Supplementary Information

Ciprofloxacin degradation from aqueous solution by Fenton oxidation: Reaction kinetics and degradation mechanisms

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Table S1

Daughter ions formation in CIP degradation by FO.

| Daughter ions	Molecular Formula	m/z (MH$^+$)	Degradation route
D_1	$C_{15}H_{16}O_3N_3F$	305	Partial piperazine ring cleavage
D_2	$C_{15}H_{17}O_4N_3$	304	Defluorination followed by hydroxylation of D_1
D_3	$C_{13}H_{11}O_4N$	239	Complete piperazine ring cleavage of D_2
D_4	$C_{13}H_{15}O_2N_3F$	304	Decarboxylation of CIP
D_5	$C_{13}H_{16}O_3N_3$	301	Defluorination followed by hydroxylation of D_4
D_6	$C_{16}H_{16}ON_3F$	287	Dehydroxylation of D1
D_7	$C_{11}H_{10}ON_2$	186	Partial piperazine ring breaking followed by defluorination of D_6
D_8	$C_{11}H_{12}O_2N_2$	205	Hydroxylation of D_7
D_9	$C_{11}H_{12}ON_2$	198	Cleavage of cyclic amine of D_7
D_{10}	$C_{11}H_{10}O_2N_2$	217	Hydroxylation of D_9
D_{11}	$C_{14}H_{14}O_2N_2$	242	Partial piperazine ring breaking followed by defluorination of D_1
D_{12}	$C_{14}H_{14}O_2N_2F$	261	Partially piperazine ring cleavage of D_1
D_{13}	$C_{14}H_{16}O_3N_2F$	279	Hydroxylation followed by protonation of D_{12}
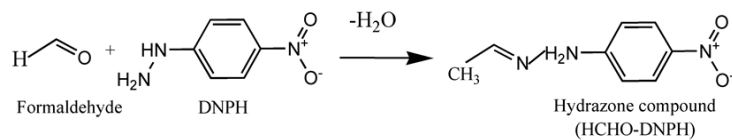
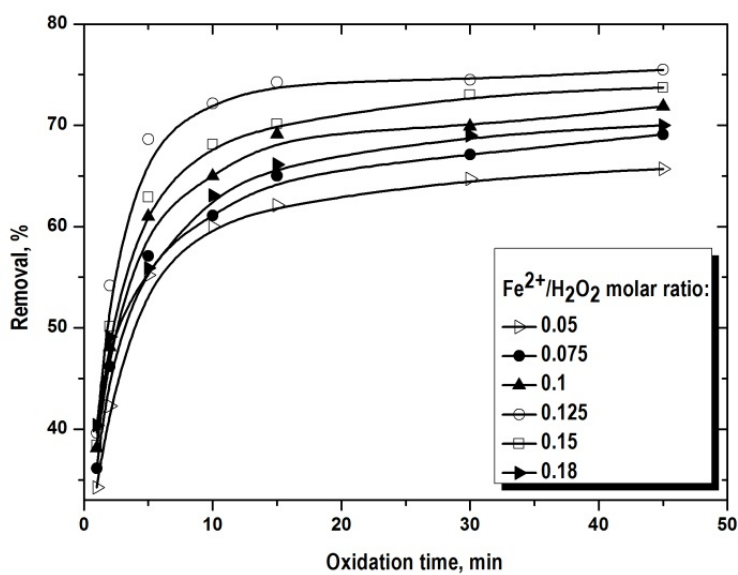**Fig. S1** Formation of hydrazone colored derivative by the reaction between HCHO and DNPH.

Fig. S2 Dynamics of drug degradation with the variation of Fe^{2+}/H_2O_2 molar ratio. Experimental conditions: $[CIP]_0 = 15$ mg/L, pH = 3.5 and temperature = 25°C
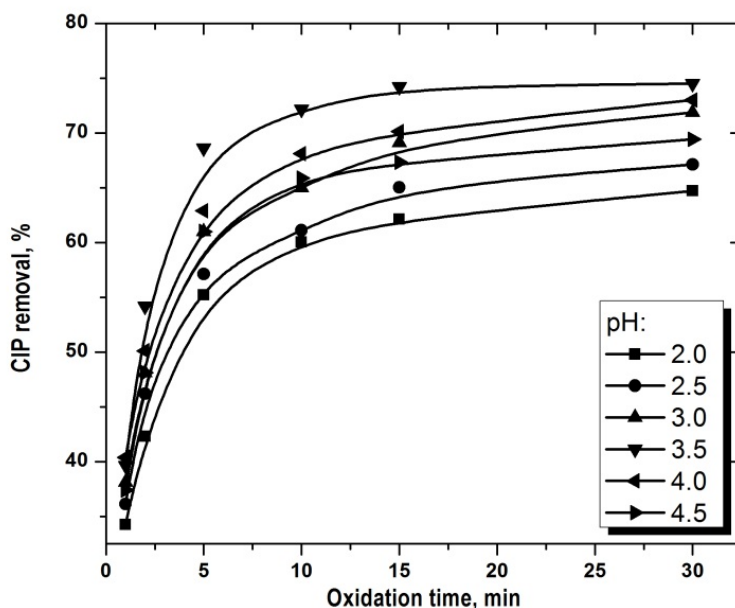
Fig. S3 Effect of pH on % CIP degradation at 3.5 pH. Experimental conditions: $[CIP]_0 = 15$ mg/L, Fe^{2+}/H_2O_2 molar ratio = 0.125 and temperature= 25°C.
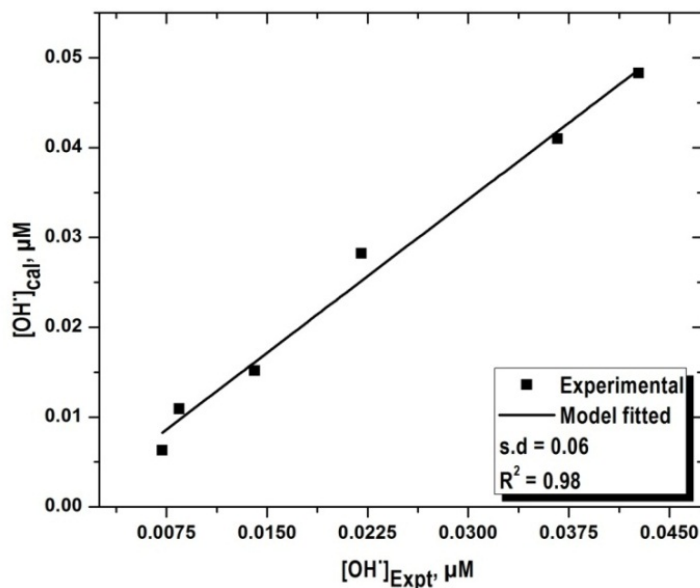

Fig. S4 Experimental vs. model predicted (eqns (17) to (20)) concentration of $OH^.$. Experimental conditions: $[CIP]_0 = 15$ mg/L, Fe^{2+}/H_2O_2 molar ratio = 0.125, pH = 3.5 and temperature = 25°C.
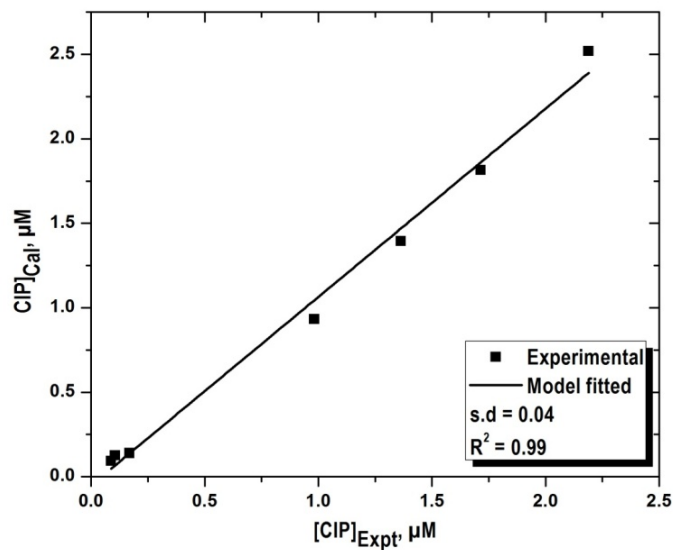
Fig. S5 Experimental vs. model predicted (eqns (17) to (20)) CIP degradation. Experimental conditions: $[CIP]_0$=15 mg/L, Fe^{2+}/H_2O_2 molar ratio = 0.125, pH = 3.5 and temperature = 25°C.
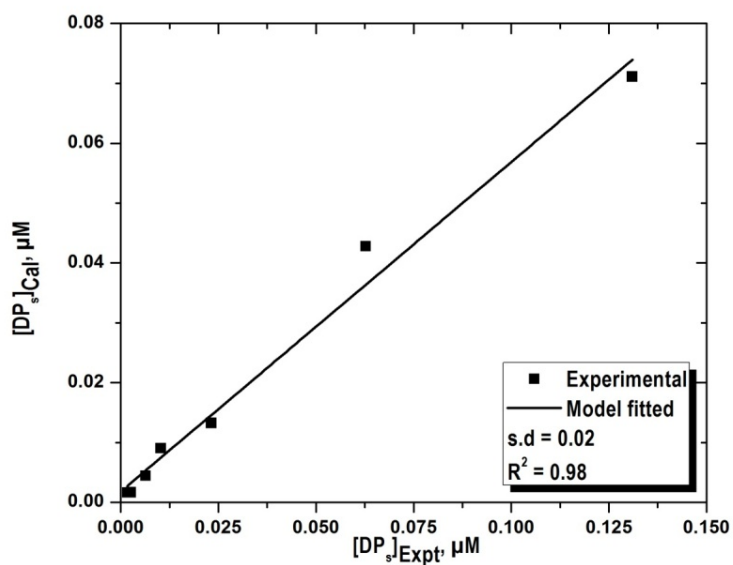

Fig. S6 Experimental vs. model predicted (eqns (17) to (20)) degradation products (DPs). Experimental conditions:$[CIP]_0$ =15 mg/L, Fe^{2+}/H_2O_2 molar ratio = 0.125, pH = 3.5 and temperature = 25°C.