燃料化学学报
JOURNAL OF FUEL CHEMISTRY AND TECHNOLOGY

燃料化学学报 » 2014, Vol. 42 » Issue (03): 377-384　DOI:

SO_2对甲烷在金属铁表面还原NO的反应影响

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Effect of SO_2 on the reduction of NO by methane over iron catalyst

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摘要 采用卧式程序控温电加热陶瓷管反应器，在N_2和模拟烟气气氛中、300~1 100 ℃下，研究了SO_2对甲烷在金属铁及化物表面还原NO反应的影响。采用XRD等手段对反应前后铁催化剂样品的组成变化进行了表征，分析了SO_2在甲烷-铁脱硝中的作用机理。结果表明，甲烷在金属铁及氧化铁表面能够高效率地还原NO，NO还原效率不受烟气中SO_2的影响。在SO_2分数为0.01%~0.04%的N_2气氛中，温度高于700 ℃时，金属铁上NO还原率和SO_2脱除率可同时达到100%。在SO_2体积为0.01%~0.04%的模拟烟气中，当温度高于850 ℃时，NO还原效率达到90%以上；温度为950 ℃时，NO还原效率达到98%，SO_2对NO还原效率的影响可忽略。当反应温度为1 000 ℃时，在含0.02%SO_2的模拟烟气中，甲烷的体积分数为1时，持续100 h金属铁表面上的NO还原效率都能保持95%以上。

关键词： NO还原　甲烷　铁　氧化铁　SO_2

Abstract: The effect of SO_2 on the reduction of NO by methane over iron and iron oxides was investig at 300~1 100 ℃ in an electrically heated ceramic tubular flow reactor in simulated flue gas and N_2 atmosphere. The iron catalyst after reaction was characterized by X-ray diffraction (XRD) and the mecha of NO reduction by methane over iron catalyst in the presence of SO_2 was elucidated. The results demonstrated that methane is effective to reduce NO over iron and iron oxides and SO_2 in the flue gas h little influence on the reduction of NO. In N_2 atmosphere with 0.01%~0.04% SO_2, metallic iron can simultaneously eliminate almost 100% of NO and SO_2 at a temperature above 700 ℃. In the simulated flu gas with 0.01%~0.04% SO_2, the efficiencies of NO reduction at 850 ℃ and 950 ℃ are higher than 95% a 98%, respectively; the influence of SO_2 on NO reduction is insignificant. More than 95% of NO is reduced 1.13% methane over iron at 1 000 ℃ in a durable test over 100 h in the simulated flue gas atmosphere containing 0.02% SO_2.

Key words: NO reduction　methane　iron　iron oxide　SO_2

收稿日期: 2013-08-06;

基金资助:

国家自然科学基金（51278095）；上海市自然科学基金（11ZR1401000）。

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引用本文:

苏亚欣,苏阿龙,任立铭等. SO_2对甲烷在金属铁表面还原NO的反应影响[J]. 燃料化学学报, 2014, 42(03): 377-384.

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