

Sintesis dan karakterisasi Zeolit Y dari Kaolin untuk katalis perengkahan n-heksadekana = Synthesis and Characterization Zeolite Y from Kaolin as catalytic cracking catalyst for n-n-Heksadekane

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Abstrak

ABSTRAK

Sintesis Zeolit NaY menggunakan sumber alam alumina dan silika memiliki banyak tantangan. Berfokus pada pengurangan bahan sintesis, dalam penelitian ini, sintesis telah dilakukan menggunakan kaolin alam Bangka Belitung sebagai sumber silika dan alumina. Pre-treatment pada kaolin diperlukan melalui proses aktivasi, pemurnian, dan kalsinasi. Selanjutnya, zeolit NaY juga disintesis menggunakan kaolin alami sebagai sumber silika dan alumina dengan beberapa jenis benih yang dibuat dari sumber silika yang berbeda, yaitu Ludox HS40, Na-silikat, dan NaY komersil dari Wako. Semua material kemudian dikarakterisasi menggunakan XRD, FTIR, dan SEM-EDX. Dapat dilihat bahwa seed dari Ludox HS40 memberikan NaY terbaik. Tapi, zeolite NaP menjadi pengotor utama. Rasio Si/Al NaY zeolit adalah ~1.78 dengan bentuk pola difraksi mirip dengan yang ada dalam literatur. Sehingga disimpulkan, sintesis NaY menggunakan aluminasilika alam sebagai sumber silika dan alumina cukup berhasil. Hasil uji perengkahan memperlihatkan jika katalis dengan material sintetik (HY sintetik) memiliki persen konversi, yield dan selektivitas yang lebih tinggi dibandingkan dengan katalis dengan campuran bahan alam (HY MKSE dan HY SE). Namun, setiap katalis memiliki persen yield dan selektivitas lebih tinggi terhadap produk C5 dibandingkan dengan produk lainnya.

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ABSTRACT

Synthesis of sodium Y zeolite (NaY Zeolite) using natural sources of alumina and silica is interesting yet challenging. Focused on reducing synthetic material, in this research, synthesis has been carried out using Bangka natural Kaolin as silica and alumina sources. Pretreatment on kaolin was needed through the process of activation, purification, and calcination. The purpose of activation process is to remove the polar impurities, free oxides in the surface that cover up the pores, and release the water that trapped in the pores of the materials. The purification was conducted using Na-acetate buffer solution with ratio 1:3 (w/v). The calcination process was required because Si-O and Al-O structures in Kaolin are inactive and inert. Synthesis of NaY zeolite was conducted with the addition seed gel using hydrothermal method with 24 hours at the temperature 100 oC for crystallization. Furthermore, NaY zeolites were also synthesized using natural kaolin as silica and alumina sources with several types of seeds made from different silica sources, i.e Ludox HS40, Na-silicate, and NaY zeolite from Wako . All materials then were characterized using XRD, FTIR, and SEM-EDX. It can be seen that

seed from Ludox HS40 gives the best NaY. But, NaP zeolite becomes the main impurities. The Si/Al ratio of NaY zeolite is ~1.78 but the shape of the crystals is similar to that in literature. To conclude, synthesis of NaY using natural aluminosilicates as source is considerably successful. The cracking test results show if the catalyst with synthetic material (HY synthetic) has a higher percent conversion, yield and selectivity compared to a catalyst with a mixture of natural materials (HY MKSE and HY SE). However, each catalyst has a higher percent yield and selectivity for C5 products compared to other products.