Sintesis Ni-phen/MC sebagai Katalis Reaksi Karboksilasi Fenilasetilena dengan CO2 = Synthesis of Ni-phen/MC as Catalyst for carboxylation Reaction of phenylacetylene with CO2

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Abstrak

Carbon dioxide is a renewable C1 resource for synthesis chemicals. CO2 in carboxylation reactions requires catalysts Ni complex for CO2 activation. However, the use of Ni complex homogeneous catalysts in the reaction is still less efficient due to the difficult in separating the product and catalyst. Therefore, it is necessary to heterogenize the Ni complex in solid supporting such as mesoporous carbon. In this research, a carboxylation reaction with CO2 was tested using a Ni catalyst that was functionalized with phenanthroline (phen) ligand impregnated on the solid support of mesoporous carbon. Soft template method has been successfully used in mesoporous carbon synthesis with phloroglucinol and formaldehyde prekursors as a carbon source, Pluronic F127 as a structural directing agent, and HCl as an acid catalyst. Modification of the catalyst was carried out by impregnation of Ni from Ni(NO3)2.6H2O which was then functionalized with phenanthroline (phen) ligands into mesoporous carbon to form Ni-phen/MC catalysts. Mesoporous carbon material (MC) and Ni-phen/MC are characterized by FT-IR, XRD, SEM-EDX, and SAA. The results of SAA characterization showed that the pore diameter of MC was 6.7174 nm and Ni-phen/MC was 5.08 nm which indicate that the material was mesoporous. Ni-phen/MC material was then used as a heterogeneous catalyst in the carboxylation reaction of phenylacetylene with CO2. The reaction were carried out in several variations of conditions, temperature variations (25oC, 50oC and 75oC), time variations (4 hours, 8 hours and 16 hours), variations in catalyst types (MC, Ni-phen and Ni-phen/MC). Based on the results of the reaction, the optimum conditions was obtained at 25oC for 8 hour of reaction time using Ni-phen/MC catalyst. The main product of the carboxylation reaction is identified by the HPLC instrument, while the remaining catalyst that has been used in the reaction was identified using the FT-IR instrument.

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