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Preparation of Nanoiron by Water-in-Oil (W/O) Microemulsion for Reduction of Nitrate in Groundwater

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ABSTRACT

Nanometer-sized iron particles with monodispersity and narrow size distribution were synthesized by modified microemulsion system using environment-friendly non-ionic surfactants Span 80 and Tween 60 as mixed surfactants. The synthesized iron nanoparticles were characterized by using powder X-ray diffraction (XRD) and transmission electron microscopy (TEM). The results show that the synthesized particles were mainly composed of α-Fe with an average diameter of 80-90 nm. The chemical activity of the obtained iron nanoparticles was evaluated by the denitrification of nitrate in water. On neutral condition, complete denitrification of nitrate was achieved by freshly synthesized nanoiron within 30 min. Ammonia was the main product, with good material balance at the end of the reaction. Two possible reaction pathways for nitrate reduction by nanoiron have been proposed in this study.

KEYWORDS

Iron Nanoparticles, Microemulsion, Reduction, Nitrate

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