

Supplementary Materials

Text S1. Synthesis of CoOOH

CoOOH was synthesized by an improved chemical precipitation method (Hu et al., 2005; Zhang et al., 2020). 20 mL of NaOH (1 mol/L) solution was added to 200 mL of $\text{Co}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ (0.05 mol/L) solution until the color of solution turned to dark blue, and the solution was then placed in a 60 °C water bath. 2 hours later, excess 30% H_2O_2 was added dropwise and maintained for 4 hours. Finally, the obtained sample was centrifuged, washed, and placed in a 60 °C oven for 12h.

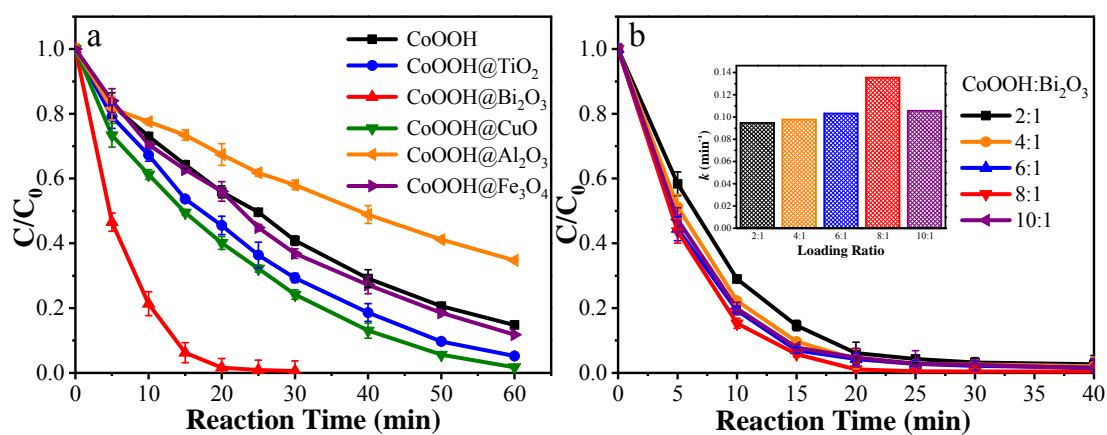


Figure S1. Degradation kinetics of 2,4-DCP with different metal oxides loading on CoOOH (a), effect of loading ratio between CoOOH and Bi₂O₃ on catalytic activity (b). Conditions: [Catalyst] = 0.20 g/L, [2,4-DCP] = 50 mg/L, [PMS] = 6.0 mM, pH = 3, Temperature = 25 °C.

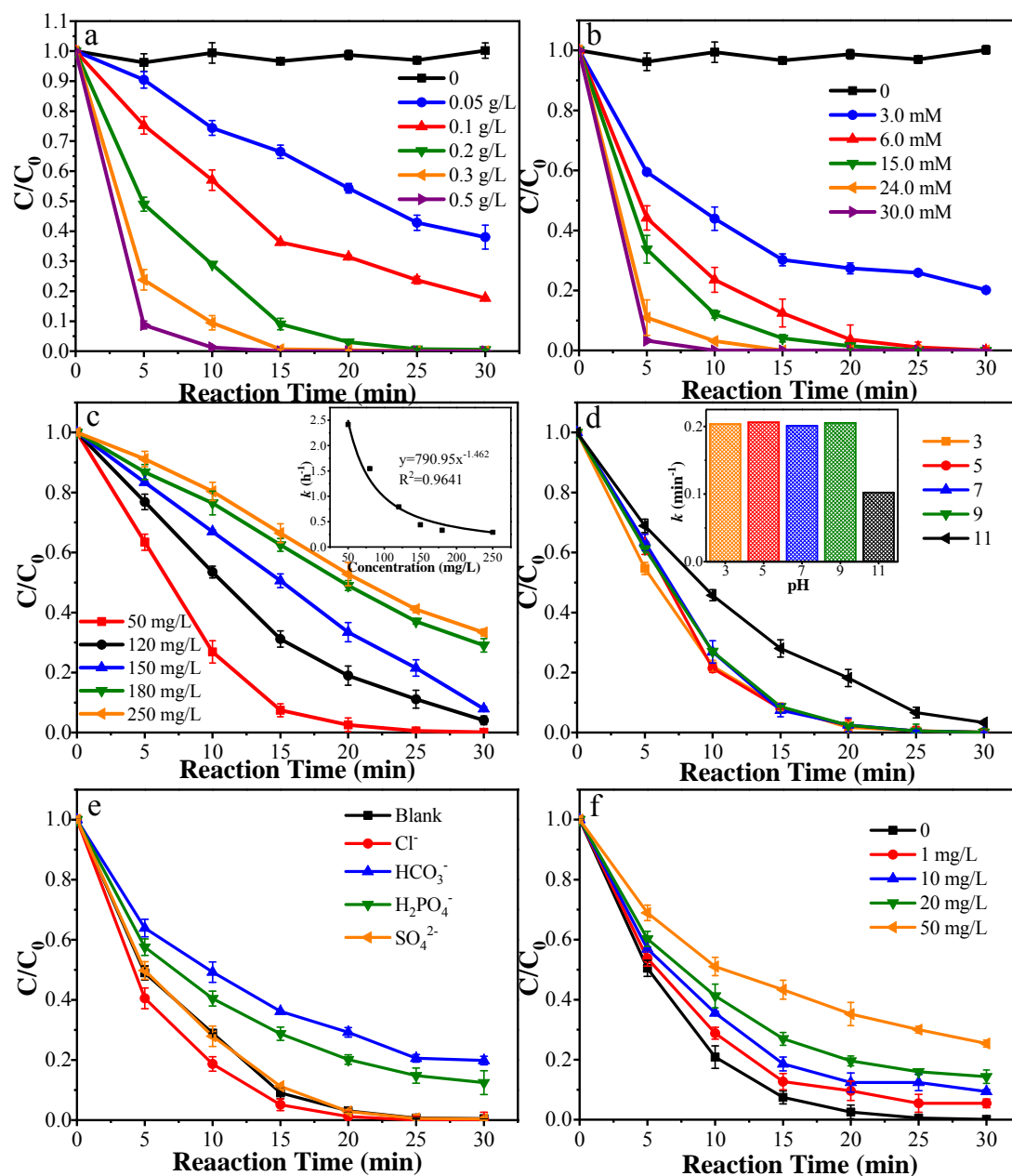


Figure S2. Effect of catalyst dosages (a), PMS dosages (b), initial concentration of 2,4-DCP (c), pH value (d), different anions (e), NOM concentration (f) on catalytic activity.

Conditions: [Catalyst] = 0.20 g/L, [2,4-DCP] = 50 mg/L, [PMS] = 6.0 mM, [anion] = 10 mM, pH = 3,

Temperature = 25 °C.

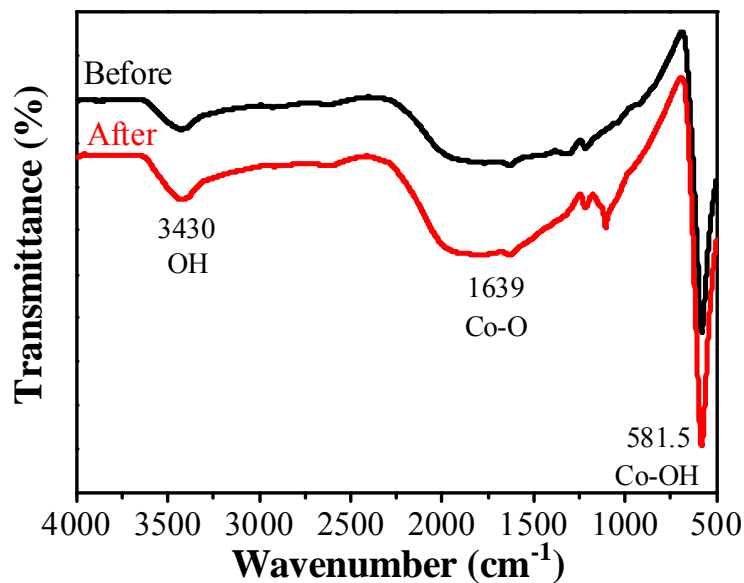


Figure S3. FT-IR spectrum of CoOOH@Bi₂O₃ composite before and after the reaction.

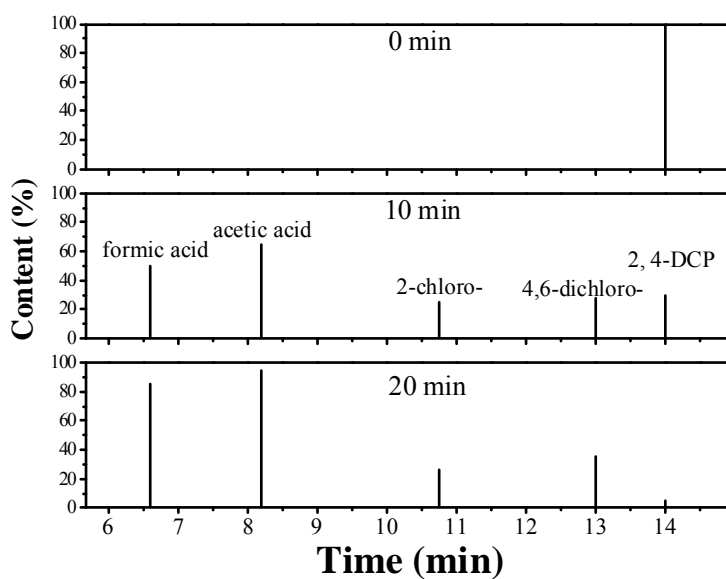


Figure S4. The results of GC-MS analysis in CoOOH@Bi₂O₃/PMS system. Conditions:

[CoOOH@Bi₂O₃] = 0.20 g/L, [2,4-DCP] = 50 mg/L, [PMS] = 6.0 mM, pH = 3, Temperature = 25 °C.

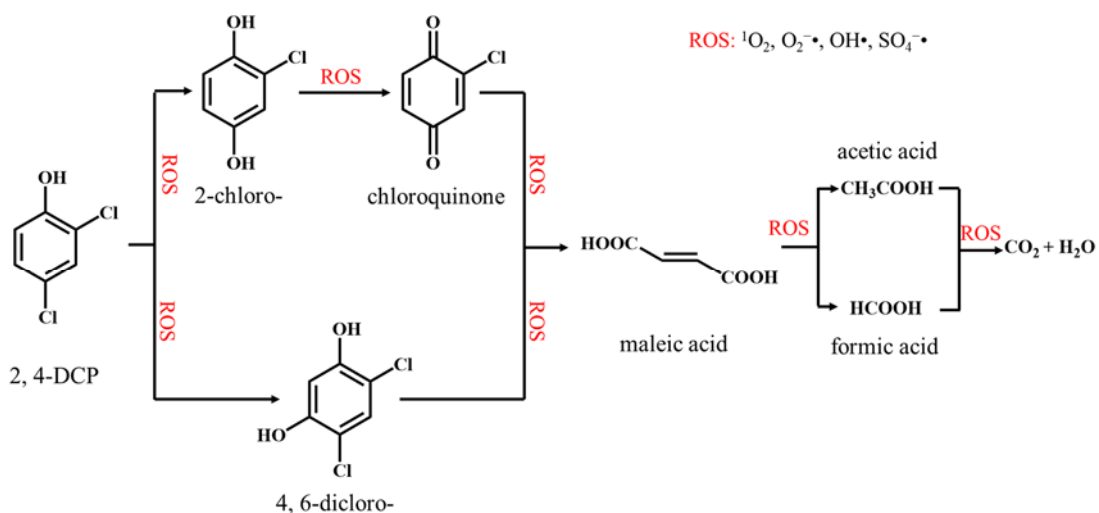


Figure S5. Proposed degradation pathways of 2,4-DCP degradation in CoOOH@Bi₂O₃/PMS system.

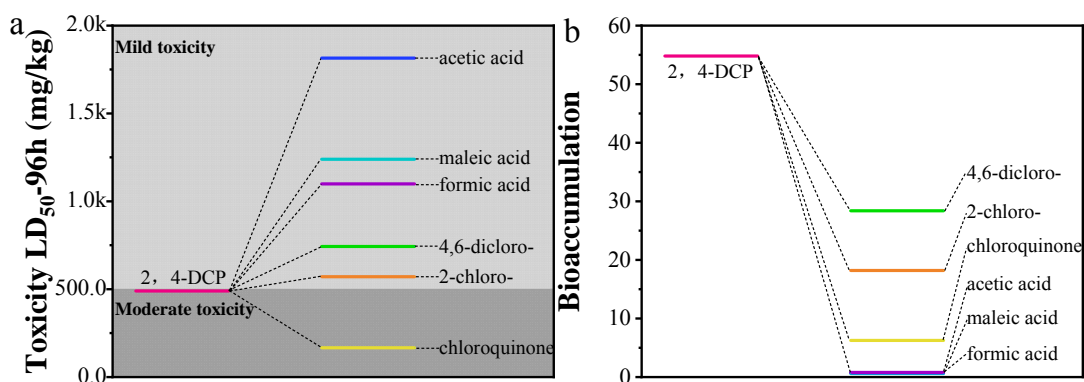


Figure S6. Predicted toxicity (a) and bioaccumulation (b) of 2,4-DCP and intermediates in CoOOH@Bi₂O₃/PMS system.

Table S1. Second-order rate constants for reactions of selected quenchers with different ROS.

Quenching agents	Reaction rate constants ($M^{-1}s^{-1}$) (Liang and Su, 2009; Liu et al., 2011)			
	$SO_4^{\bullet-}$	OH^{\bullet}	1O_2	$O_2^{\bullet-}$
TBA	9×10^5	7×10^8	—	—
EtOH	2.5×10^7	9.7×10^8	—	—
NaN_3	1.2×10^{10}	2.5×10^9	1×10^9 (Zhu et al., 2017)	—
<i>p</i> -BQ	—	$\leq 2.4 \times 10^7$ (Nien Schuchmann et al., 1998)	—	9×10^8 (Wang et al., 2017)

References

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