

Supplementary information

Catalytic remediation of phenol contaminated wastewater using Cu-Zn hydroxide nitrate

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Table S1 Concentrations of Cu and Zn in the CWPO treated phenol solutions after hydroxide precipitation. The results at pH 5 correspond to the leaching of 6Cu-Zn catalyst during CWPO treatments performed at 35 °C, with initial pH of the phenol solution of 5.5, H₂O₂ dosage of 3 mmol, catalyst loading of 3 and 6 g L⁻¹. Note that, according to U.S. EPA requirement¹ for drinking water, the standard limits for Cu = 1.3 ppm and for Zn =5 ppm.

Solution pH	Concentration of metal ions (mg.L ⁻¹)			
	Catalyst loading of 6 g.L ⁻¹		Catalyst loading of 3 g.L ⁻¹	
	Cu	Zn	Cu	Zn
5.5	112.67	22.89	77.43	15.90
6	63.56	16.74	63.14	14.86
7	6.25	11.09	4.91	6.99
7.5	0.65	6.36	1.82	5.01
8	0.15	3.23	0.02	0.61
9	0.01	0.17	0.01	0.13
10	0.01	0.08	0.01	0.08
11	0.01	0.06	0.01	0.08

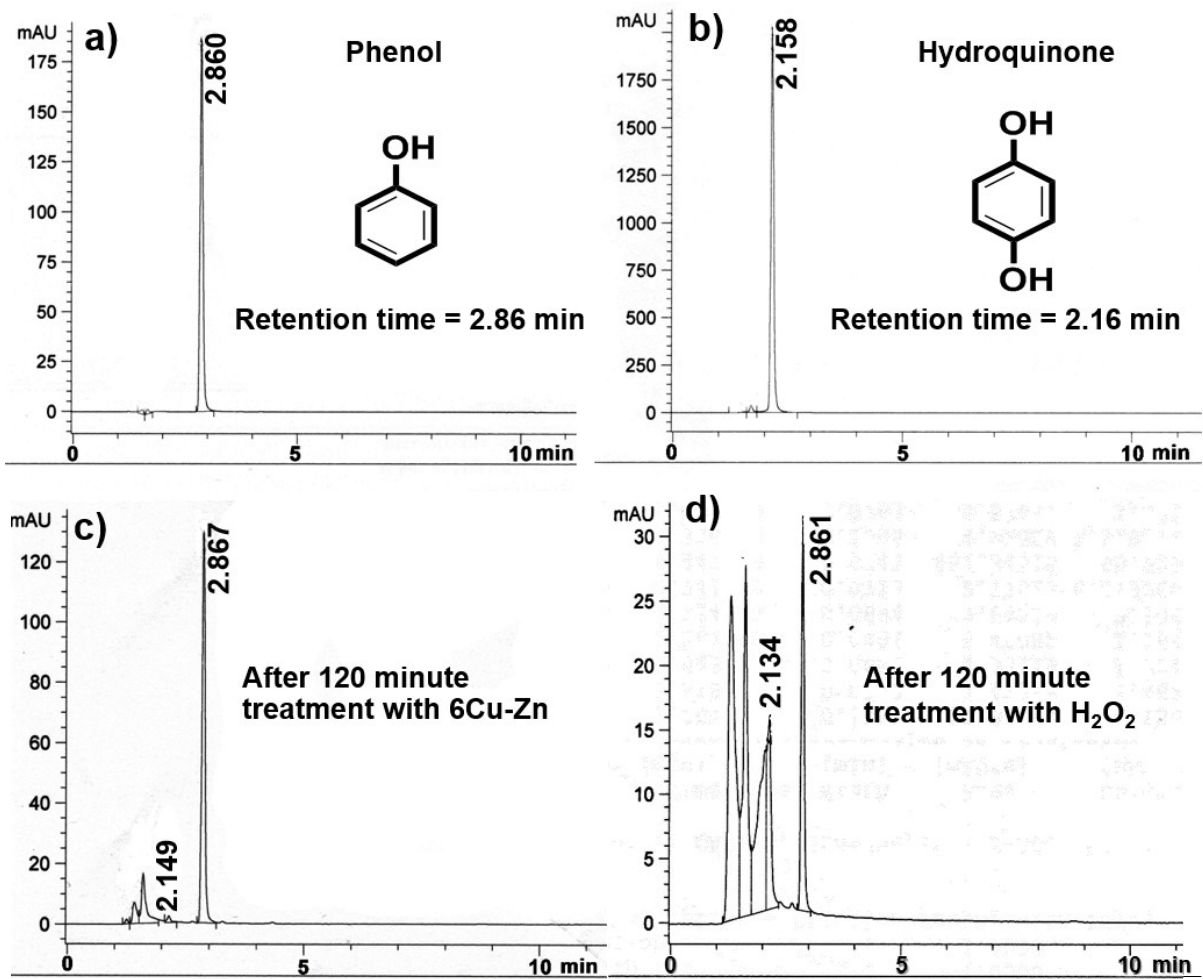


Fig. S1 HPLC chromatogram of (a) phenol and (b) hydroquinone as reference compounds, and oxidized phenol solutions after 120 minute treatments with (c) 6Cu-Zn, and (d) 3 mmol H₂O₂. The peak at a retention time of 2.1 corresponds to hydroquinone and 2.8 relates to phenol.

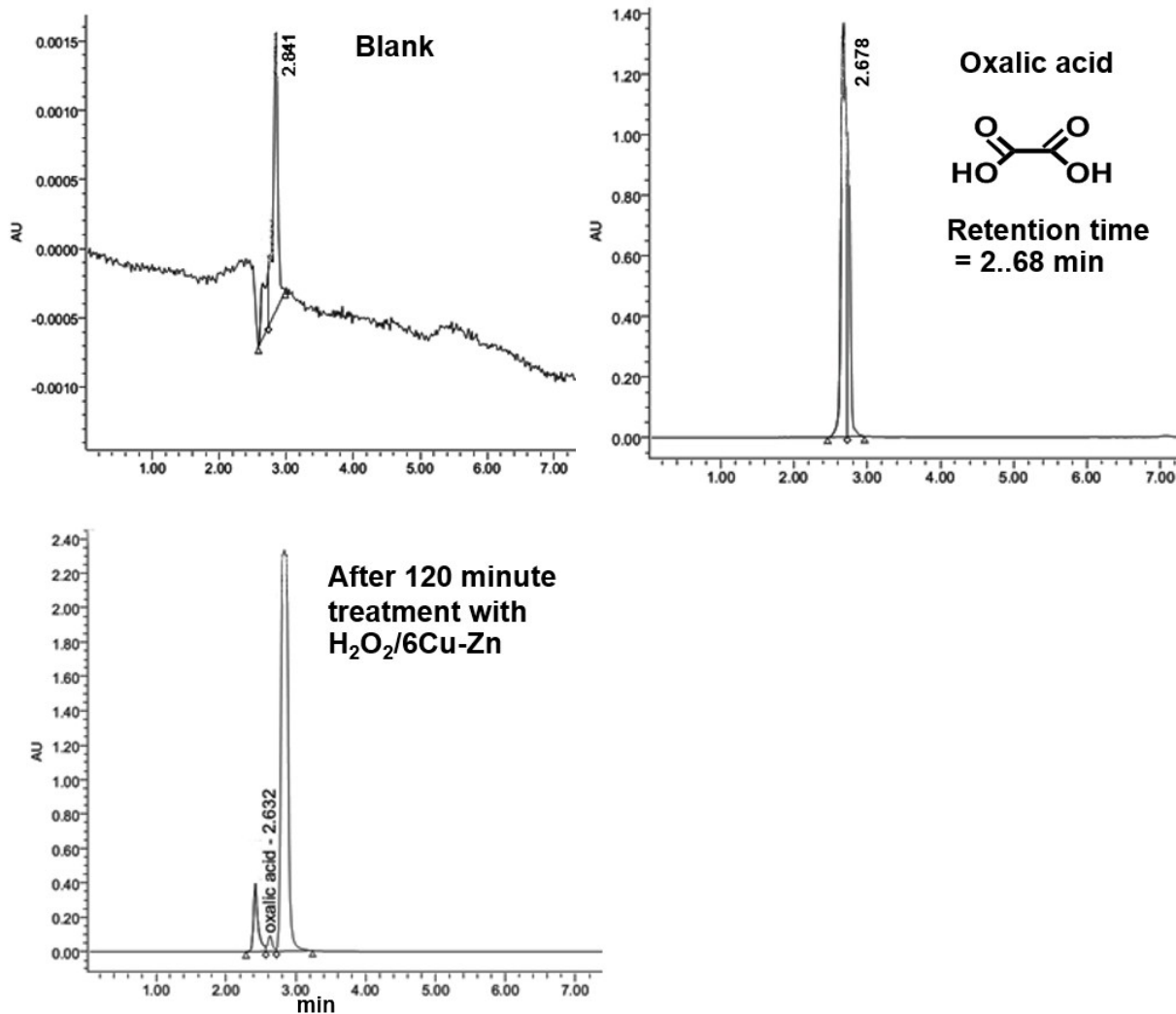


Fig. S2 HPLC analysis of blank, oxalic acid and oxidized phenol solution after 2-h CWPO treatment using 6Cu-Zn. The peak at retention time of 2.8 corresponds to instrumental signal (with very low intensity), and the peak between 2.6-2.7 relates to oxalic acid. The unidentified peaks at retention time of 2.4-2.5 were out of the range to be identified as those corresponding to formic acid, maleic acid and succinic acid (other possible acid degradation products of phenol oxidation).

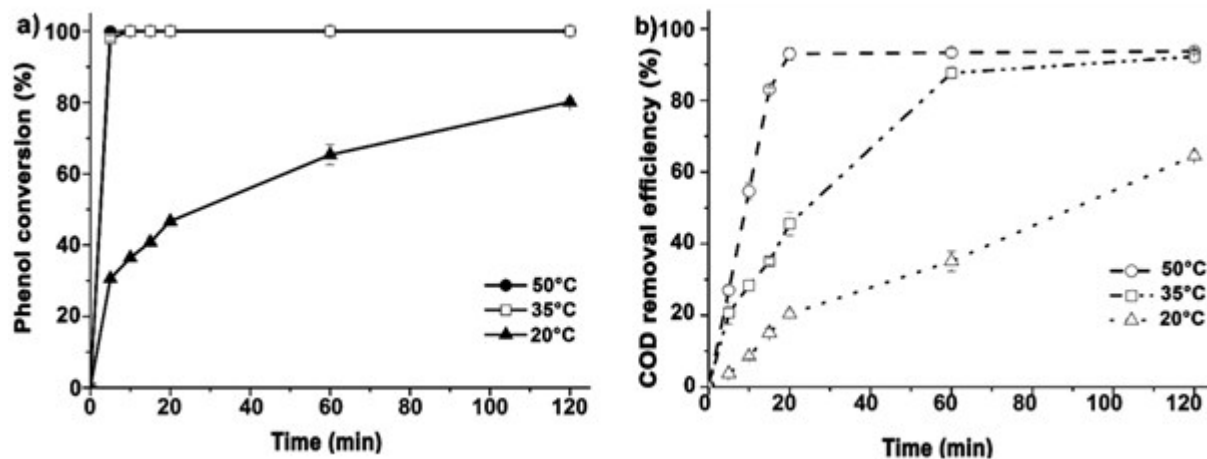


Figure. S3 Temperature dependence of (a) phenol conversions and (b) COD removal efficiencies obtained from CWPO of 100 ppm aqueous phenol solution catalyzed by 6Cu-Zn. All experiments were conducted using the phenol solution with initial pH of 5.5, 3 mmol H₂O₂, and 3 g L⁻¹ catalyst loading.