SUPPORTING INFORMATION

Efficient removal of 17α-ethinylestradiol (EE2) from water using freshly formed Fe–Mn binary oxide

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Text S1 The preparation of MnO$_2$ and FeOOH

1. The preparation of MnO$_2$:

\[ 2\text{MnO}_4^- + 3\text{Mn}^{2+} + 2\text{H}_2\text{O} = 5\text{MnO}_2(\text{s}) + 4\text{H}^+ \]

1 L of DI-water was sparged with N$_2$ gas for about 1 hour in a large beaker at first. 180 ml of the sparged water was removed to prepare solutions: 40 ml 0.1 M KMnO$_4$, 80 ml 0.1 M NaOH and 60 ml 0.1 M MnCl$_2$. After solution preparing, 40 ml 0.1 M KMnO$_4$ and 80 ml 0.1 M NaOH were added to 0.82 L of N$_2$-sparged reagent water and sparged this solution with N$_2$ gas for another half an hour. Then 60 mL 0.1 M MnCl$_2$ was added dropwise into the solution while keeping the solution constantly stirred. After addition, the solution was continuously stirred for another half an hour. The formed MnO$_2$ particles were filtered and rinsed repeatedly with deionized water until the conductivity was $< 2$ $\mu$S cm$^{-1}$, then dried at 105$^\circ$C for 4 h. The dry material was crushed and stored in a desiccator.

2. The preparation of FeOOH:

\[ \text{Fe}^{3+} + 3\text{OH}^- = \text{Fe(OH)}_3(\text{S}) \]

100 ml 0.5 M FeCl$_3$ and 300 ml 0.5 M NaOH were prepared first. Then 100 ml 0.5 M FeCl$_3$ was added slowly into the NaOH solution under vigorous magnetic-stirring. After addition, the suspension was kept stirring for another hour and aged at room temperature for 4 h. The formed FeOOH particles were filtered and rinsed repeatedly with deionized water until the conductivity was $< 2$ $\mu$S cm$^{-1}$, then dried at 105$^\circ$C for 4 h. The dry material was crushed and stored in a desiccator.