

Silica supported Schiff-based palladium nanocatalyst for n-alkylation at room temperature

ABSTRACT

This work documents a new silica gel-supported nanocatalyst (Si@NSBPdNPs 3) with low Pd loadings for n-alkylation reactions at room temperature. Post synthesis characterisation using SEM-EDX and ICP techniques provided a quantitative assessment of palladium species. Additionally, TEM analysis unveiled an average palladium nanoparticle size of 5.87 ± 0.2 nm. In-depth X-ray Photoelectron Spectroscopy (XPS) analysis revealed its predominant composition as Pd(0) complexed to a Schiff base ligand on low cost silica matrix. The nanocatalyst exhibited high efficacy in the catalysis of n-alkylation (Michael addition) reactions with various α,β -unsaturated Michael acceptors, yielding the corresponding n-alkyl products at room temperature with exceptional yields. Notably, the catalyst exhibited good stability and could be easily separated from the reaction mixture. Moreover, the catalyst displayed recyclability potential, maintaining its original catalytic efficacy for up to seven cycles without any discernible loss.