

Iridium-supported SBA-15 modified with Ga and Al as a highly active catalyst in the hydrodenitrogenation of quinoline



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ABSTRACT

Ir-supported SBA-15 was studied in the hydrodenitrogenation (HDN) of quinoline as a model nitrogen compound. The activity was improved when Si-SBA-15 support was modified with Ga and Al. Characterization of the catalysts was performed by XRD, N₂ adsorption, XPS, H₂ chemisorption, TEM, TPR, NMR and Py-FTIR. Dispersion and nature of the iridium species are dependent parameters on the support characteristics. Better activity for the elimination of the nitrogen atom was observed with Ir-Ga-SBA-15 as compared to Ir-Al-SBA-15 at 250 and 300 °C. However, the TON value for Ir-Al-SBA-15 was higher than Ir-Ga-SBA-15 at 300 °C, indicating the influence of the stronger Bronsted acidity in the elimination of the nitrogen atom at higher temperature. The enhanced activity was attributed to the particularly good dispersion of the iridium catalytic centers and to the synergic effect of Bronsted and Lewis acid sites, derived from Ga or Al incorporation. Ga-SBA-15 with 1 wt.% of iridium loading was the most active catalyst for HDN of quinoline. 95% of nitrogen elimination was attained at short time in mild conditions. The reusability of the catalyst presents it as potential catalyst for HDN process.

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