

New Stable Ligand-Free Cu(I) Catalyst Supported on Weakly Acidic Polyacrylate Resin: Case Study in Synthesis

Nitin S. Kore, Pavel Pazdera

Centre for Syntheses at Sustainable Conditions and their Management, Faculty of Science, Masaryk University, Kamenice 5, CZ-62500 Brno, Czech Republic

Catalysis by Cu(I) catalysts like CuI is very well known for various C-C, C-N, C-O and similar oxidative coupling reactions, catalytic oxidation processes as well as for click chemistry reactions. Problem of using homogeneous catalyst and ligand remains a challenge as it is difficult to separate and recycle and as a result produce unnecessary toxic waste. A simple and efficient methodology for Cu(I) catalyzed C-N cross coupling post-Ullmann reactions and some click chemistry reactions were studied using Cu(I) ion immobilized on inexpensive industrial weakly acidic cation-exchanger resin as a catalyst. Coupling reaction of different aryl amine with 4-chloropyridine were carried out using ligand free Cu(I) ion immobilized on inexpensive industrial weakly acidic cation-exchanger resin as a catalyst. C-N cross coupling product was obtained in good yield as one hydrogen was easily replaced with aryl amine containing an electron donating group and slightly deactivating group (Cl, Br, I, F). Unexpectedly, novel triaryl amine molecules obtained from the coupling reaction of 4-chloropyridine with aryl amine consisting a strong electron withdrawing group like CN or NO₂. The same catalytic system was found active for click chemistry. In cycloaddition reaction of arylazide with aliphatic, aromatic and heterocyclic terminal alkyne compounds almost quantitative yield corresponding 1,2,3 triazole compound. This presented supported catalytic system is very stable, insensitive to moisture or atmospheric air and hence reactions can be carried out under open atmospheric and mild condition. Our catalytic system is less-toxic, economical, easily separable and recyclable.