

研究论文

Al₂O₃催化剂结构对催化臭氧化活性的影响

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摘要 以Al₂O₃为催化剂催化臭氧化处理邻苯二甲酸二甲酯. 通过XRD、比表面积、孔结构、FTIR和活性评价等方法对催化剂的物化性质及催化活性进行了研究, 考察了焙烧温度、成型粒径对催化剂活性的影响. 结果表明, Al₂O₃催化剂对臭氧化降解邻苯二甲酸二甲酯具有很高的催化活性, 反应120 min后, 总有机碳(TOC)的去除率从单独臭氧氧化的23.9%提高到55.1%; 焙烧温度对催化剂的活性具有很大的影响, 600 °C催化剂催化活性最高; 随着焙烧温度的升高, Al₂O₃晶型经历了从γ-Al₂O₃到θ-Al₂O₃到α-Al₂O₃的转变, 催化剂的比表面积、焙烧得到的孔容逐渐变小, 晶体粒径变大, 表面•OH数量减少, 催化活性下降. Al₂O₃成型粒径的减小, 提高了催化剂的外比表面积, 减小了内部传质扩散的影响, 从而提高了催化活性.

关键词 [催化臭氧化](#) [邻苯二甲酸二甲酯](#) [高级氧化技术](#) [臭氧](#)

分类号

Effect of Alumina Structure on Catalytic Ozonation Activity

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Abstract For catalytic ozonation of dimethyl phthalate with alumina as catalyst, the physicochemical properties (pore size, crystal structure and size, surface area, surface groups) and catalytic performance of the catalyst were investigated based on results of nitrogen adsorption-desorption, XRD, TEM, FTIR and activity evaluation. The effects of calcination temperature and particle diameter of the catalyst on its activity were studied. Results show that Al₂O₃ can significantly increase the effect of such ozonation, and total organic carbon (TOC) removal rate in 120 min can reach 55.1% while only 23.9% with ozone alone. Catalytic performance was affected significantly by calcination temperature and reached maximum at 600 °C. With the rise of the calcination temperature, the structure of Al₂O₃ was changed from γ-Al₂O₃ to θ-Al₂O₃ then to α-Al₂O₃, the surface area and pore volume were decreased, crystal size and the surface hydroxyl groups were increased and the catalytic activity was decreased.

Key words [catalytic ozonation](#) [dimethyl phthalate](#) [advanced oxidation technique](#) [ozone](#)

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