Iron oxides/waste steel slags composites as catalyst for the transfer hydrogenation of nitrobenzene

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Abstract.
Iron oxide-based catalysts have been widely investigated due to the high catalytic activity and operational availability [1, 2]. However, considering the commercial application, the performance and the cost are two crucial parameters in the developing of catalysts. To reduce the cost, it is possible to use industrial waste, such as steel slags as effective support of iron oxides catalysts, that can also assist the catalytically active sites during their performances.
Steel slags are by-product of steel making, generated during the separation of the molten steel from impurities in steel-making furnaces. The slag occurs as a molten liquid melt and is a complex solution of silicates and oxides that solidifies upon cooling, consisting of silicon oxide (30-40%), calcium oxide (38-50%), aluminum oxide (6-18%), magnesium oxide (2-6%), iron oxide II (0.5-1%) and manganese oxide (0.5-2%). Currently, the steel slags are mainly used as building materials, nevertheless, sustainable reuse technologies are desirable.
Herein, the synthesis and characterization of several composites of iron oxides/steel slags in different mass ratio is reported. The catalytic activity of the different prepared composites is also described in the reduction of nitrobenzene using isopropanol as the hydrogen source in the absence of any added base.

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