor, dan wadah produk cair. Sekitar 100 gram sampah polistirena dipirolisis menggunakan variasi katalis 0%-25% (berat polistirena) dan menggunakan variasi suhu 300°C-550°C. Produk cair hasil pirolisis dikumpulkan dalam waktu pirolisis 60 menit dan ditimbang. Pirolisis polistirena menggunakan zeolit alam dan bentonit sebagai katalis menghasilkan produk cair, gas dan padatan. Komposisi produk cair ditentukan oleh analisis GCMS. Produk cair hasil pirolisis mengandung senyawa benzena, toluena, etilbenzena, stirena, isopropilbenzena, α-metilstirena dan 1,3 difenilpropana. Diantara variasi rasio katalis dan suhu yang digunakan dalam penelitian ini, katalis bentonit yang paling efisien dan meningkatkan hasil stirena sebanyak 30,19% pada suhu 400°C dibandingkan dengan katalis zeolit alam. Hasil energi aktivasi yang dihasilkan dalam penelitian ini adalah 34,36 kJ/mol untuk penambahan katalis zeolit alam dan 33,67 kJ/mol untuk penambahan katalis bentonit.

Kata kunci : Pirolisis katalitik, Polistirena, Bentonit, Zeolit alam, Stirena

ABSTRACT

Polystyrene is a type of plastic that is widely used in everyday life. The use of polystyrene such as for decoration, food packaging, and electronic packaging. The use of polystyrene is a problem for the environment because the nature of polystyrene is difficult to degrade naturally. Pyrolysis can be considered as one of the environmentally friendly methods to recycle polystyrene waste. This study aims to determine the effect of natural zeolite and bentonite catalysts on polystyrene pyrolysis. Experiments was carried out in a batch process, pyrolysis process tools was conducted in a cylindrical reactor with electric heaters, condensers, and liquid product containers. About 100 grams of polystyrene waste was pyrolyzed using a catalyst variation of 0%-25% (weight of polystyrene) and temperature was varied between 300°C-550°C. The liquid product was collected in 60 minutes of pyrolysis and weighed. Polystyrene pyrolysis with natural zeolite and bentonite as catalysts to produce liquid, gas and solid products. The composition liquid product was determined by GCMS analysis. Liquid product of pyrolysis contains benzene, toluene, ethylbenzene, styrene, isopropylbenzene, α-methylstyrene and 1,3 diphenylpropane. Effect of catalyst and temperature have been also investigated. Among the variation catalysts and tempeatures studied, bentonite catalyst is found to be most efficient and increases the styrene yield i.e. 30.19% at 400°C compared to natural zeolite catalysts. Activation energy of polystyrene pyrolysis in this study was 34.36 kJ/mol for the addition of natural zeolite catalysts and 33.67 kJ/mol for the addition of bentonite catalysts.

Keywords: Pyrolysis Catalytic, Polystyrene, Bentonite, Natural Zeolite, Styrene