

三聚氰胺浸渍活性炭用于低温NH₃-SCR脱硝的研究

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Selective catalytic reduction of NO with NH₃ over activated carbon impregnated with melamine at low temperature

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摘要 通过将三聚氰胺(M)浸渍在活性炭(AC)上制备了渗氮活性炭(ACM),研究了浸渍时间、煅烧温度等因素对ACM含氮量以及低温NH₃-SCR脱硝活性的影响。结果表明,三聚氰胺浸渍后可以提高活性炭的低温脱硝活性,在80℃下ACM-5-900的NO转化率达到51.67%,而AC只有21.92%。采用BET、元素分析及XPS等分别对渗氮活性炭ACM的结构、表面含氮量以及含氮官能团分布进行分析,表明含氮官能团的存在形式而不是含氮量影响渗氮活性炭的低温脱硝活性。同时NO+O₂-TPD结果表明,渗氮改性后脱硝活性提高主要是由于表面含氮官能团提高了活性炭对NO的吸附和氧化。另外,SO₂的存在会抑制渗氮活性炭的低温脱硝活性。

关键词: 脱硝 活性炭 选择性催化还原 含氮官能团

Abstract: N-doped activated carbons (ACM) was obtained by impregnated activated carbon (AC) with melamine (M). The relationship between the impregnated time and calcination temperature on the nitrogen content and NH₃-SCR activity was investigated. Results showed that SCR activity of ACM was higher than original AC. For ACM-5-900 was about 51.67% at 80 °C while AC was about 21.92%. Characterizations of BET, element analysis and XPS were employed to study the structural properties, nitrogen contents and distribution of nitrogen-containing groups of ACM. Results indicated that NO conversion of ACM was influenced by the form of nitrogen-containing functional groups rather than the nitrogen content. The NO+O₂-TPD revealed that nitrogen-containing surface groups of ACM facilitated the adsorption and oxidation of NO, leading to the higher NO conversion. However, SO₂ played an inhibit role on NO conversion of ACM.

Key words: DeNO_x activated carbon SCR N-containing groups

收稿日期: 2013-12-02;

基金资助:

国家自然科学基金(21103218, 21106174, 21177136); 中国科学院战略性先导科技专项(XDA07030300)。

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引用本文:

李巧艳, 侯亚芹, 韩小金等. 三聚氰胺浸渍活性炭用于低温NH₃-SCR脱硝的研究[J]. 燃料化学学报, 2014, 42(04): 487-493.

LI Qiao-yan, HOU Ya-qin, HAN Xiao-jin et al. Selective catalytic reduction of NO with NH₃ over activated carbon impregnated with melamine at low temperature[J]. J Fuel Chem Technol, 2014, 42(04): 487-493.

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