**Supplementary Material**

**Oxidation-precipitation of magnetic Fe3O4/AC nanocomposite as a heterogeneous catalyst for electro-Fenton treatment**

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**Synthesis of Fe3O4 NPs**

4.000 g of iron (II) sulfate heptahydrate and 1.800 g of sodium nitrate were dissolved in 200 ml of double distilled water and the solution was deoxygenated using Ar gas. After 20 min, the resulted solution was heated to 333 K and 20 ml ammonium hydroxide (28%) was added dropwise, under vigorous stirring. The temperature was kept at 333 K for 1 h. The mixture was cooled to room temperature and the solid was collected by a magnetic bar. The precipitate was washed with double distilled water until reaching pH=7 and dried in vacuum oven at 353 K for 12 h.



**Figure S1.** Nitrogen adsorption/desorption isotherms for (a) Fe3O4 and (b) Fe3O4/AC



**Figure S2.** The magnetization hysteresis loops of (a) Fe3O4 and (b) Fe3O4/AC



**Figure S3.** Catechol adsorption on the surface of catalyst before EF reaction (pH 3, Fe3O4/AC: 1.2 g L-1, Catechol: 1.0 × 10-3 mol L-1)



**Figure S4.** Catechol removal by various processes at the optimum conditions (pH 3, Fe3O4/AC: 0.9 g L-1, Na2SO4: 0.05 mol L-1, Catechol: 8.0×10-4 mol L-1 at I: 120 mA)



**Figure S5.** Plot of ln ([catechol]0/[catechol]) versus time for catechol removal at the optimized condition (pH 3, Fe3O4/AC : 0.9 g L-1, Na2SO4: 0.05 mol L-1, Catechol: 8.0×10-4 mol L-1 at 120 mA)



**Figure S6.** GC-MS chromatogram of sample after 90 min EF degradation of catechol (pH 3, Fe3O4/AC: 0.9 g L-1, Na2SO4: 0.05 mol L-1, Catechol: 8.0×10-4 mol L-1 at 120 mA)