Catalytic degradation of tetracycline by Mo–Fe catalyst

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\textbf{A B S T R A C T}

Incorporating Mo into Fe-catalyst can enhance the catalytic activity and application range of pH value of catalyst. Therefore, Mo–Fe compounds with different Mo:Fe molar ratios were prepared by a wet chemical process, and then were used to degrade tetracycline (TC) by initiating a heterogeneous Fenton-like system with \( \text{H}_2\text{O}_2 \). The results demonstrated that the \( \text{Fe}_2(\text{MoO}_4)_3/\text{H}_2\text{O}_2 \) system most efficiently degraded TC. At an initial concentration of 50 mg/L TC with natural pH value (about 5.5), about 99% of TC could be removed within 30 min by 0.8 g/L \( \text{Fe}_2(\text{MoO}_4)_3 \) and 17.6 mM \( \text{H}_2\text{O}_2 \) at 299.15 K. Moreover, the pH value did not affect TC removal rate; but changed the total organic carbon removal rate. The Fe leaching concentration was about 0.009 mg/L under the optimal conditions. The TC removal rates in the \( \text{Fe}_2(\text{MoO}_4)_3/\text{H}_2\text{O}_2 \) system were influenced by the complexity level of practical wastewater. The scavenging experiment using several scavengers indicated that both hydroxyl radicals (in solution and catalyst surface) and superoxide radicals played important roles in the degradation of TC. A possible degradation mechanism and pathway for TC were proposed in the \( \text{Fe}_2(\text{MoO}_4)_3/\text{H}_2\text{O}_2 \) system. Finally, a comparison was made between this study and some others, showing that \( \text{Fe}_2(\text{MoO}_4)_3/\text{H}_2\text{O}_2 \) was a preponderant system for TC removal.

\textbf{Keywords:} Mo–Fe catalyst; Hydrogen peroxide; Fenton-like; Tetracycline

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