Synthesis and activity of α-Fe_2O_3 nanoparticles in the catalytic reduction of halonitroarenes under sustainable conditions

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Abstract.

The catalytic reduction of nitroarenes towards anilines is an important reaction from both academic and industrial points of view, being the resulting products important intermediates to produce dyes, agrochemicals, pigments, and pharmaceuticals. In addition, removal of nitroarene pollutants from water by reducing them into anilines is a valuable method to purify contaminated matrices. Such reductive reactions are frequently carried out by using noble metal catalysts [1], which are usually very active and recyclable in some cases. Recently, the use of earth abundant metal catalysts has gained great interest especially for economic reasons, as these materials are generally cheap and easy to be reached [2]. In this framework, iron oxides catalysts are very attractive because they are cheap and not toxic. Herein, we report on the synthesis of α-Fe_2O_3 nanoparticles (NPs) of size ranging from 50 to 80 nm starting from a porous organic polymer (POP) containing Fe(III) sites, which was in turn annealed at 400°C. The obtained NPs were characterized by SEM-EDX, XRPD, IR and TXRF and were employed as active and recyclable catalysts in the reduction of *p*-bromo-nitrobenzene into *p*-bromo-aniline, using hydrazine hydrate in ethanol, taken as the model reaction.

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