

CHEMICAL REDUCTION OF NITRATE (NO³⁻) BY ZERO-VALENT IRON PARTICLES

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The level of nitrate in ground water exceeds its natural occurrence due to over-fertilization, concentrated animal feedings, discharge of human excreta in the form of septic tanks and industrial waste effluent discharge. Nitrate itself does not show acute toxicity unless it converts to nitrite (NO₂⁻) and other NO_x species. As the process of coagulation, precipitation or adsorption and filtration do not show remarkable efficiency in removing highly soluble nitrate, a variety of techniques is used in nitrate remediation in water such as chemical, biological and catalytic de-nitrification. In the present study, experiments were designed and conducted to investigate the reduction of nitrate by zero valent iron (Fe⁰) particles. Kinetics of the reduction process was investigated as a function of time by varying initial nitrate concentration, pH and Fe⁰ loading at a defined temperature(s). Results of the kinetic studies indicated that the nitrate reduction rate increased as the initial nitrate concentration was decreased and low pH conditions are favorable for the reduction reaction. The reaction shows complex nitrate reduction kinetics. Elucidation of this kinetics needs further experimental and theoretical investigations which are currently underway.

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