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CATALYTIC WET AIR OXIDATION OF TETRACYCLINE WASTEWATER BY MoS_2 NANO SHEET AND ITS MECHANISM

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Abstract

In this study, we successfully synthesized MoS_2 nano sheets (MNS) using hydrothermal synthesis and employed them as catalysts to degrade tetracycline wastewater in catalytic wet air oxidation (CWAO) system. We used many modern analytical instruments to characterize the synthesized materials, and the characterization results revealed that catalysts displayed a 2D nano sheet morphology. The experimental results of the catalytic wet air oxidation demonstrated that the MoS_2 nano sheets effectively facilitated the degradation of tetracycline wastewater. Under the reaction temperature of 130°C , the tetracycline degradation rate was achieved more than 96% after 90mins. Also, the degradation process was conformed to the apparent first-order kinetic equation and Arrhenius equation. In addition, the catalyst maintained excellent degradation performance after recycling usage. The catalytic mechanism studied through DFT (density functional theory) calculation illustrated that under the condition of thermal excitation ($105\text{-}160^\circ\text{C}$), MoS_2 nano sheet was excited enough electrons and holes to catalyze the degradation of tetracycline wastewater.

Key words: catalytic wet air oxidation, DFT calculation, MoS_2 , nano sheet

Received: April, 2022; *Revised final:* December, 2022; *Accepted:* February, 2023; *Published in final edited form:* March, 2023

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