Supporting Information for

Polyoxometalate-Enhanced Oxidation of Organic Compounds by Nanoparticulate Zero-Valent Iron and Ferrous Ion in the Presence of Oxygen

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The supporting information consists of 6 pages, including 5 figures.

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Supporting Information S1

Estimation of *K* from the redox potentials of Fe^{3+}/Fe^{2+} and POM/POM^{-}

$$Fe^{2+} + POM \quad \leftrightarrow \quad Fe^{3+} + POM^{-} \qquad \text{(reaction 9)}$$

$E_H^0(POM/POM^{-}) - E_H^0(Fe^{3+}/Fe^{2+}) = -\Delta G^0/nF = (RT/nF)\ \ln K$

Where, $F = 9.65 \times 10^4$ C/mol, $R = 8.314$ J/mol/K, $E_H^0(Fe^{3+}/Fe^{2+}) = +0.771$, $E_H^0(POM/POM^{-}) =$ +0.218 V

Therefore, $K = \text{Exp}[(0.218–0.771) \times (9.65 \times 10^4) / (8.314 \times 293)] =$ **$\underline{3.06 \times 10^{-10}}$**

S1-2. Estimation of the redox potential of $Fe^{(III)}$-POM/$Fe^{(II)}$-POM from the *K* value determined in this study (2.26×10^{-2})

$E_H^0(Fe^{(III)}\text{-POM}/Fe^{(II)}\text{-POM}) = (RT/nF)\ \ln K + E_H^0(POM/POM^{-})$

$= 0.218 - [(8.314 \times 293) / (9.65 \times 10^4) \times \ln(2.26 \times 10^{-2})]$

= **$\underline{0.314\ V}$**

Supporting Information S2

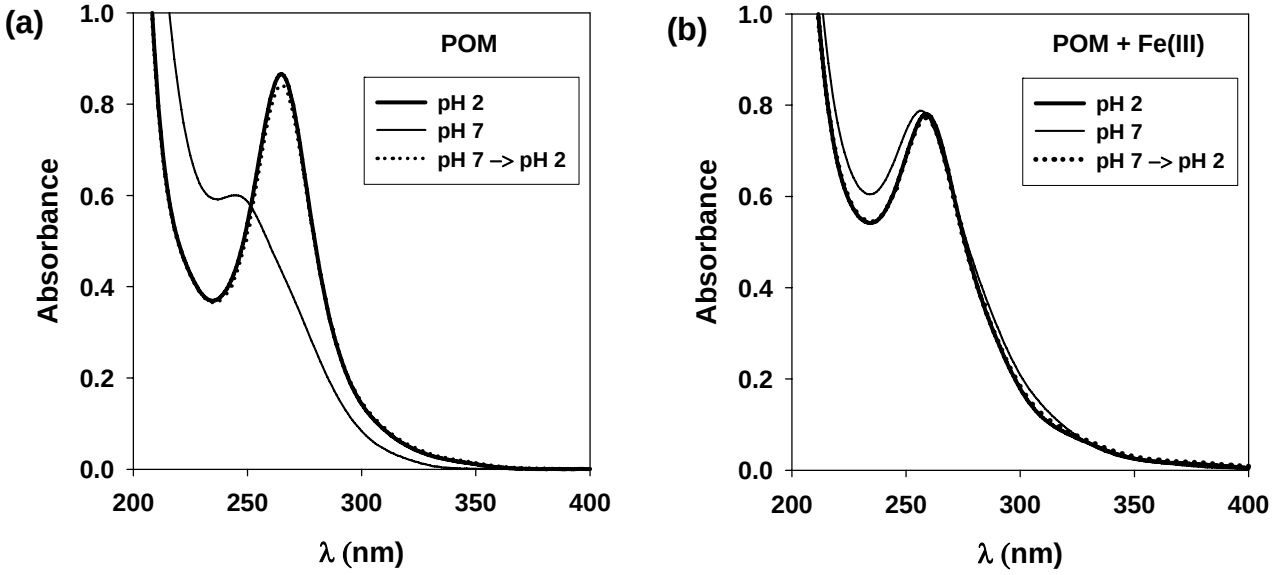

Figure S1. Reversible UV-vis absorption spectra of (a) POM and (b) Fe(III)-POM complexes: $[Fe(III)]_0 = [POM]_0 = 20$ μM; Deaerated conditions (argon saturation).

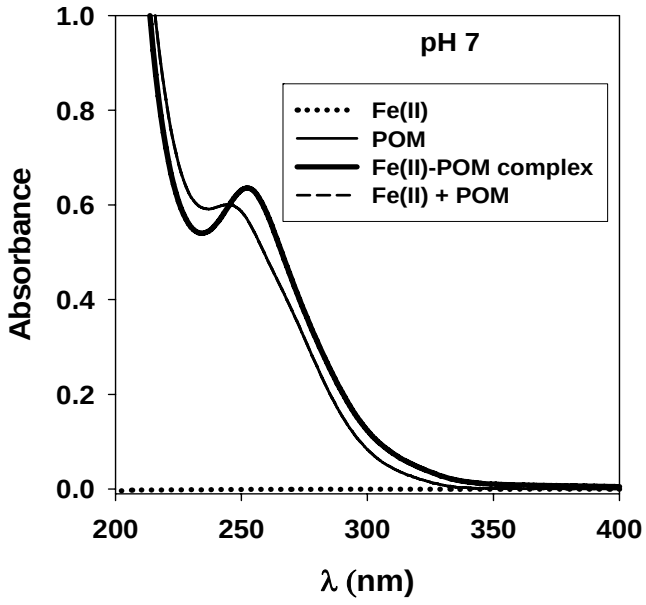

Figure S2. UV-vis absorption spectra of the solutions of POM and Fe(II) at pH 7: $[Fe(II)]_0 = [POM]_0 = 20$ μM; Deaerated conditions (argon saturation).

Supporting Information S3

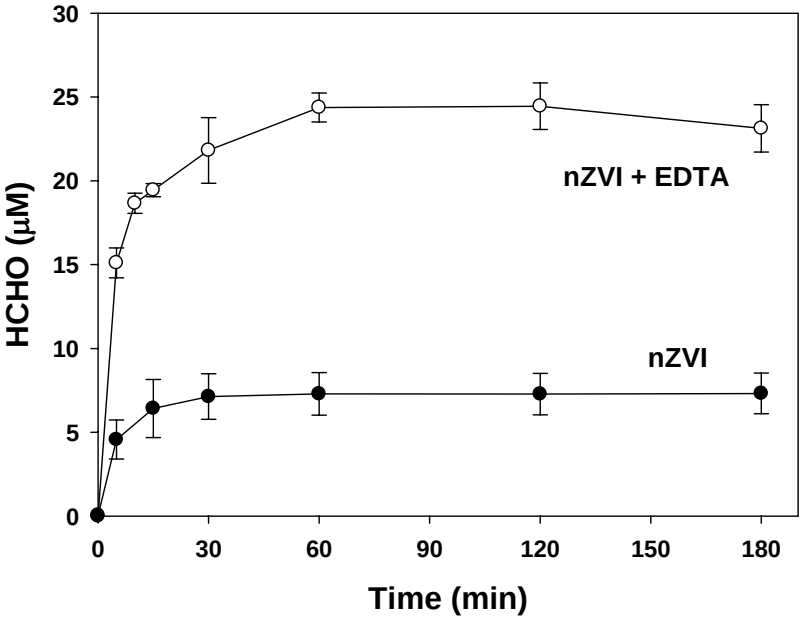

Figure S3. Effect of EDTA on HCHO production from nZVI: $[Fe^0]_0$ = $[Fe(II)]_0$ = 0.15 mM, $[EDTA]_0$ = 0.25 mM; $[methanol]_0$ = 100 mM; pH = 7.

Supporting Information S4

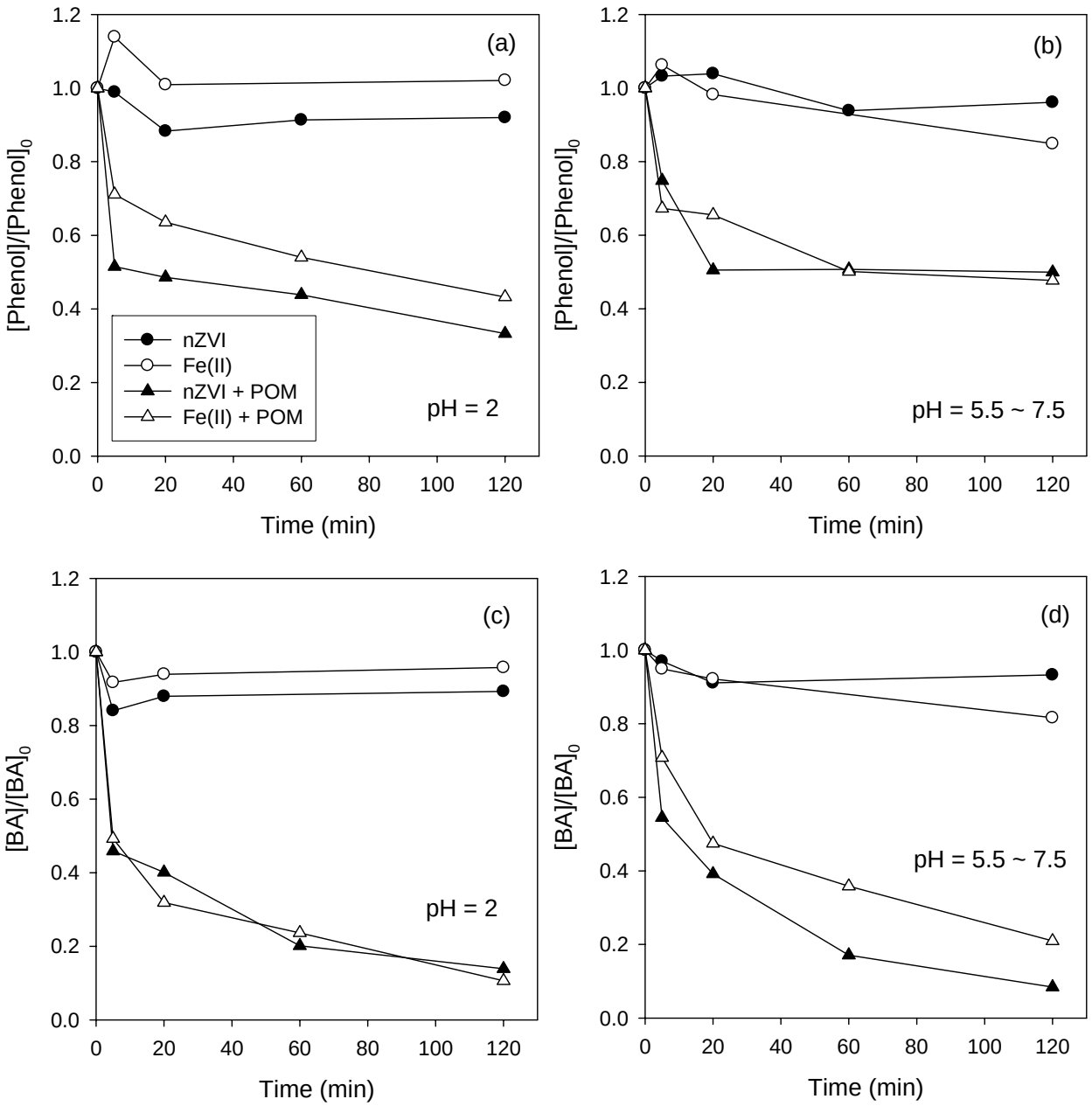

Figure S4. Degradation of organic compounds by nZVI and Fe(II) in the absence and presence of POM: $[Fe^0]_0 = [Fe(II)]_0 = 1$ mM; $[POM]_0 = 1$ mM; $[phenol]_0 = [benzoic\ acid]_0 = 10$ μM

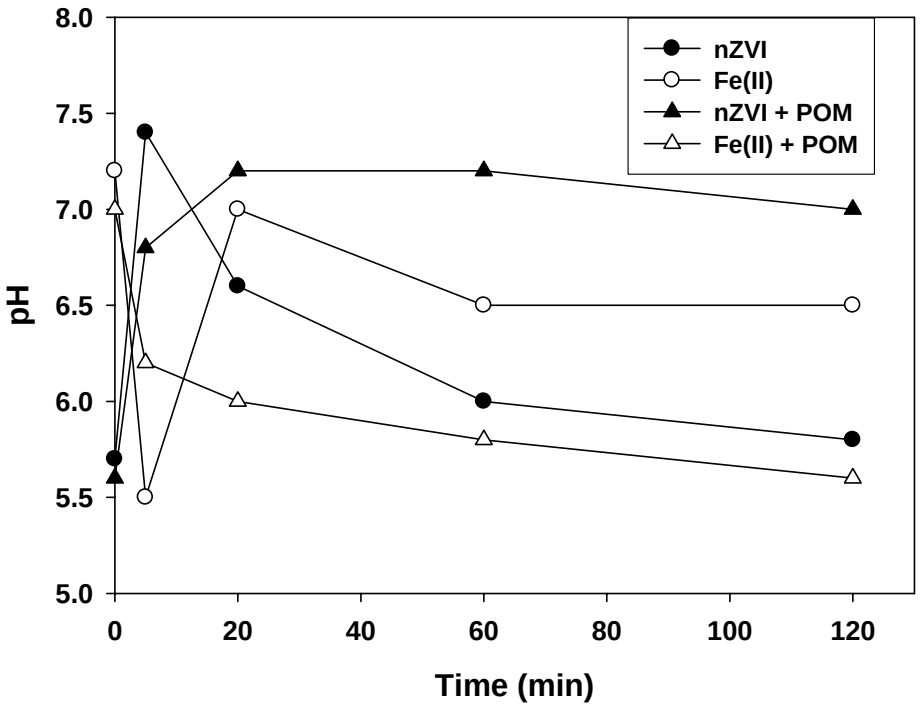

Figure S5. pH variation in the condition of Figure S4-1b