

Supporting Information

Reactive Functionalized Membranes for Polychlorinated Biphenyl Degradation

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Figure S1. Pure water flux of Fe/Pd NP immobilized PVDF-PAA membrane in 2-chlorobiphenyl dechlorination (convective flow).

Figure S2. Batch study of PCB (2-chlorobiphenyl) dechlorination and biphenyl formation by Fe/Pd NPs.

Figure S3. Mass spectrum (Selected ion: 227) and chromatograph of tentatively identified 3, 4-hydroxybiphenyl (derivatized).

Figure S4. 2,2'-Dihydroxybiphenyl (derivatized) detected in biphenyl oxidation.

Figure S5. Benzoic acid (derivatized) detected in biphenyl oxidation.

Figure S6. Tentatively identified trihydroxybiphenyl (derivatized) detected in biphenyl oxidation.

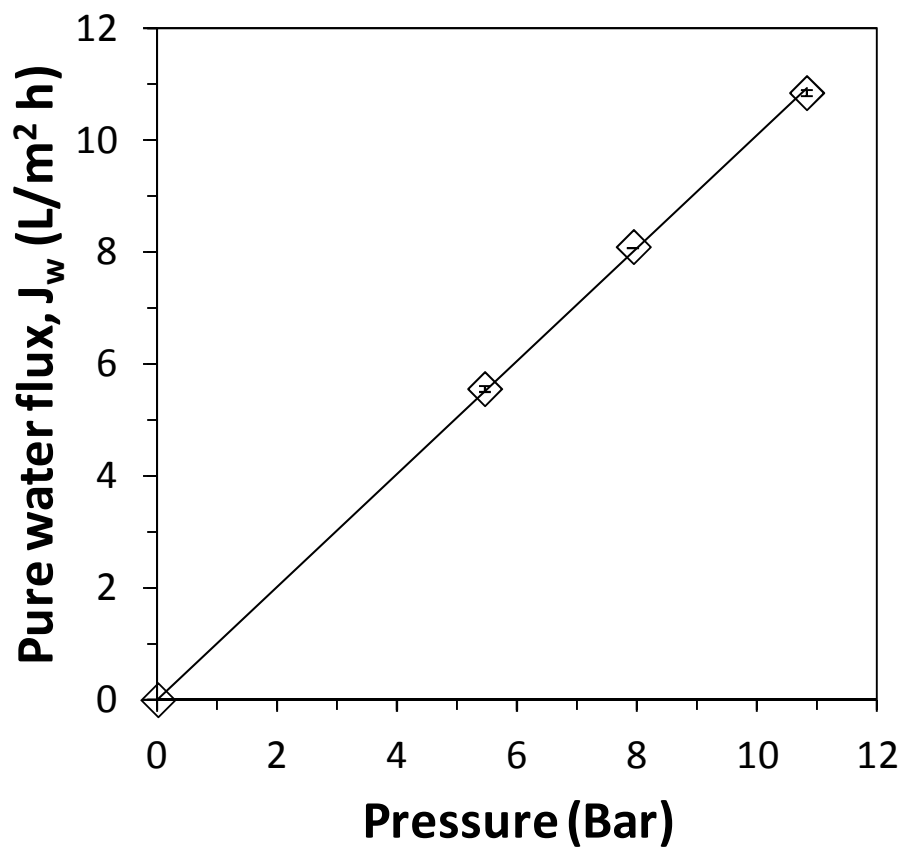


Figure S1. Pure water flux of Fe/Pd NP immobilized PVDF-PAA membranes in 2-chlorobiphenyl dechlorination (convective flow). $[\text{PCB}]_0=31\mu\text{M}$, mass (Fe)=6.1 mg (size: 80 nm, $\rho_m=58.5$ g/L), $[\text{Pd}]=0.9$ wt% as Fe, pH=7.5-8.0. Membrane external area: 13.2 cm².

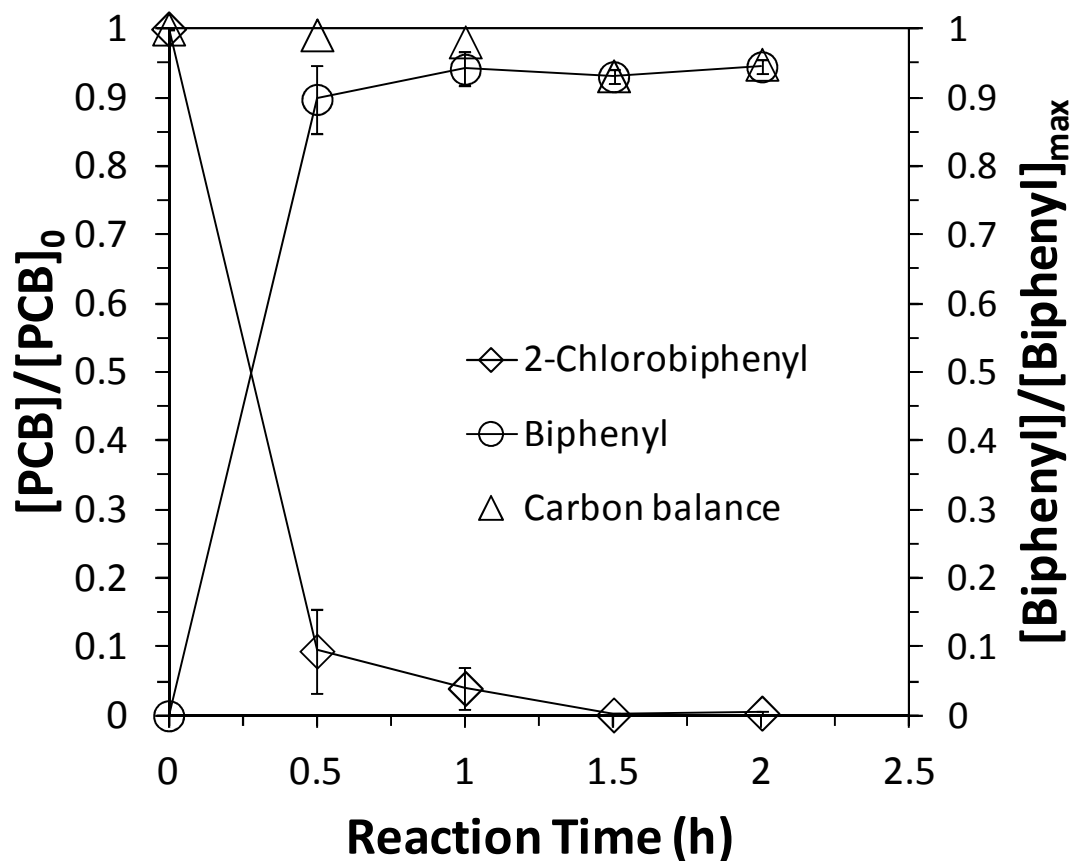


Figure S2. Batch study of PCB (2-chlorobiphenyl) dechlorination and biphenyl formation by Fe/Pd NPs. $[PCB]_0=31\mu M$, $[Fe]=0.5\text{ g/L}$ (BET surface area: $37.8\text{ m}^2/\text{g}$), $[Pd]=0.9\text{ wt\% as Fe}$, $\text{pH}=7.3-7.5$.

Synthesis of Fe/Pd NPs

5 mL of NaBH_4 (90 mM) was added into 15 mL of FeSO_4 (12 mM) dropwise. The black iron NPs formed were washed with deoxygenated water twice and separated with a magnet. Pd was coated on Fe surface by adding 20 mL of K_2PdCl_4 (153 μM , ethanol:water=9:1 v/v) and shaking the solution for 30 min.

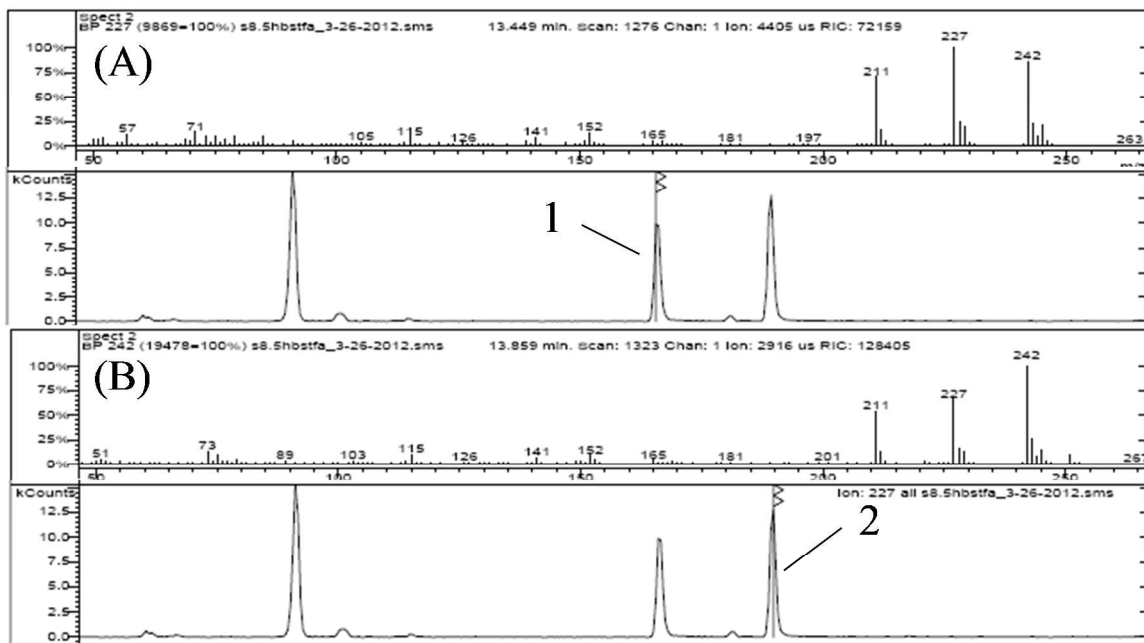


Figure S3. Mass spectrum (Selected ion: 227) and chromatograph of tentatively identified (A) 3-hydroxybiphenyl (derivatized, peak 1); (B) 4-hydroxybiphenyl (derivatized, peak 2).

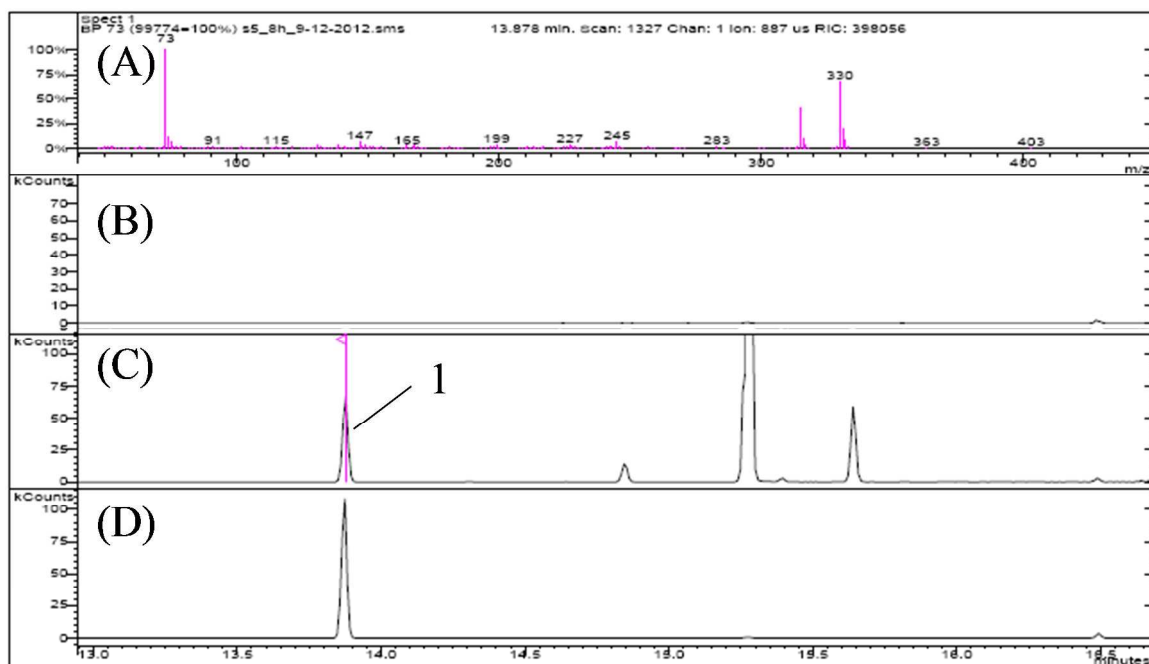


Figure S4. 2,2'-Dihydroxybiphenyl (derivatized) detected in biphenyl oxidation by Fe/Pd NP immobilized PAA/PVDF membranes (peak 1). (A) Mass spectrum (Selected ion: 330); (B) Chromatograph of BSTFA/Pyridine; (C) Chromatograph of sample; (D) Chromatograph of 2,2'-dihydroxybiphenyl standard.

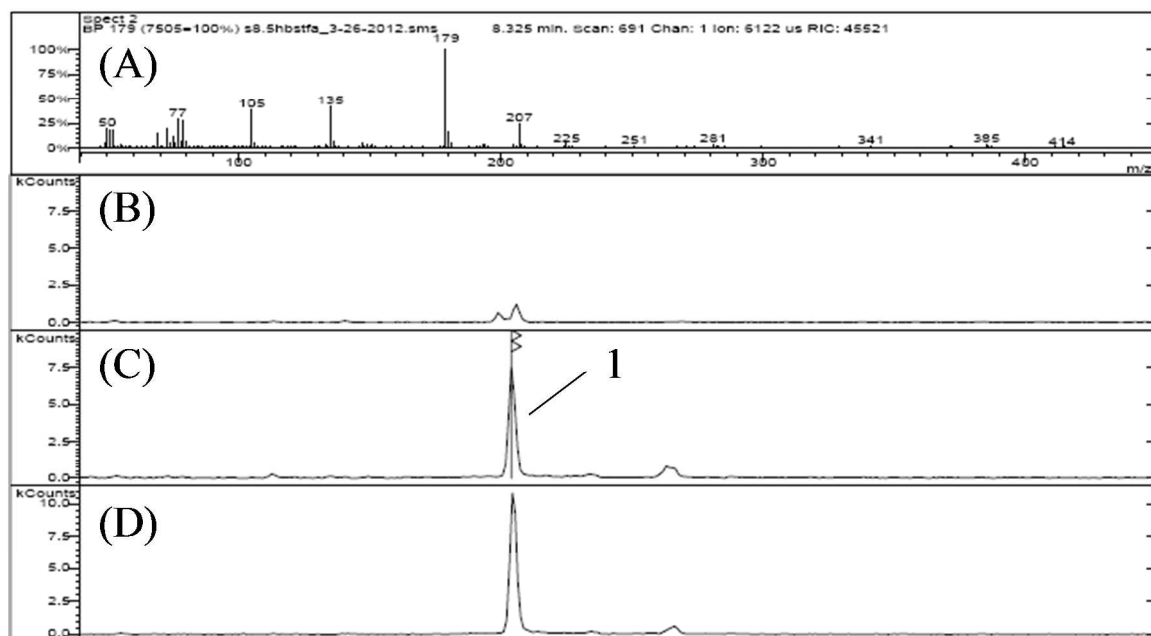


Figure S5. Benzoic acid (derivatized) detected in biphenyl oxidation by Fe/Pd NP immobilized PAA/PVDF membranes (peak 1). (A) Mass spectrum (Selected ion: 179); (B) Chromatograph of BSTFA/Pyridine; (C) Chromatograph of sample; (D) Chromatograph of benzoic acid standard.

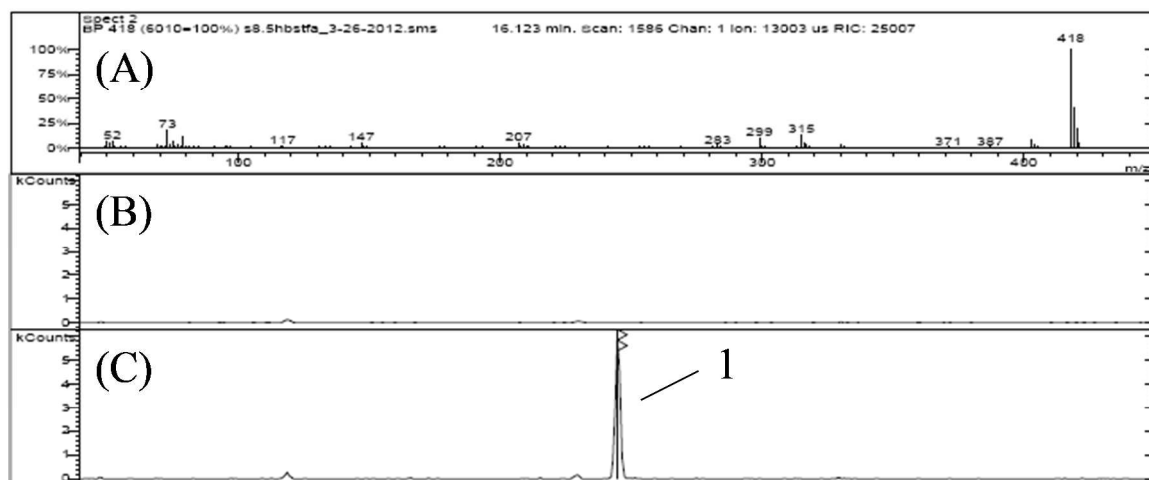


Figure S6. Tentatively identified trihydroxybiphenyl (derivatized) detected in biphenyl oxidation by Fe/Pd NP immobilized PAA/PVDF membranes (peak 1). (A) Mass spectrum (Selected ion: 418); (B) Chromatograph of BSTFA/Pyridine; (C) Chromatograph of sample.