Effects of co-present cations and anions on hexachlorobenzene removal by activated carbon, nano zerovalent iron and nano zerovalent/activated carbon composite

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ABSTRACT

Activated carbon, nano zerovalent iron (nZVI), and nano zerovalent iron/activated carbon (nZVI/AC) have all been found to be effective for hexachlorobenzene (HCB) removal either through adsorption, dechlorination, or both. Detailed investigations on the effects of several anions and cations normally present in aqueous streams on the removal of HCB were carried out to evaluate the potential performance of these materials in field treatment. Effects of ions were analyzed from the perspectives of changes in pH, ionic strength, and redox conditions. Results showed that ions that facilitate zerovalent iron corrosion, i.e. bicarbonate, chloride, chloride, ferrous, and copper, could greatly enhance HCB removal by nZVI, while HCB adsorption by activated carbon was more a factor of solution pH and ionic strength. The effects of ions on nZVI/AC were more complicated since both nZVI and activated carbon played a role in HCB removal. The results lead to a better understanding of HCB removal by these materials and could be employed in the consideration of choosing materials and prediction of treatment efficiency.

Keywords: Hexachlorobenzene; Activated carbon; Nano zerovalent iron; Dechlorination; Copresent ions

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