

H₂O和SO₂对Ce(1)Mn(3)Ti 催化剂催化氧化NO性能的影响

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Effects of H₂O and SO₂ on a Ce(1)Mn(3)Ti catalyst for NO catalytic oxidation

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摘要 为了提高MnO_x/TiO₂催化剂催化氧化NO的活性,在载体TiO₂上负载醋酸锰的同时掺杂了一定量的硝酸铈,构成了Ce(1)Mn(3)Ti催化剂,并对催化剂进行XRD、BET和XPS等表征。重点考察了H₂O和SO₂对催化剂活性的影响,通过FT-IR、SEM和BET等表征手段对毒化前后的催化剂组成及结构进行了分析。结果表明,Ce(1)Mn(3)Ti催化剂具有较好的活性,在空速41 000 h⁻¹、NO体积分数为300×10⁻⁶及O₂含量10%的条件下,反应温度200℃时NO转化率可达58%,250℃时NO转化率达到最高值85%。单独加入4%H₂O使得催化剂活性降低,升高反应温度,H₂O对催化剂的影响减弱;同时通入4%H₂O和100×10⁻⁶SO₂,在反应温度250℃时,NO转化率下降并维持在48%左右,停止通入后恢复到61%。H₂O和SO₂使催化剂活性物种硫酸盐化失活。

关键词: NO 催化氧化 抗硫抗水 Ce掺杂MnO_x/TiO₂

Abstract: In order to improve the activity of catalytic oxidation of NO over MnO_x/TiO₂, a certain amount of cerium nitrate was doped into the catalyst while the MnO_x/TiO₂ catalyst was prepared by impregnation on TiO₂. Ce(1)Mn(3)Ti catalyst was characterized, using XRD, BET and XPS. At the same time, the effects of H₂O and SO₂ on catalytic oxidation of NO were investigated. The deactivation mechanisms in the presence of H₂O and SO₂ were analyzed by FT-IR, SEM and BET. The results showed that Ce(1)Mn(3)Ti yielded a 58% NO conversion at 200℃, and 85% at 250℃ when the space velocity was 41 000 h⁻¹, O₂ and NO concentrations were 10% and 300×10⁻⁶ respectively. The activity of catalyst declined in the presence of only 4% H₂O but this negative effect could be counteracted by increasing the reaction temperature. After in the presence of 4%H₂O and 100×10⁻⁶ SO₂ together, NO conversion was maintained at 48%. The activity of the deactivated catalyst could recover to 61% after removing H₂O and SO₂. H₂O and SO₂ make catalyst deactivation because of the active component has been sulfuric acid stalinization.

Key words: NO catalytic oxidation sulfur resistance and water resistance Ce doped MnO_x/TiO₂

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