Supplementary Materials

Degradation of 4-Chlorophenol in Fenton-like system using Au-Fe$_3$O$_4$ magnetic nanocomposites as the heterogeneous catalyst at near neutral condition

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Table S1. Physical character of the prepared three samples

<table>
<thead>
<tr>
<th>Sample</th>
<th>Saturation magnetization (emu g$^{-1}$)</th>
<th>Coercivity (Oe)</th>
<th>BET surface (m$^2$/g)</th>
<th>Average diameter of pore (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 1</td>
<td>82.25</td>
<td>90.02</td>
<td>43.79</td>
<td>0.25</td>
</tr>
<tr>
<td>Sample 2</td>
<td>82.92</td>
<td>72.46</td>
<td>42.69</td>
<td>0.22</td>
</tr>
<tr>
<td>Sample 3</td>
<td>83.38</td>
<td>86.53</td>
<td>44.27</td>
<td>0.27</td>
</tr>
</tbody>
</table>

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Fig. S1 The synthesized catalysts dispersed in water for 5 min (A) and then with magnet by side for 2 min (B).

Fig. S2 Stability of the Au-Fe$_3$O$_4$ nanocomposites in the repeated batch 4-CP degradation experiment. Reaction conditions: initial pH 5.0, catalyst dose 0.1 g/L, H$_2$O$_2$ dose 0.5 g/L, initial concentration of 4-CP 25 mg/L, temperature 303 K, reaction time 4 h.
Fig. S3 XRD spectrum of catalyst.

Fig. S4 (a) The Au 4f and (b) Fe 2p XPS spectrum of catalyst.
Fig. S5 Fe ion leaching in the repeated batch 4-CP degradation experiment. Reaction conditions: initial pH 5.0, catalyst dose 0.1 g/L, H$_2$O$_2$ dose 0.5 g/L, initial concentration of 4-CP 25 mg/L, temperature 303 K, reaction time 4 h.

Fig. S6 TOC removal in the 4-CP degradation experiment. Reaction conditions: initial pH 5.0, catalyst dose 0.1 g/L, H$_2$O$_2$ dose 0.5 g/L, initial concentration of 4-CP 25 mg/L,
temperature 303 K, reaction time 4 h.