

REAKSI KONDENSASI ALDOL ANTARA FURFURAL DAN SIKLOPENTANON DENGAN METODE HIDROTALSIT Mg-Al TERPROMOSI LANTHANUM MENGGUNAKAN METODE MICROWAVE

Leonard Sutanto
18/430304/PA/18817

INTISARI

Reaksi kondensasi aldol antara furfural dan siklopentanon dengan hidrotalsit terpromosi lanthanum menggunakan metode *microwave* telah dilakukan. Studi ini bertujuan untuk membuat hidrotalsit terpromosi lanthanum dengan rasio tertentu sebagai katalis pada reaksi kondensasi aldol antara furfural dan siklopentanon dan mempelajari kondisi optimum reaksi kondensasi aldol antara furfural dan siklopentanon dengan katalis hidrotalsit Mg-Al terpromosi lanthanum. Parameter kondisi yang diuji adalah pengaruh daya *microwave*, rasio perbandingan mmol furfural dan siklopentanon, dan waktu reaksi.

Tahap pertama dari studi ini adalah melakukan sintesis hidrotalsit terpromosi lanthanum dengan metode kopresipitasi. Larutan yang mengandung ion logam Mg^{2+} , Al^{3+} dituang ke dalam gelas beaker dan dicampur dalam akuades. Larutan La^{3+} dalam asam HNO_3 pekat diteteskan ke larutan campuran Mg-Al sampai tercampur merata dan selanjutnya dititrasi dengan campuran larutan antara K_2CO_3 dan KOH. Endapan yang terbentuk kemudian dicuci dan dikeringkan selama 24 jam dalam oven dengan suhu $60\text{ }^{\circ}C$. Endapan kemudian digerus dan diayak dengan ayakan 100 mesh. Katalis dikalsinasi pada temperatur $800\text{ }^{\circ}C$ (HTC MAL 0,3) selama 3 jam dan kemudian katalis digunakan untuk reaksi kondensasi aldol antara furfural dan siklopentanon. Katalis reaksi dikarakterisasi dengan FTIR dan XRD.

Katalis menunjukkan aktivitas katalitik terbaik pada HTC MAL 0,3 hasil total produknya (F2Cp dan FCp) adalah 89,4%. Kondisi optimum dari reaksi aldol kondensasi diperoleh ketika daya *microwave* yang digunakan 500W, rasio perbandingan mmol furfural:siklopentanon sebesar 1:1 dan waktu reaksinya 5 menit.

Kata kunci: furfural, hidrotalsit, kondensasi aldol, lanthanum, siklopentanon.

ALDOL CONDENSATION REACTION OF FURFURAL AND CYCLOPENTANONE IN THE PRESENCE OF LANTHANUM PROMOTED HYDROTALCITE Mg-Al CATALYST UNDER MICROWAVE IRRADIATION

Leonard Sutanto
18/430304/PA/18817

ABSTRACT

Aldol condensation reaction between furfural and cyclopentanone in the presence of lanthanum promoted hydrotalcite Mg-Al catalyst under *microwave* irradiation has been carried out. This study was aimed to synthesize lanthanum-promoted hydrotalcite with a certain ratio as a catalyst for the aldol condensation reaction between furfural and cyclopentanone and to study the optimum conditions for the aldol condensation reaction between furfural and cyclopentanone. The investigated parameters were effect of *microwave* power, furfural and cyclopentanone mmol ratio, and reaction time. The GC-MS instrument is used to analyze the resulting product (FCp and F2Cp).

The first stage of this study was to synthesize lanthanum-promoted hydrotalcite by coprecipitation method. A solution containing metal ions of Mg^{2+} and Al^{3+} was poured into a beaker glass and mixed in distilled water. The La^{3+} solution in the concentrated HNO_3 was dripped into the Mg-Al mixed solution until it was evenly mixed and followed by a titration with a mixed solution between K_2CO_3 and KOH. The precipitate formed was then washed and dried for 24 h at 60 °C. The precipitate was then crushed and sieved with a 100-mesh sieve. The catalyst was calcined at 800 °C (HTC MAL 0,3) for 3 h and then used for the aldol condensation reaction between furfural and cyclopentanone. The catalyst then is characterized by FTIR and XRD.

The catalytic performance of HTC MAL 0,3 showed the highest product of F2Cp and FCp was 89,4%. The optimum conditions for this reaction were obtained when the *microwave* power was 500 W, the furfural:cyclopentanone mmol ratio was 1:1 and the reaction time was 5 min.

Keywords: aldol condensation, cyclopentanone, furfural, hydrotalcite, lanthanum.