Enhanced Dechlorination of Chlorinated Methanes and Ethenes by Chloride Green Rust in the Presence of Copper(II)

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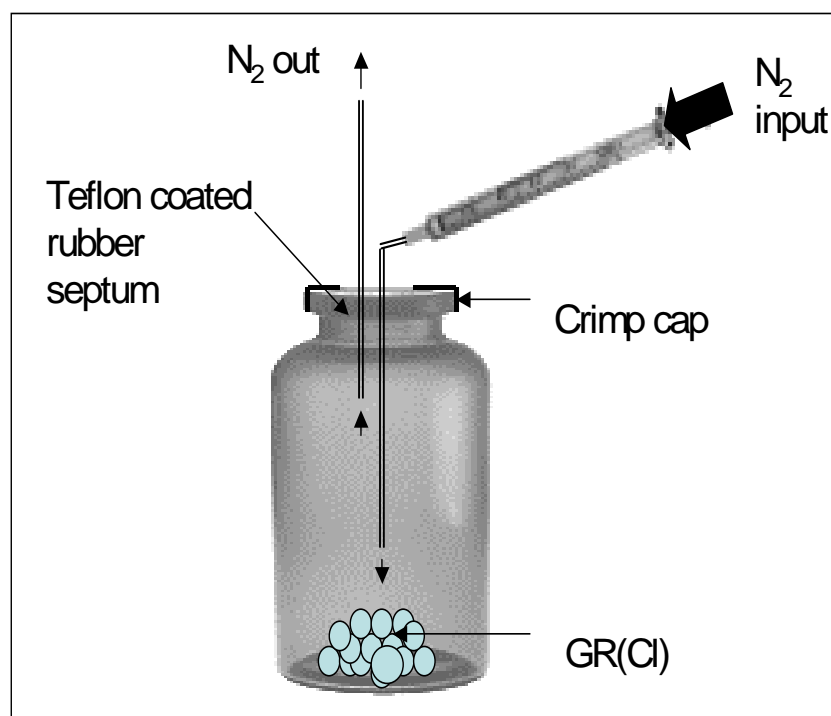
11 pages, 8 Figures and 1 Table

Figure S1. Schematic illustration of the drying process of GR(Cl). The aqueous solution

was withdrawn using a 50-mL N_2-pruged plastic syringe, and then the solid phase was dried
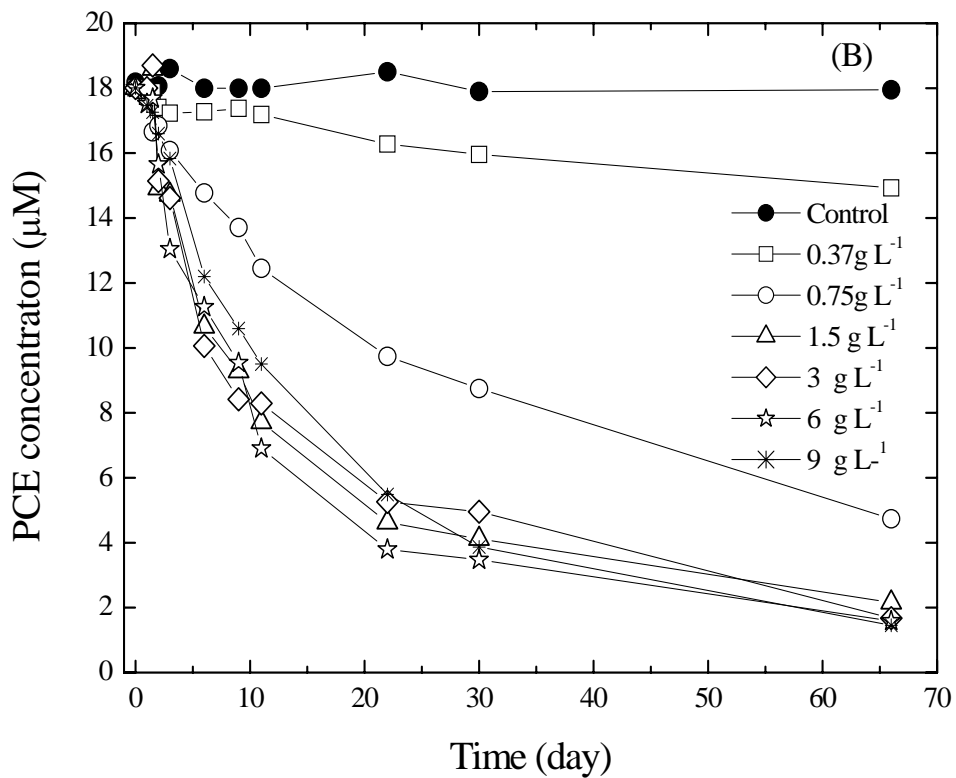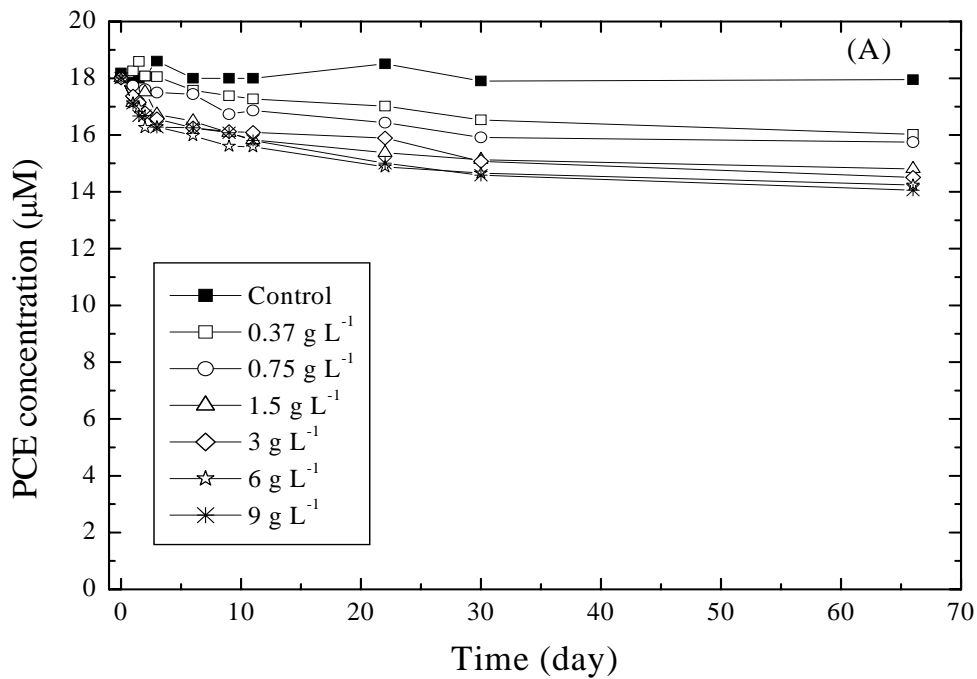
by purging nitrogen gas.

Figure S2.   Dechlorination of PCE by various concentrations of GR(Cl) ranging from 0.37 g

L^{-1} to 9 g L^{-1} in the (a) absence and (b) presence of 0.5 mM Cu(II).
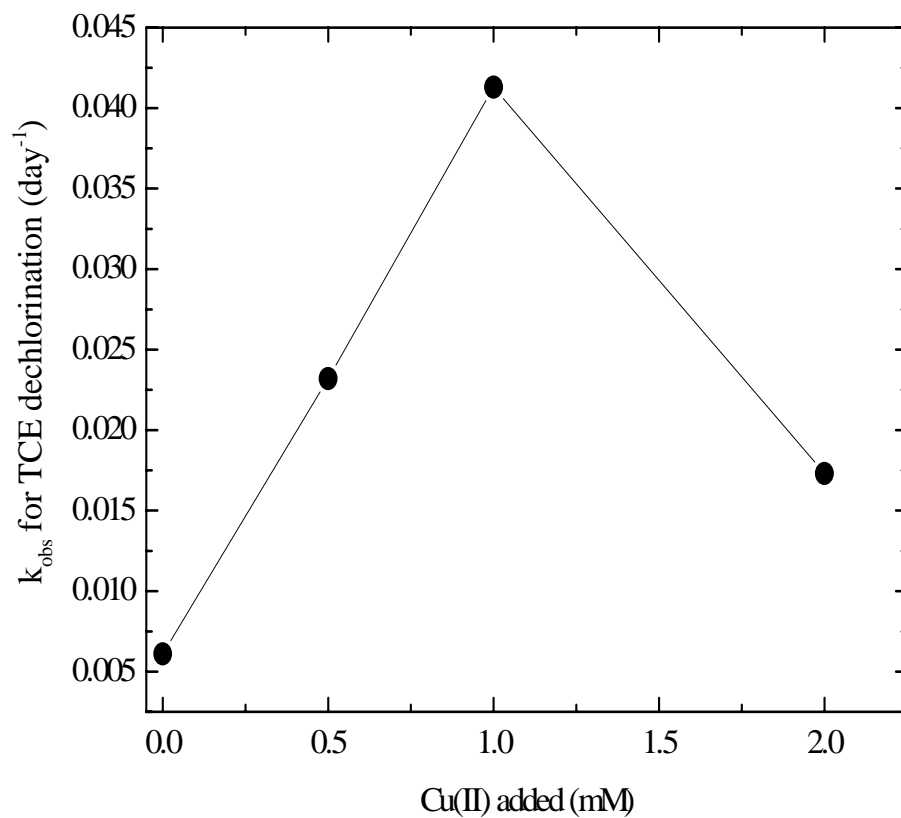
Figure S3. The pseudo first-order rate constant (k_{obs}) for TCE dechlorination as a function of Cu(II) concentration in the GR(Cl) (1.5 g L^1) suspensions. The pH of the system was maintained at 7.2 using HEPES (50 mM) buffer at 25 °C in the dark.
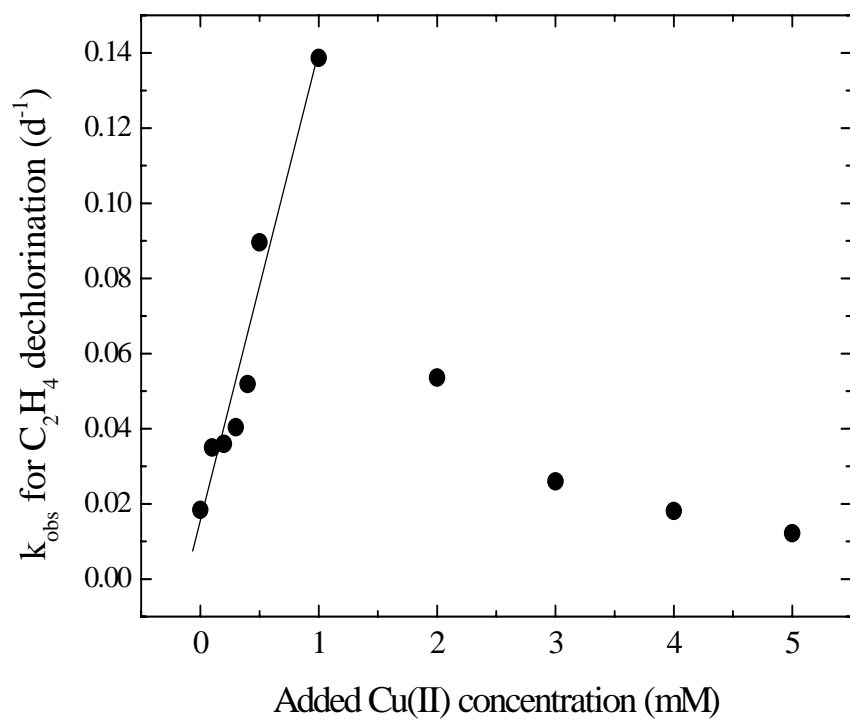
Figure S4.   The k_{obs} for PCE dechlorination as a function of Cu(II) concentration at pH 7.2
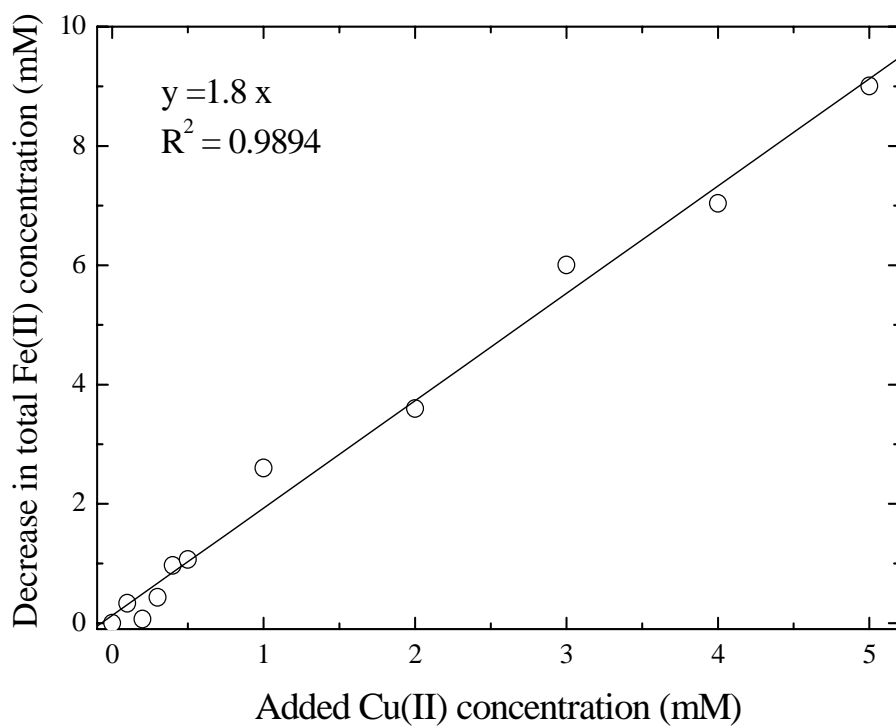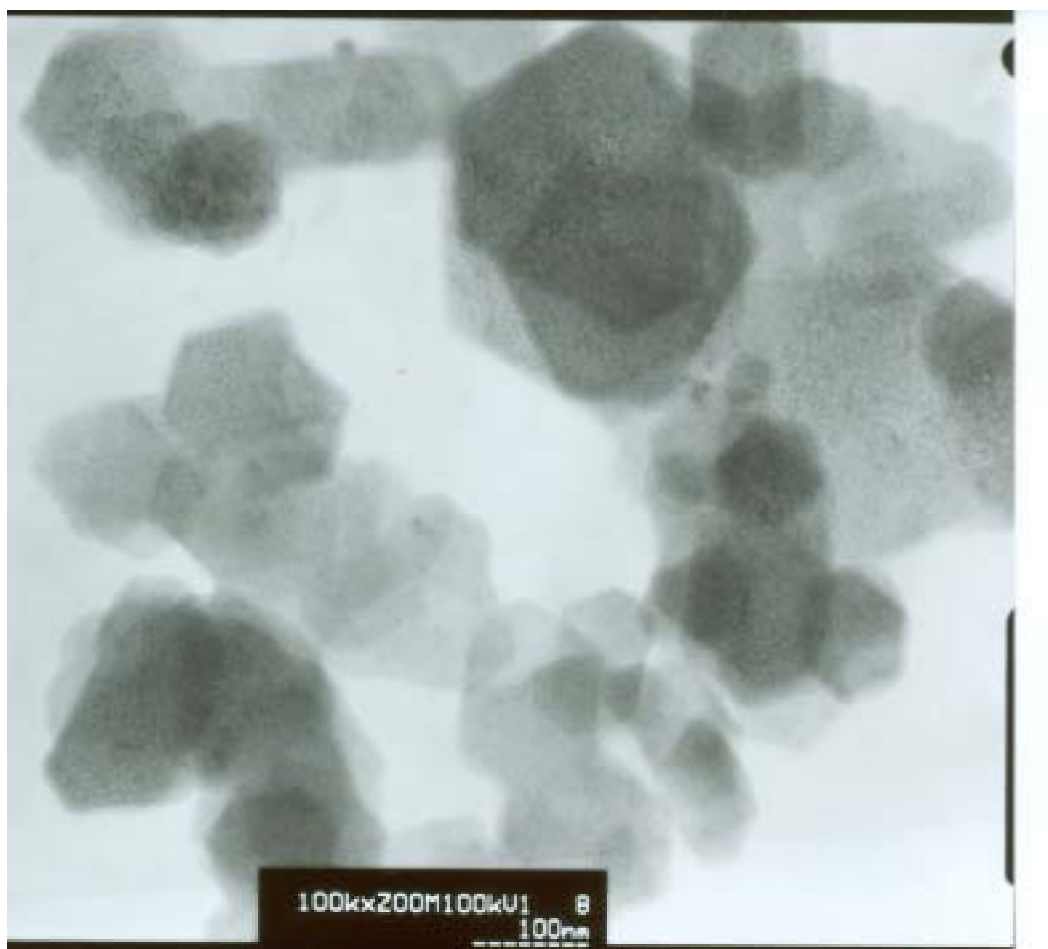
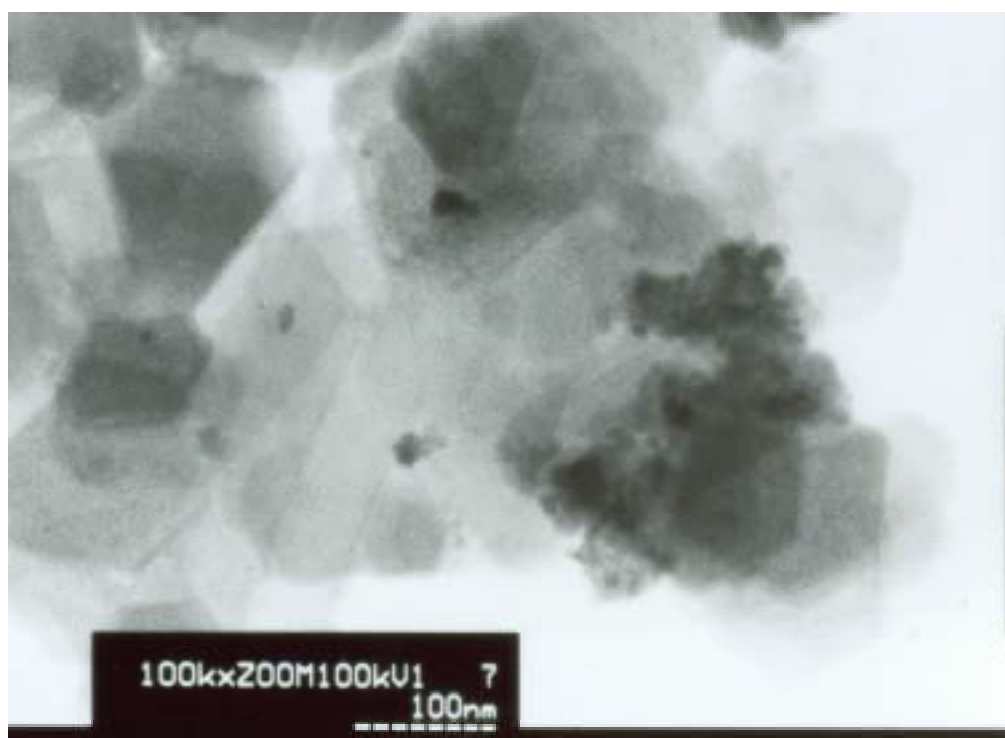in the GR(Cl) suspension systems.

Figure S5. Effect of the concentration of Cu(II) (0 - 5.0 mM) on the decreased amounts of
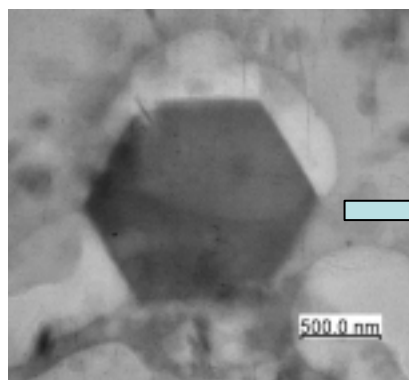
Fe(II).

(a)

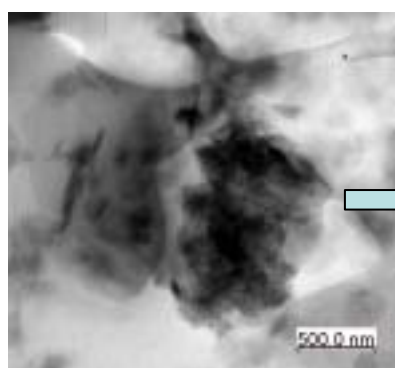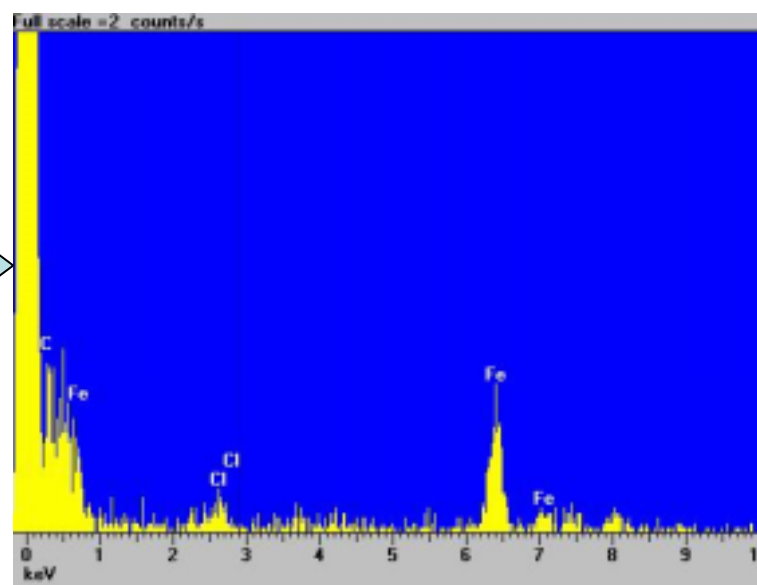100kxZOOM100kV1   8
100nm

(b)

100kxZOOM100kV1   7
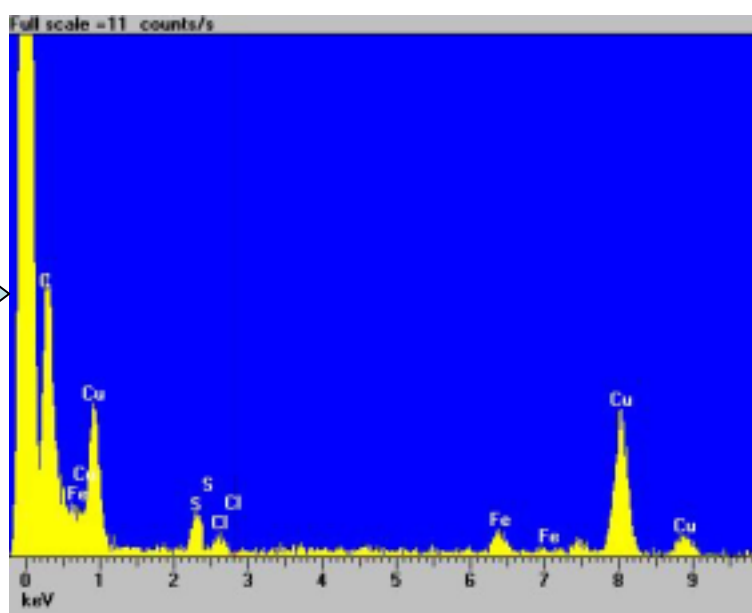100nm

(c)

GR(Cl) alone

GR(Cl) + Cu(II)

Figure S6. The TEM images of the solid phases in GR(Cl) suspensions.   (a) GR(Cl) alone,

(b) GR(Cl) with 0.5mM Cu(II), and (c) EDS spectra of solid phases in the presence and
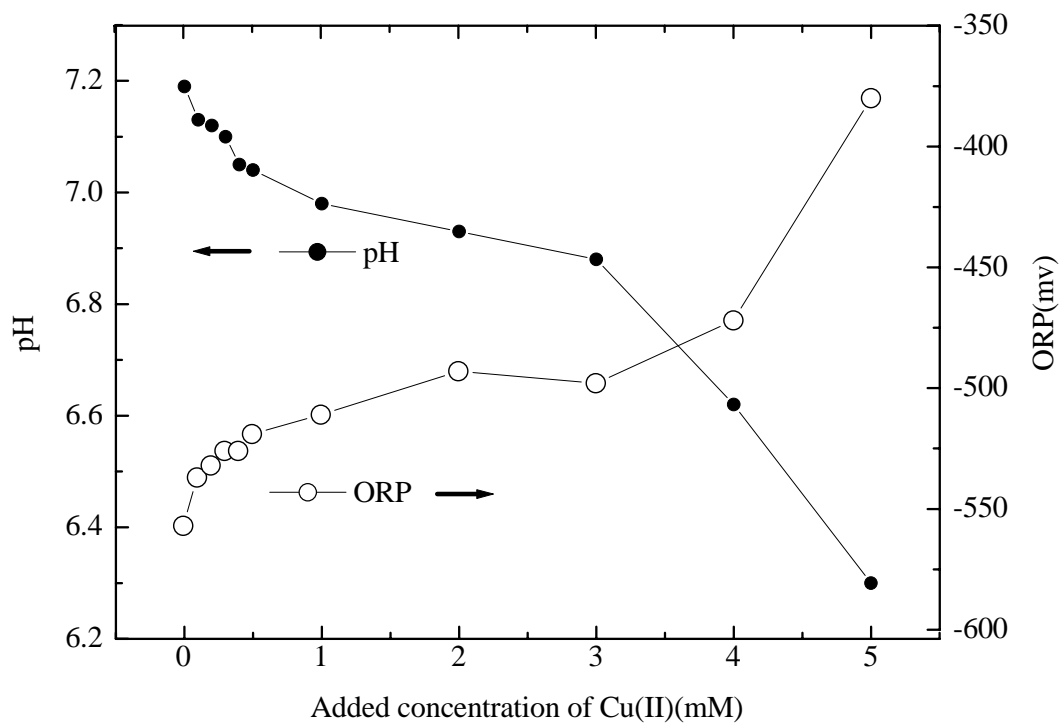
absence of Cu(II).

Figure S7. The changes in the pHs and redox potentials of the aqueous solutions of the GR(Cl) suspensions after termination of the experiments at various concentrations of Cu(II).
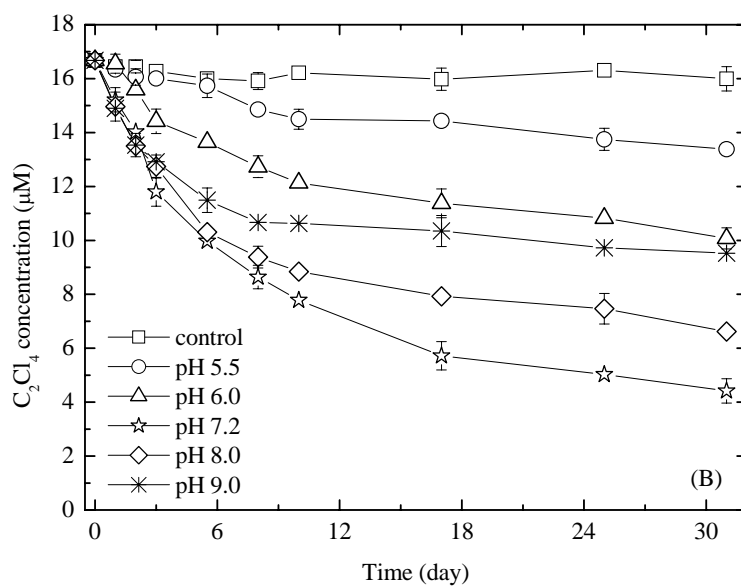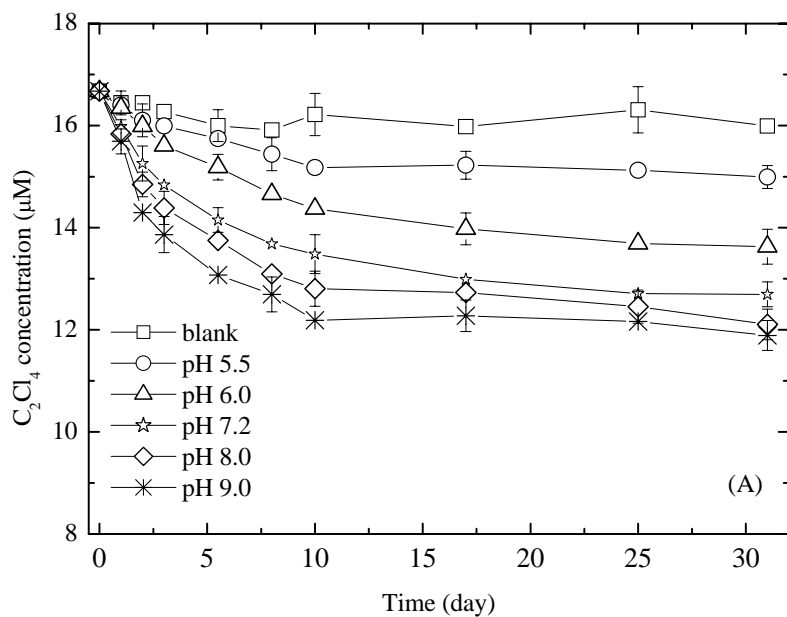
Figure S8. The effect of pH on the dechlorination of PCE by GR(Cl) in the (a) absence and

(b) presence of 0.5 mM Cu(II).

Table S1. Effect of pH on the production of trichloroethene (C_2HCl_3) and the conversion
ratios of C_2Cl_4 in the GR(Cl) suspension.

pH	GR(Cl) in the absence of Cu(II)			GR(Cl) with 0.5 mM Cu(II)		
	Remaining C_2Cl_4 (μM)	C_2HCl_3 (μM)	$C_2HCl_3/\Delta C_2Cl_4$[a] (%)	Remaining C_2Cl_4 (μM)	C_2HCl_3 (μM)	$C_2HCl_3/\Delta C_2Cl_4$[a] (%)
5.5	16.32	0.04	2.4	14.71	0.11	3.3
6.0	14.96	0.12	3.9	11.40	2.95	4.7
7.2	14.02	0.089	2.3	5.74	4.87	39.7
8.0	13.64	0.061	1.4	7.94	5.24	52.1
9.0	13.22	0.049	1.1	10.85	2.08	29.1

a: ΔC_2Cl_4 = initial C_2Cl_4 concentration – remaining C_2Cl_4 concentration.