Supplementary Information

Treatment of the Insensitive Munitions Compound, 3-Nitro-1,2,4-Triazol-5-one (NTO) in Flow Through Columns Packed with Zero-Valent Iron

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Supplementary methods, 1 Table, 2 Figures

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Synthesis of magnetite

Magnetite was synthesized following the method described by Schwertmann and Cornell (2008). The synthesis was processed under anoxic conditions and solutions were purged by $N_{2(g)}$. $FeSO_4 \cdot 7H_2O$ (80 g) was dissolved in 560 mL deionized water in a 1 L glass beaker. The beaker was placed in a water bath containing 3 L of water at 90°C. The reaction vessel was closed with an air-tight plastic lid with a gas inlet for $N_{2(g)}$ purging and a hole for a thermometer. Then, 240 mL of a solution containing 6.46 g KNO_3 and 44.9 g KOH was added dropwise over 5 min. After 30 – 60 min, the reaction vessel was cooled down overnight and the black precipitates were collected. Collected magnetite was washed with deionized water and dried.

Reference

Schwertmann U, Cornell RM (1991) *Iron Oxides in the Laboratory: Preparation and Characterization.* John Wiley & Sons.

Table S1. The pseudo first-order rate constants of NTO reduction by ZVI and average NTO recovery

Initial pH	Recovery (%)[†]
3.00	87.86 ± 5.38
4.75	99.64 ± 2.22
6.00	86.30 ± 3.11
8.00	95.26 ± 13.24

[†]The values correspond to the average recovery of NTO as ATO and unreacted NTO after 1 h reaction.

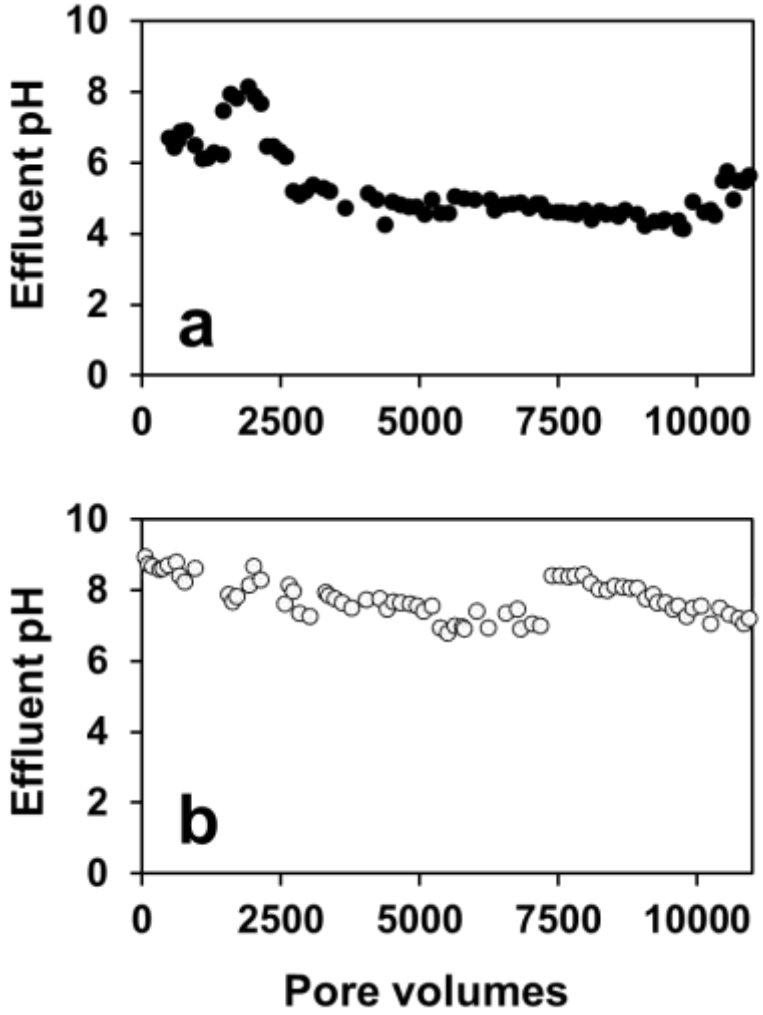

Fig. S1 Effluent pH from ZVI packed bed reactors treating pH-3.0 influent (panel a) and pH-6.0 influent (panel b) during the operations

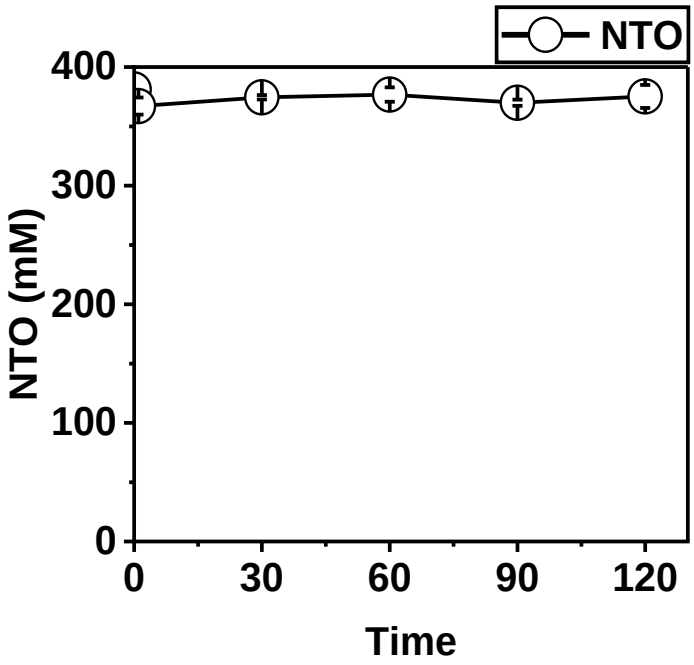

Fig. S2 Kinetics of NTO reduction by synthesized magnetite