

Studi reaksi alkilasi benzena dengan diklorometana menggunakan katalis cairan ionik = Study on the alkylation reaction of benzene with dichloromethane using ionic liquid catalysts

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Abstrak

Dalam penelitian ini, reaksi alkilasi benzena dengan asam lewis AlCl_3 menggunakan diklorometana sebagai electrophilic agent dan cairan ionik sebagai katalis. Asam lewis AlCl_3 didikombinasikan dengan cairan ionik membentuk katalis cairan ionik asam. Katalis cairan ionik asam dibuat dengan perbandingan mol $[\text{bmim}]\text{Cl}/\text{AlCl}_3$ 1:1,8. Katalis ini dikarakterisasi dengan FTIR.

Hasil karakterisasi menunjukkan serapan $=\text{CN}$ pada $1340,53 \text{ cm}^{-1}$ dan serapan $\text{C}^?\text{Cl}$ pada $752,24 \text{ cm}^{-1}$. Selain itu, katalis AlCl_3 dan $[\text{bmim}]\text{Cl}/\text{AlCl}_3$ diimpregnasi ke dalam silika gel untuk membentuk AlCl_3 -silika gel dan $[\text{bmim}]\text{Cl}/\text{AlCl}_3$ -silika gel. Hasil karakterisasi katalis ini dengan FTIR menunjukkan serapan Si-O-Si pada $1083,99 \text{ cm}^{-1}$ dan serapan Si-O-Al pada $418,12 \text{ cm}^{-1}$. Reaksi Alkilasi dilakukan dengan variasi waktu dan suhu.

Produk reaksi dianalisis dengan GC dan menunjukkan persen konversi benzena dengan waktu reaksi 3 jam masing-masing sebesar 27,04% pada suhu 30°C menggunakan katalis AlCl_3 dan 24,64 % pada suhu 10°C menggunakan katalis cairan ionik asam. Konversi dengan AlCl_3 -silika gel menunjukkan konversi benzena sebesar 21,42% dan 0% menggunakan katalis $[\text{bmim}]\text{Cl}/\text{AlCl}_3$ -silika gel. Identifikasi produk dilakukan dengan GC-MS dan menunjukkan terbentuknya benzil klorida sebagai produk intermediet.

.....In this study, the alkylation reaction of benzene with Lewis acid AlCl_3 was conducted using Dichloromethane as the electrophilic agent and ionic liquid $[\text{bmim}]\text{Cl}$ as catalyst. The Lewis acid AlCl_3 was combined with $[\text{bmim}]\text{Cl}$ to produce acidic ionic liquid, which was prepared by a fixed molar ratio of $[\text{bmim}]\text{Cl}/\text{AlCl}_3$ 1:1,8. This acid catalyst was characterized by FTIR.

The FTIR spectrum showed the absorption band of $=\text{CN}$ at $1340,53 \text{ cm}^{-1}$ and $\text{C}^?\text{Cl}$ absorption band at $752,24 \text{ cm}^{-1}$. In addition, AlCl_3 and $[\text{bmim}]\text{Cl}/\text{AlCl}_3$ catalysts were impregnated into silica gel to produce AlCl_3 -silica gel and $[\text{bmim}]\text{Cl}/\text{AlCl}_3$ -silica gel. The FTIR spectra showed the absorption of Si-O-Si at $1083,99 \text{ cm}^{-1}$ and Si-O-Al absorption at $418,12 \text{ cm}^{-1}$. The alkylation reactions were carried out by varying the reaction time and the reactions temperature.

The reaction products were analyzed by GC and showed the percentage conversion of benzene in 3 hours were respectively 27,04% at 30°C using AlCl_3 catalyst and 24,64 % at 10°C using $[\text{bmim}]\text{Cl}/\text{AlCl}_3$ catalyst. Meanwhile the conversion with AlCl_3 -silica gel catalyst showed the benzene conversion of 21,42% and 0% using $[\text{bmim}]\text{Cl}/\text{AlCl}_3$ -silca gel catalyst. The products identification were conducted by GC-MS and showed benzyl chloride compound as the intermediate product.