Iron molybdate (Fe₂(MoO₄)₃) was used as a novel heterogeneous catalyst to activate persulfate (S₂O₆²⁻) for rhodamine B (RhB) degradation. Results indicated 10 mg/L RhB can be completely removed under the addition of 4 mM S₂O₆²⁻ and 0.4 g/L Fe₂(MoO₄)₃ within 240 min. Fe₂(MoO₄)₃ can be repeatedly used for six cycles and showed high stability with Fe leaching amounts less than 2.9% in each run. Possible catalytic mechanism was proposed as follows: RhB degradation intermediate products such as hydroxybenzene, quinone compounds and organic compound radicals acted as electron transfer agents to reduce Fe³⁺ to Fe²⁺, which reacted with persulfate to form Fe³⁺ creating the redox cycling of iron, the RhB and those intermediate products are oxidized directly by the molybdenum peroxy complexes which forming probably with MoO₅²⁻ and persulfate, and the synergy between Fe³⁺ and MoO₅²⁻ occurring the catalytic effect on the persulfate. Additionally, the major intermediates of RhB were identified according to GC/MS and the possible degradation pathway was proposed.

Keywords: Fe₂(MoO₄)₃ catalyst; Persulfate; Sulfate radical; Degradation