

工程热物理

CuO/g-Al₂O₃和CuO-CeO₂-Na₂O/g-Al₂O₃催化吸附剂的脱硝性能

赵清森 孙路石 向军 石金明 王乐乐 殷庆栋 胡松

华中科技大学煤燃烧国家重点实验室 华中科技大学煤燃烧国家重点实验室 华中科技大学煤燃烧国家重点实验室
华中科技大学煤燃烧国家重点实验室 华中科技大学煤燃烧国家重点实验室 华中科技大学煤燃烧国家重点实验室
华中科技大学煤燃烧国家重点实验室

摘要: 利用改进的溶胶凝胶法制备纳米孔径的CuO/ γ -Al₂O₃和CuO-CeO₂-Na₂O/ γ -Al₂O₃催化吸附剂颗粒, 在固定床上测试其催化脱硝活性。两类催化吸附剂250~400℃范围内脱硝效率稳定在70%以上。在350℃时效率稳定在最高值。利用程序升温方法研究了两大类催化剂对NH₃和NO的氧化性能, 发现NH₃在高于400℃下急剧氧化, 是脱硝效率下降的主要原因。CuO/ γ -Al₂O₃催化剂能将NO氧化生成NO₂, NO₂生成有利于脱硝反应的进行。NO在催化剂上的吸附对脱硝过程有重要作用。改进的CuO-CeO₂-Na₂O/ γ -Al₂O₃催化剂能使NH₃在高温400℃下不被氧化, 也促进了NO在催化剂表面的吸附, 从而提高催化剂了脱硝效率。催化剂反应的机理为NO吸附在催化剂表面, 氧化生成吸附态的NO₂, 其再与吸附催化剂上的NH₃反应。

关键词: 溶胶凝胶法 CuO/ γ -Al₂O₃ CuO-CeO₂-Na₂O/ γ -Al₂O₃ NH₃ NO 选择性催化还原

Selective Catalytic Reduction of NO over CuO/g-Al₂O₃ and CuO-CeO₂-Na₂O/g-Al₂O₃ Catalysts

ZHAO Qing-sen SUN Lu-shi XIANG Jun SHI Jin-ming WANG Le-le YIN Qing-dong HU Song

Abstract: CuO/g-Al₂O₃ and CuO-CeO₂-Na₂O/g-Al₂O₃ granular sorbents were synthesized by the modified sol-gel method. Selective catalytic reduction (SCR) of NO over the two kinds of sorbents was carried out in a fixed bed reactor. The optimum temperature ranges of the two catalysts are 250~ 400 °C. The maximum efficiency is stably reached at 350 °C. Preliminary tests were carried out to study the behavior of NO and NH₃ over fresh sorbents in the presence of oxygen. The NO oxidation experiments reveal that NO is oxidized to NO₂ over the sorbents. The NH₃ oxidation experiments show that NO and N₂O are gradually produced with temperature increasing. The oxidation degree of NH₃ is lower over the CuO-CeO₂-Na₂O/g-Al₂O₃ sorbent than that of the CuO/g- Al₂O₃ sorbent at 400 °C, and the adsorption amount of NO over the CuO-CeO₂-Na₂O/g-Al₂O₃ sorbent is larger. So the denitration efficiency of the CuO-CeO₂-Na₂O/g-Al₂O₃ sorbent is improved. The NH₃ and NO desorption experiments show that NH₃ and NO could be absorbed on the granular catalysts and the NO₂ intermediate species could play an important role in the reaction mechanism.

Keywords: sol-gel method CuO/ γ -Al₂O₃ CuO-CeO₂-Na₂O/ γ -Al₂O₃ NH₃ NO selective catalytic reduction

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通讯作者: 赵清森

作者简介:

作者Email: zhaoqingsen@gmail.com

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