

Rational Design of Nanocarbons for Catalytic Reduction of 4-nitrophenol (4-NP)

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Recently nanocarbons (NCs) including carbon nanotube (CNTs), graphene, and 3D carbons have spurred intensive interests for various applications due to their exceptional physical and chemical properties. 4-NP is considered to be one of the most prevalent organic pollutants in wastewater sources, thus the nitro to amino conversion has great industrial or commercial contribution. Here, we reported the metal-free catalytic reduction of 4-nitrophenol (Nip) to 4-aminophenol (Amp). We have demonstrated that nitrogen(N)-doped CNT can be a useful catalyst for 4-NP reduction. Apparent mass normalized rate constant (k_n) can be achieved $2.8 \times 10^{-3} \text{ s}^{-1} \cdot \text{g}^{-1}$. In addition, we found that the catalytic activity of N-doped nanocarbons has strongly affected by carbon structure. The N-MWCNT showed the best catalytic activity, compared to the other carbon nanomaterials (i.e. CNTs, GNR, and graphene, 3D porous carbon). These results will promote further interest in the field of metal-free catalysis.

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