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Abstract

Supported nano-scale zero-valent (nZVI) iron is a suitable material for groundwater and wastewater treatment applications. It can prevent the agglomeration of nanoparticles and increase their hydraulic conductivity. However, these supported nZVI particles suffer corrosion and greater pore diffusion resistance. Synthesis in ethanol medium, thermal treatment, acid treatment and acid thermal treatment were applied to deal with these problems and produce several treated composites of different nZVI to activated carbon (AC) mass ratios. Produced composites were characterized and applied in batch experiments to remove nitrate (200 mg NO_3^-/L), phosphate (50 mg PO_4^{3-}-P/L) and a mixture of nitrate and phosphate from their aqueous solutions. Among 25 composites, AC-supported nZVI ($F_1^2AT_2^{950}$) was selected at optimum nZVI/AC mass ratio of 2:1 and treatment conditions of 950 ^oC for 2 h. This study introduced thermal treatment of AC before supporting nZVI, which modified its textural and surface chemistry properties to attract contaminant anions with a higher affinity