SINTESIS DAN PENGGUNAAN KATALIS HIDROTALSIT Mg-Al TERPROMOSI LANTANUM DALAM REAKSI KONDENSASI ALDOL ANTARA FURFURAL DAN SIKLOPENTANON

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INTISARI

Studi sintesis dan penggunaan katalis hidrotalsit Mg-Al terpromosi lantanum (HTC MAL X) dalam reaksi kondensasi aldol antara furfural dan siklopentanon telah dilakukan. Studi ini bertujuan untuk sintesis hidrotalsit Mg-Al terpromosi lantanum sebagai katalis untuk reaksi kondensasi aldol antara furfural dan siklopentanon, menentukan kondisi optimum reaksi kondensasi aldol antara furfural dan siklopentanon, serta mempelajari *reusability* katalis hidrotalsit Mg-Al terpromosi lantanum.

Sintesis hidrotalsit Mg-Al terpromosi lanthanum dilakukan dengan metode kopresipitasi. Larutan yang mengandung Mg^{2+}, Al^{3+} dan La^{3+} diteteskan ke larutan campuran antara K_2CO_3 dan KOH. Endapan yang terbentuk kemudian dicuci dan dikeringkan selama 12 jam. Material kemudian dikarakterisasi dengan FTIR dan XRD. Katalis dikalsinasi pada temperatur 800 °C selama 3 jam dan kemudian digunakan untuk reaksi kondensasi aldol antara furfural dan siklopentanon. Instrumen GCMS digunakan untuk menganalisis produk yang dihasilkan. Katalis dengan aktivitas katalitik terbaik diperoleh dengan mempromosikan lantanum pada hidrotalsit Mg-Al sebesar 0,3 molar dengan total produk 35%. Kondisi optimum dari reaksi ini diperoleh ketika waktu reaksinya 3,5 jam dan rasio perbandingan mmol furfural:siklopentanon sebesar 1. Katalis HTC MAL 0,3_C800 dapat digunakan sebanyak 3 kali dan menghasilkan total produk sebesar 35%.

Kata kunci: furfural, hidrotalsit, kondensasi aldol, lantanum, siklopentanon

SYNTHESIS AND USE OF LANTHANUM PROMOTED Mg-Al HYDROTALCITE IN ALDOL CONDENSATION REACTION OF FURFURAL AND CYCLOPENTANONE

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ABSTRACT

The study of lanthanum promoted Mg-Al hydrotalcites (HTC MAL X) in the aldol condensation reaction of furfural and cyclopentanone has been conducted. The purposes of this study are to synthesize lanthanum promoted Mg-Al hydrotalcites for aldol condensation of furfural and cyclopentanone, determine the optimum reaction condition, and the reusability test of HTC MAL X.

The lanthanum promoted Mg-Al hydrotalcites was prepared using co-precipitation method. The mixed solution of Mg^{2+}, Al^{3+} and La^{3+} was dropped to the mixed solution of K_2CO_3 and KOH. The precipitate that formed was washed and dried for 12 hours. The as-prepared catalyst was characterized by FTIR and XRD. The as-prepared catalyst was calcined at 800 °C for 3 hours before it was used for aldol condensation reaction between furfural and cyclopentanone. The products were analyzed using GCMS. The optimum catalyst was obtained when the 0.3 molar of lanthanum was added into Mg-Al hydrotalcite to produce the total product up to 35%. The optimum condition was obtained when the reaction time was 3.5 hours and the mole ratio of furfural: cyclopentanone was 1. The reusability test showed that the catalyst (HTC MAL 0,3_C800) can be used until 3rd reaction with the total product up to 35%.

Keyword: aldol condensation, cyclopentanone, furfural, hydrotalcite, lanthanum