

Sintesis dan karakterisasi zeolit NaY berbasis mineral alam sebagai katalis perengkahan n-heksadekana = Synthesis and characterization of NaY zeolite based on natural minerals as catalyst in cracking of n-hexadecane

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Abstrak

Zeolit NaY berbasis mineral alam berhasil disintesis dari zeolit alam Bayat Klaten dan kaolin Bangka sebagai sumber alumina dan silikanya. Zeolit NaY disintesis setelah material sintesisnya: zeolit alam Bayat Klaten dan kaolin Bangka di pretreatment terlebih dahulu dengan perlakuan : aktivasi, purifikasi, fragmentasi untuk zeolit alam Bayat, dan ekstraksi silika dari kaolin Bangka. Kemudian zeolit NaY disintesis menggunakan material hasil pretreatment menggunakan teknik seeding dan metode hidrotermal dengan rasio molar dan variasi waktu kristalisasi satu hari dan dua hari. Berdasarkan pola XRD diperoleh zeolit NaY berbasis bahan alam yang menunjukkan puncak khas zeolit NaY pada $2\theta = 6,30^\circ$; $15,60^\circ$; dan $24,90^\circ$ dengan rasio Si/Al sebesar 4,1. Kemudian zeolit NaY berbasis bahan alam dimodifikasi menjadi bentuk H⁺ menggunakan metode pertukaran kation untuk memperbanyak situs asam dan meningkatkan kemampuan katalitiknya sebagai katalis perengkahan n-heksadekana. Zeolit HY hasil modifikasi zeolit NaY kemudian diaplikasikan sebagai katalis perengkahan n-heksadekana. Dengan hasil konversi, yield, dan selektivitas produk gasolin berturut-turut sebesar 59,80%, 59,80%, dan 98,53%. Berdasarkan hasil ini, dapat disimpulkan bahwa zeolit HY berbasis mineral alam memiliki kemampuan selektivitas yang hampir serupa dan dapat dibandingkan dengan zeolit HY sintetik.

.....NaY zeolite based on natural minerals was successfully synthesized from Klaten Bayat natural zeolite and Bangka kaolin as a source of alumina and silica. NaY zeolite is synthesized after its synthesis material: Klaten's natural Baye zeolite and Bangka kaolin are pretreated with treatment: activation, purification, fragmentation for Bayat natural zeolite, and silica extraction from Bangka kaolin. Then NaY zeolite was synthesized using pretreatment material using seeding technique and hydrothermal method with molar ratio and variation of crystallization time of one day and two days. Based on the XRD pattern obtained by natural NaY zeolite which shows the typical peak of NaY zeolite at $2\theta = 6.30^\circ$; 15.60° ; and 24.90° with a Si / Al ratio of 4.1. Then zeolite NaY based on natural ingredients was modified to form H⁺ using cation exchange method to increase the acidic site and increase its catalytic ability as a catalyst for n-hexadecane cracking. Zeolite HY modified from zYolite NaY was then applied as a catalyst for n-hexadecane cracking. With the results of conversion, yield, and selectivity of gasoline products respectively 59.80%, 59.80%, and 98.53%. Based on these results, it can be concluded that natural mineral-based HY zeolites have almost similar selectivity and can be compared with synthetic HY zeolites.