

纳米Fe⁰对Cr(VI)的还原及其影响因素

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Reduction of Hexavalent Chromium by Nanoscale Fe⁰ and Its Influencing Factors

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摘要

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摘要 采用纳米Fe⁰还原水溶液中的Cr(VI), 考察纳米Fe⁰投加量、Cr(VI)初始浓度、溶液pH值和有机酸等因素对Cr(VI)还原的影响。结果表明, 纳米Fe⁰对Cr(VI)的还原效果明显, 其对Cr(VI)的还原率分别是铁粉和铁屑的7和13倍。Cr(VI)溶液初始质量浓度为20 mg·L⁻¹、Fe⁰投加量为5 g·L⁻¹条件下, 反应24 h时纳米Fe⁰对Cr(VI)的还原率达82.7%。溶液低pH值可以促进Fe⁰的腐蚀速度, 提高反应速率, 当pH值为3.0时还原效果最好。草酸、丙二酸和丁二酸对纳米Fe⁰还原Cr(VI)均有明显的促进作用, 3种有机酸对Cr(VI)还原率的提高幅度由高到低依次为草酸、丙二酸和丁二酸。

关键词: 纳米Fe⁰ Cr(VI) 还原 影响因素

Abstract: An experiment was carried out on nanoscale zero-valent iron (NZVI) reducing Cr(VI) in water to explore effects of NZVI application rate, initial concentrations of Cr(VI), initial pHs, and organic acids on the reduction. It was found that NZVI efficiently reduced Cr(VI) in water at a rate 7 and 13 times higher than that of iron powder and filings, respectively. Under the condition of the initial concentration of Cr(VI) being 20 mg·L⁻¹ and the NZVI application rate being 5g·L⁻¹, the reduction rate reached 82% after 24 h of incubation. Low pH solution promoted corrosion of NZVI, which raised Cr(VI) reduction rate. The highest reduction rate occurred in solution being 3.0 in pH. Among organic acids, oxalic acid, malonic acid and succinic acid all significantly improved the effect of NZVI reducing Cr(VI), and followed the order of oxalic acid > malonic acid > succinic acid.

Keywords: nanoscale zero-valent iron (NZVI) hexavalent chromium reduction influencing factor

Received 2012-03-19; published 2012-09-25

Fund:

国家自然科学基金(40971182)

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引用本文:

刘文艺, 邹影, 司友斌. 纳米Fe⁰对Cr(VI)的还原及其影响因素[J]. 生态与农村环境学报, 2012, 28(5): 559-562LIU Wen-Wen, ZOU Ying, SI You-Bin. Reduction of Hexavalent Chromium by Nanoscale Fe⁰ and Its Influencing Factors[J]. Journal of Ecology and Rural Environment, 2012, 28(5): 559-562

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