Reaksi katalitik substitusi nukleofilik antara benzil klorida dengan kalium sianida menggunakan katalis [BMIM]Cl-Silika Gel

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Abstrak

Penelitian ini mempelajari reaksi substitusi nukleofilik antara benzil klorida dan kalium sianida. Reaksi substitusi nukleofilik antara reaktan organik dan anorganik membutuhkan katalis transfer fasa agar reaktan non polar dan polar dapat berinteraksi. Pada peneliltian ini, cairan ionik 1-butil-3metil immidazolium klorida digunakan untuk menggantikan katalis transfer fasa yang umumnya tidak ramah lingkungan. Cairan ionik [BMIM]Cl diimobilisasi ke dalam silika gel yang memiliki luas permukaan yang besar dan memiliki fungsi sebagai adsorben untuk mendapatkan katalis [BMIM]Cl-silika gel. Katalis [BMIM]Cl-silika gel dikarakterisasi dengan FT-IR untuk menentukan dimana cairan ionik teradsorbsi oleh silika gel. Reaksi substitusi nukleofilik antara benzil klorida dan kalium sianida dilakukan dengan menvariasikan waktu reaksi dari 3 jam sampai 10 jam dan persen berat katalis 2%, 5% dan 7% pada suhu ruang. Produk reaksi dianalisis dengan FT-IR, GC dan GC-MS dan ditemukan bahwa reaksi optimum dicapai pada waktu 5 jam dan 2% berat katalis dimana sebanyak 43.02% benzil klorida terkonversi menjadi benzil sianida. Pembentukan benzil sianida dikonfirmasi dengan metode GC-MS. Studi perbandingan dilakukan dengan mereaksikan menggunakan katalis [BMIM]Cl yang tidak diimobilisasi dan ini membuktikan bahwa katalis [BMIM]Cl yang tidak diimobilisasi ke dalam silika gel tidak selektif untuk benzil sianida.

.....The research studied the nucleophilic substitution reaction between benzyl chloride and potassium cyanide. Nucleophilic substitution reaction between organic reactant and inorganic reactan requires phase transfer catalyst to enable the non polar reactant to interact with the polar reactant. In this research, ionic liquid material 1-butyl-3-methyl immidazolium chloride [BMIM]Cl was used to replace the phase transfer catalyst, which is normally environmental unfriendly. Ionic liquid [BMIM]Cl was immobilized into silica gel, which has high surface area and has the function as an adsorbent, to obtain the catalyst, [BMIM]Cl-silica gel. Catalyst [BMIM]Cl-silica gel was characterized by FT-IR to determine where the ionic liquid was adsorbed by the silica gel. The catalyst nucleophilic reactions between benzyl chloride and potassium cyanide was carried out by varying the reaction periods form 3 hours to 10 hours and weight percentage of catalyst 2%, 5% and & 7% at room temperature. The reaction products were analyzed by FT-IR, GC and GC-MS and it was found that the optimum reaction was achived in 5 hours using 2% weight of catalyst in which 43.02% benzyl chloride was converted onto benzyl cyanide. The formation of benzyl cyanide was confirmed by GC-MS method. A comparison study was conducted with unmobilized ionic liquid and it was found that the unmobilized [BMIM]Cl into silica gel was none selective toward the product benzyl cyanide.