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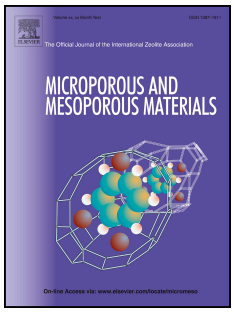

Biosynthesis, characterization and catalytic activity of the Pd/bentonite nanocomposite for base- and ligand-free oxidative hydroxylation of phenylboronic acid and reduction of chromium (VI) and nitro compounds

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Biosynthesis, characterization and catalytic activity of the Pd/bentonite nanocomposite for base- and ligand-free oxidative hydroxylation of phenylboronic acid and reduction of Chromium (VI) and nitro compounds

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Abstract

In this study, an eco-friendly method was developed to synthesize Pd/bentonite nanocomposite using *Gardenia taitensis* leaf extract and bentonite as a natural support. The suggested method has the benefits of simple work up, high yields and elimination of toxic chemicals. The biosynthesized nanocomposite was characterized by FT-IR, TEM, FESEM, EDS, and XRD. The stability studies showed that the biosynthesized Pd nanoparticles (NPs) have a good durability even for more than 2 weeks. The catalytic activity of the prepared nanocatalyst was evaluated in the ligand-free hydroxylation of phenylboronic acid to phenol and reduction of the chromium (VI) (Cr(VI)) and nitro compounds such as 4-nitrophenol (4-NP) and 2,4-dinitrophenylhydrazine (2,4-DNPH). The as-prepared catalyst was reused at least 5 times without remarkable loss in its catalytic activity.

Keywords: Green synthesis, Pd/bentonite nanocomposite, *Gardenia taitensis*, Phenol; Reduction, Chromium (VI), Nitro compounds

1. Introduction

Nitroaromatic compounds are one of the most common industrial contaminants that are non-biodegradable and highly toxic [1]. Elimination of nitro groups through reduction of nitroaromatic compounds leads to reduced toxicity and enhanced biodegradation of these pollutants [2, 3]. Furthermore, aromatic amines obtained by reducing nitroaromatic compounds can be used as intermediate materials for manufacturing, pharmaceutical and industrial compounds [4].

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