Equip adsorbent with indicator: A novel composite to simultaneously detect and remove heavy metals from water

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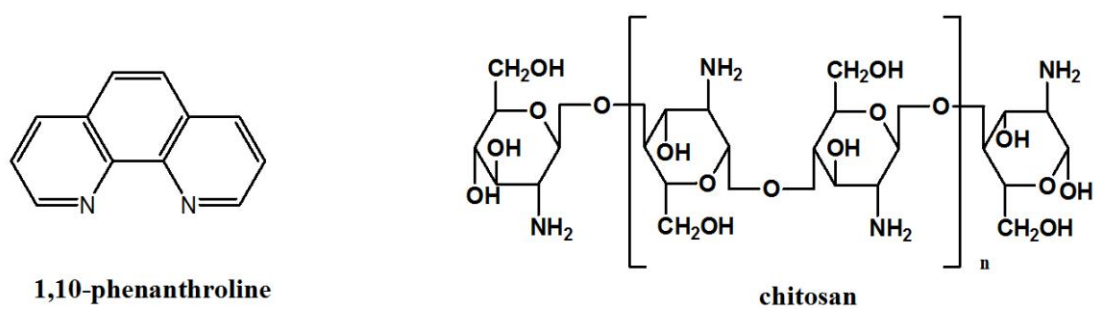
Figure. S1 The structures of 1,10-phenanthroline and chitosan
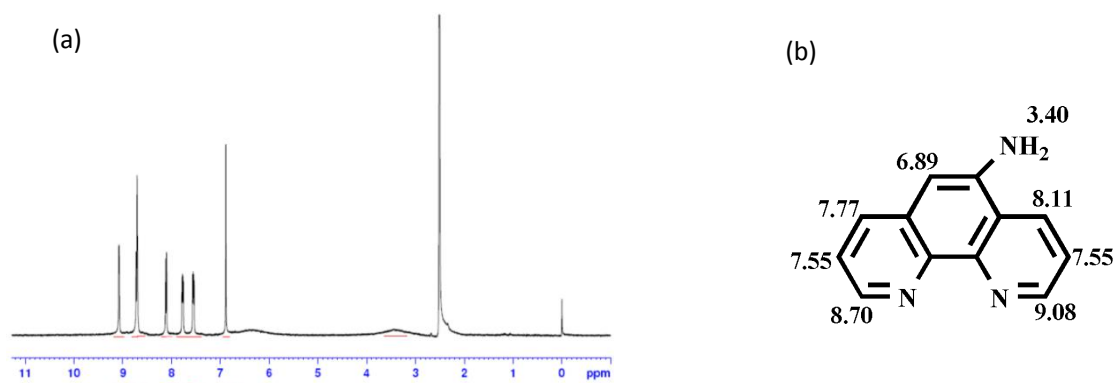
^{1}HNMR analysis of 5-amino-phenanthroline

Figure. S2 (a) ^{1}HNMR spectrum of 5-amino-phenanthroline; (b) The assignment of H in the structure.

^{1}HNMR (400 MHz, C_6D_6, δ): 3.40 (br, 2H, -NH$_2$), 6.89 (s, 1H, 6-phen-H), 7.55 (m, 2H, 3, 8-phen-H), 7.77 (d, 1H, 7-phen-H), 8.11 (d, 1H, 4-phen-H), 8.70 (d, 1H, 9-phen-H), 9.08 (d, 1H, 2-phen-H).

Three solutions containing unknown concentrations of Fe(II) and other three solutions containing unknown concentrations of Cu(II) were measured by the composite and flame atom absorption spectrophotometry (FAAS), respectively. The results are listed in Table S1.

Table S1 Comparison of metal ions concentrations detected by the composite and FASS

Fe(II)			Cu(II)		
C_C	C_F	S_b	C_C	C_F	S_b
0.62	0.61	1.6%	3.05	3.09	-1.3%
0.90	0.89	1.1%	5.07	5.22	-2.9%
1.34	1.4	-4.3%	6.92	7.09	-2.4%

C_C are the concentrations determined by the composite; C_F are the concentrations determined by FASS; S_b are the deviations from C_C to C_F.
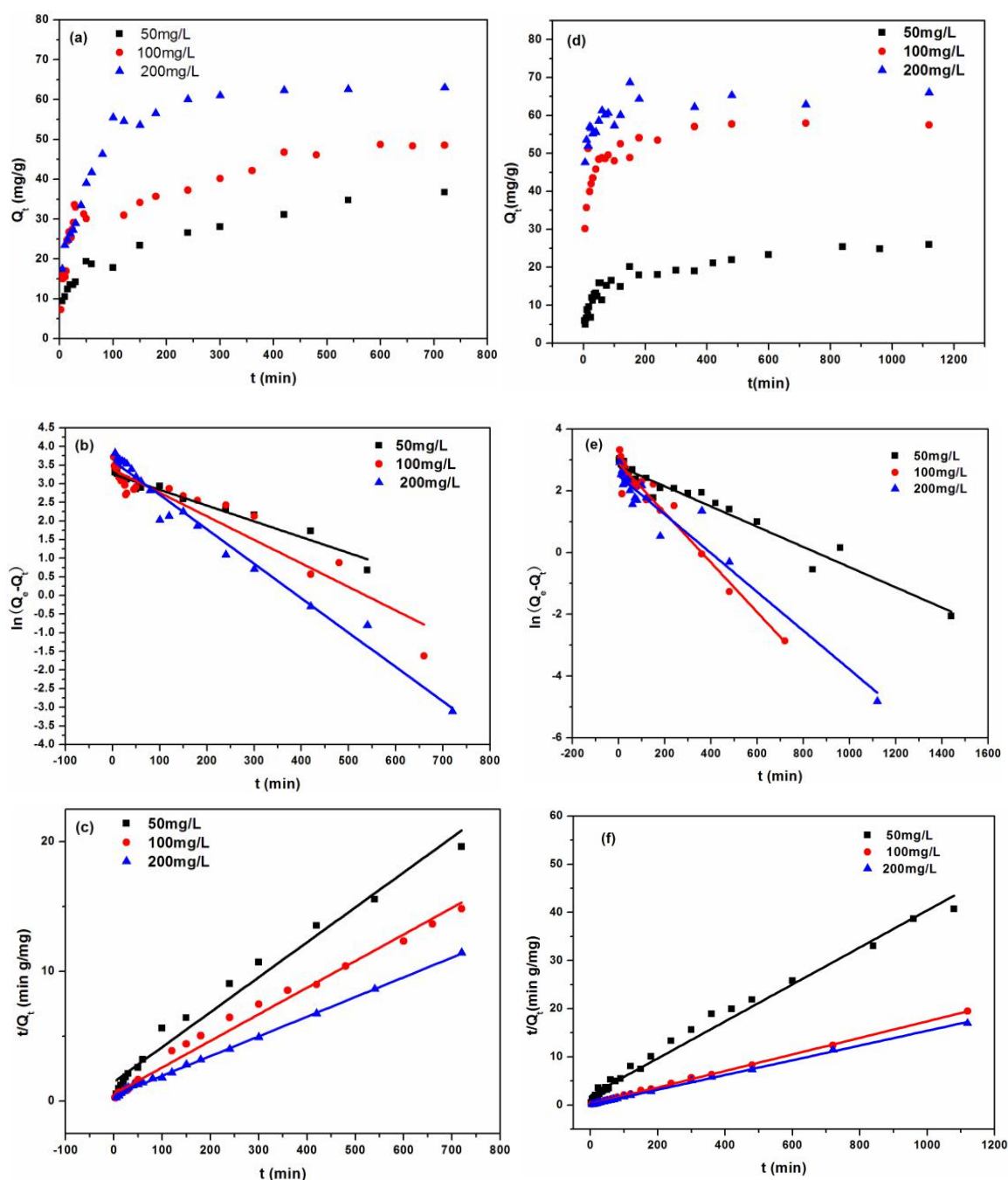
Figure.S4 (a) Adsorption capacity of Fe(II) vs. time with initial concentration of 50, 100 and 200 mg/L; (b) Curve fitting with Pseudo-first order kinetic model at different initial Fe (II) concentrations; (c) Curve fitting with Pseudo-second order order kinetic model at different initial Fe (II) concentrations; (d) Adsorption capacity of Cu (II) vs. time with initial concentration of 50, 100 and 200 mg/L; (e) Curve fitting with Pseudo-first order kinetic model at different initial Cu (II) concentrations; (f) Curve fitting with Pseudo-second order order kinetic model at different initial Cu (II) concentrations.