

### 论文摘要

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## Au/TiO<sub>2</sub>催化剂的制备及低级醇类的光催化消除

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**摘要:** 采用沉积-沉淀法制备Au/TiO<sub>2</sub>催化剂,并用IR、TG-DTA、XRD、TEM、BET、FL、XPS、UV-vis DRS和PL等分析方法对其进行表征;测试和计算在甲醇的光催化消除反应中Au/TiO<sub>2</sub>催化剂的动力学参数;以低级醇类消除反应为模式反应评价催化剂在紫外光照下的光催化性能。结果表明: Au质量分数为1%的Au/TiO<sub>2</sub>催化剂在200 °C下活化4 h的光催化活性最佳,0.15 g催化剂可将初始浓度为7.0 g/m<sup>3</sup>、流速为12.5 mL/min的甲醇和初始浓度为2.14 g/m<sup>3</sup>、流速为5 mL/min的乙醇以及初始浓度为2.21 g/m<sup>3</sup>、流速为4 mL/min的正丙醇完全消除;得到的反应活化能E<sub>a</sub> = 14.80 kJ/mol,拟合的曲线线性关系好(R = 0.981 1),符合一级动力学反应规律。

**关键字:** Au/TiO<sub>2</sub>; 光催化消除; 甲醇; 乙醇; 正丙醇

## Preparation of Au/TiO<sub>2</sub> catalyst and their performance for photo-catalytic elimination of light alcohols

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**Abstract:** Au/TiO<sub>2</sub> catalyst was prepared by deposition-precipitation methods, and characterized by IR, TG-DTA, XRD, TEM, BET, FL, XPS and UV-vis DRS spectrum analysis. The dynamic parameters of the elimination of methanol over Au/TiO<sub>2</sub> catalyst were also tested and computed. The photocatalytic eliminations of alcohol steams (methanol, ethanol, n-propanol) were used as model reaction to evaluate the photocatalytic activity of the catalyst under ultraviolet light irradiation. The results show that TiO<sub>2</sub> catalyst doped with 1% Au activated under 400 °C for 4 h has the highest activity. Methanol with initial concentration of 7.0 g/m<sup>3</sup> and flow rate of 12.5 mL/min, ethanol with initial concentration of 2.14 g/m<sup>3</sup> and flow rate of

5 mL/min, propanol with initial concentration of  $2.21 \text{ g/m}^3$  and flow rate of 4.0 mL/min can be completely eliminated when 0.15 g catalysts are used. The activation energy is 14.80 kJ/mol, the pre-exponential factor is  $1.126 \text{ 1/s}$  and the correlation coefficient  $R$  is 0.981 1, which accords to the first order dynamics law.

**Key words:** Au/TiO<sub>2</sub>; photocatalytic elimination; methanol; ethanol; propanol

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