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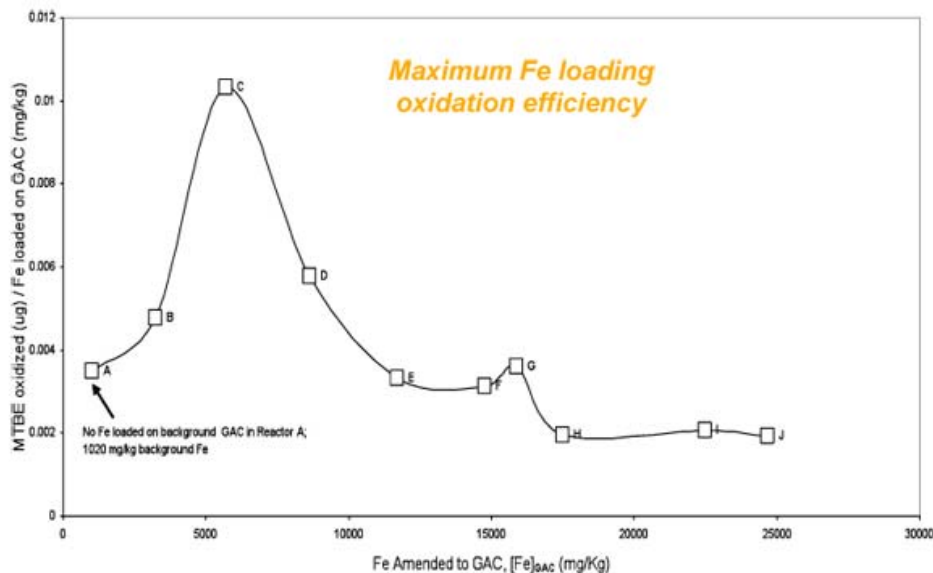
Iron Optimization for Fenton-Driven Oxidation of MTBE-Spent Granular Activated Carbon

Abstract

Fenton-driven chemical oxidation of methyl tert-butyl ether (MTBE)-spent granular activated carbon (GAC) was accomplished through the addition of iron and hydrogen peroxide (H_2O_2) (15.9 grams per liter; pH 3). The iron concentration in GAC was incrementally varied (1,020–25,660 milligrams per kilogram [mg/kg]) by the addition of increasing concentrations of iron solution (ferrous sulfate hepta hydrate [$FeSO_4 \cdot 7H_2O$]). MTBE degradation in iron-amended GAC increased by an order of magnitude over iron-unamended GAC, and H_2O_2 reaction was predominantly (99 percent) attributed to GAC-bound iron within the porous structure of the GAC. Imaging and microanalysis of GAC particles indicated limited penetration of iron into GAC. The optimal iron concentration was 6,710 mg/kg (1,020 mg/kg background; 5,690 mg/kg amended iron), and resulted in the greatest MTBE removal and maximum iron loading oxidation efficiency (MTBE oxidized [micrograms]/iron loaded to GAC [mg/kg]). At lower iron concentrations, the H_2O_2 reaction was iron-limited. At higher iron concentrations, the H_2O_2 reaction was not entirely iron-limited, and reductions in GAC surface area, GAC pore volume, MTBE adsorption, and iron-loading oxidation efficiency were measured. Results are consistent with non-uniform distribution of iron, pore blockage in H_2O_2 transport, unavailable iron, and limitations in H_2O_2 diffusive transport. The results emphasize the importance of optimal iron loading.

Products

Huling, S.G., K.P Jones, and T. Lee. (2007). "Iron Optimization for Fenton-Driven Oxidation of MTBE-Spent Granular Activated Carbon." *Environmental Science and Technology*, 41, 11: 4090–4096.



Iron optimization in granular activated carbon

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