

Co-Mn-Al 层状双氢氧化物催化臭氧氧化水中有机污染物的活性

隋铭皓*, 段标标, 盛力, 黄书杭, 余磊

同济大学环境科学与工程学院污染控制与资源化国家重点实验室, 上海 200092

SUI Minghao*, DUAN Biaobiao, SHENG Li, HUANG Shuhang, SHE Lei

State Key Laboratory of Pollution Control and Resource Reuse, School of Environmental Science and Engineering, Tongji University, Shanghai 200092, China

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摘要 采用共沉淀法制备了 Co-Mn-Al 层状双氢氧化物, 并将其用于以硝基苯为目标污染物的催化臭氧降解反应中. 结果表明, Co-Mn-Al 层状双氢氧化物存在时, 硝基苯的降解和矿化效率较单独臭氧氧化系统显著提高. 采用加入羟基自由基捕获剂 (叔丁醇) 和电子顺磁共振检测 (5,5-二甲基-1-吡咯啉-N-氧化物为捕获剂) 的间接、直接方法, 探讨了 Co-Mn-Al 层状双氢氧化物是否强化了羟基自由基的生成. 结果表明, 加入叔丁醇降低了硝基苯的降解效率; 电子顺磁共振检出了更强的羟基自由基加成物生成信号. Co-Mn-Al 层状双氢氧化物的存在促进了羟基自由基的生成.

关键词: 层状双氢氧化物 催化臭氧 硝基苯 叔丁醇, 电子顺磁共振 羟基自由基

Abstract: The catalytic activity of layered double hydroxides containing Co, Mn, and Al for the ozonation of organic pollutants in water was investigated. The Co-Mn-Al layered double hydroxides were prepared by coprecipitation. Nitrobenzene was used as a model compound, and it was shown that the degradation and mineralization of nitrobenzene was increased by the presence of Co-Mn-Al layered double hydroxides as compared to ozonation alone. Both an indirect method of adding a scavenger (*tert*-butanol) of the hydroxyl radical chain reaction and direct electron spin resonance using 5,5-dimethyl-1-pyrroline-*N*-oxide as a spin trapping agent were used to investigate the generation of hydroxyl radicals in the ozonation by the Co-Mn-Al layered double hydroxides. The inhibiting effect of *tert*-butanol on the degradation of nitrobenzene and the detection of the stronger 5,5-dimethyl-1-pyrroline-*N*-oxide/hydroxyl radical adduct showed that the Co-Mn-Al layered double hydroxides catalyzed the generation of hydroxyl radicals.

Keywords: [layered double hydroxide](#), [catalytic ozonation](#), [nitrobenzene](#), [tert-butanol](#), [electron spin resonance](#), [hydroxyl radical](#)

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