Fenton pre-treatment of rice straw with citric acid as an iron chelate reagent for enhancing saccharification

Tao Sheng[1], Lei Zhao[1], Wen-zong Liu[2], Ling-fang Gao[2], Ai-Jie Wang[1,2]*

[a]State Key Lab of Urban Water Resource and Environment, Harbin Institute of Technology, Harbin 150090, China.

[b]CAS Key Laboratory of Environmental Biotechnology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China.
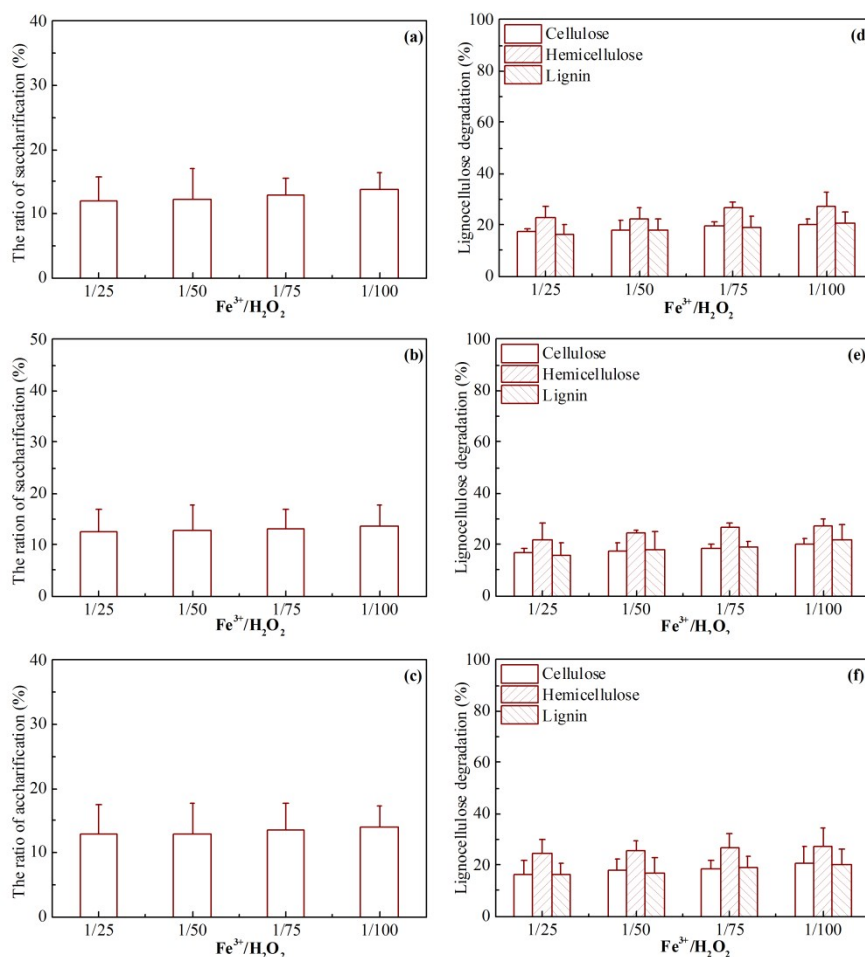
Figure S1. Effect of $FeCl_3$ and H_2O_2 concentrations on the saccharification ratio and the composition of rice straw pretreated by Fe^{3+}/H_2O_2. (a) and (d) Initial Fe^{3+} 0.01mol/L, (b) and (e) Initial Fe^{3+} 0.03mol/L, (c) and (f) Initial Fe^{3+} 0.05mol/L..

Table S1 Effect of Fenton reaction duration on the carbon balance of pretreated rice straw[a].

Time	Glucose	Xylose	Arabinose	Acetate	Lactate	Ethanol	Carbon dioxide	Consumed hocellulose[b]	Undegrade	Cell mass
0	9.1±1.7	5.2±0.9	0.4±0.1	10.1±2.1	5.9±1.7	1.4±0.1	0.3±0.1	0.0	67.5±15.7	0.5±0.1
6	11.7±2.5	6.7±2.1	0.4±0.2	8.1±3.2	4.0±1.6	0.9±0.2	0.4±0.1	18.4±4.1	49.2±14.1	0.6±0.2
12	13.9±3.1	8.0±2.3	0.4±0.1	8.2±1.3	3.0±1.0	1.1±0.2	0.4±0.2	24.8±7.3	40.0±12.5	0.7±0.5
18	15.7±4.1	8.9±1.2	0.4±0.1	7.6±2.5	2.9±1.3	1.4±0.1	0.6±0.2	31.2±5.1	30.7±10.2	0.9±0.2
24	21.5±2.2	12.3±1.2	0.4±0.1	4.0±1.0	0.9±0.5	1.3±0.5	0.6±0.2	36.4±6.6	21.9±5.1	1.0±0.4
30	19.9±4.7	11.3±3.2	0.4±0.1	4.8±1.2	2.1±1.0	1.4±0.3	0.7±0.2	40.0±5.8	18.8±4.2	1.0±0.3
36	18.3±3.1	10.4±1.5	0.5±0.2	4.1±1.3	1.9±0.2	1.5±0.5	0.7±0.1	44.9±4.9	17.1±1.7	1.1±0.5
42	14.3±2.7	8.2±2.2	0.5±0.1	6.3±0.9	1.8±0.2	1.5±0.2	0.7±0.2	51.1±7.1	15.1±2.6	1.1±0.2
48	12.2±1.5	7.0±2.4	0.5±0.2	7.6±1.2	1.8±0.3	1.7±0.6	0.7±0.3	54.6±7.2	13.4±3.5	1.1±0.3
54	11.9±1.1	6.8±1.5	0.5±0.2	6.2±1.8	1.7±0.4	1.7±0.1	0.7±0.1	57.4±9.8	12.5±3.7	1.1±0.1
60	10.7±3.2	6.1±1.2	0.5±0.1	7.2±2.2	1.7±0.2	1.8±0.2	0.8±0.2	58.5±10.3	12.1±2.2	1.2±0.3
66	9.9±1.2	5.6±0.8	0.5±0.2	7.3±1.9	1.6±0.5	1.8±0.1	0.8±0.4	60.3±12.7	11.6±3.4	1.2±0.1
72	9.7±1.7	5.5±1.1	0.5±0.1	7.6±0.9	1.5±0.1	1.8±0.4	0.8±0.3	61.1±14.4	10.9±1.7	1.2±0.4

[a]The carbon mass balance was calculated as output carbon mass divided by input carbon mass (%.).

[b]The consumed holocellulose was calculated according as the ratio of holocellulose consumed during pretreatment/the holocellulose of raw rice straw.
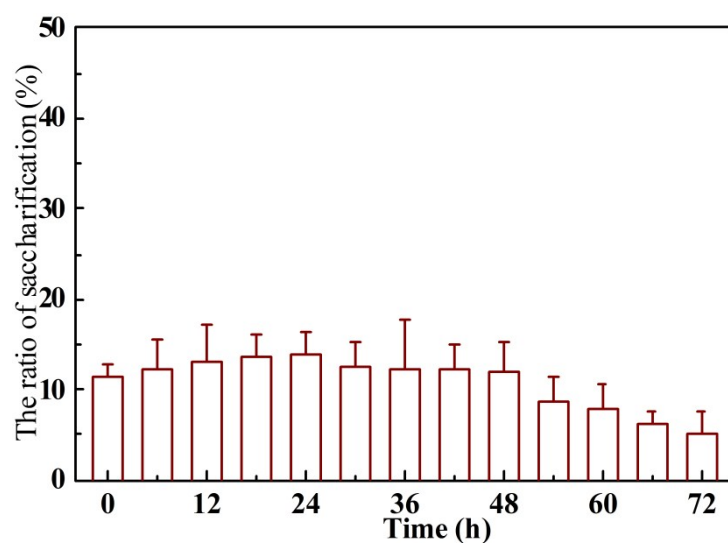
Figure S2. The Effect of Fenton reaction duration on the saccharification of rice straw pretreated by Fe^{3+}/H_2O_2 under pH6.