

能源和环境工程

烟气气相组分及Ca(OH)₂对KMnO₄氧化NO的影响机理

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摘要

在固定床反应器中考察了KMnO₄氧化烟气中NO的过程, 分析了烟气组分H₂O、O₂及SO₂对NO氧化过程的影响规律, 得到了Ca(OH)₂对KMnO₄氧化NO的影响机理。实验结果表明, H₂O是KMnO₄氧化NO的必要条件; 在含H₂O条件下, O₂可以提高NO氧化率。SO₂与氧化剂反应生成无水钾镁矾类复盐K₂Mn₂(SO₄)₃对NO氧化具有负面作用; Ca(OH)₂的加入提高了氧化剂表面的固体碱度从而促进氧化过程进行; 通过添加Ca(OH)₂可以降低SO₂对NO氧化过程的负面影响。根据气体成分和产物分析可知, KMnO₄在钙基吸收剂表面氧化烟气中NO的机理可能是KMnO₄以离子态将吸附在氧化剂表面的NO和SO₂氧化为NO₂和SO₃, 生成的NO₂、SO₃再传递到氧化位临近的碱性位被吸收。

关键词

[NO氧化](#) [高锰酸钾](#) [同时脱硫脱硝](#) [固定床反应器](#)

分类号

Mechanism of influence of flue gas components and Ca(OH)₂ on oxidation of NO over KMnO₄

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Abstract

The processes of oxidation of NO from flue gas of coal combustion over KMnO₄ was studied in the fixed bed reactor at a low temperature. The effect of flue gas components, such as SO₂, H₂O and O₂, on the oxidation of NO was analysed. The influence mechanism of Ca(OH)₂ on oxidation of NO over KMnO₄ was proposed. The presence of H₂O was found to be necessary for the oxidation of NO to NO₂ over KMnO₄. SO₂ was absorbed as K₂Mn₂(SO₄)₃ by KMnO₄, which restrained the oxidation of NO. The addition of Ca(OH)₂ into KMnO₄ could increase the solid alkalinity of KMnO₄ surface and enhance the oxidation of NO. Ca(OH)₂ could weaken the inhibition of oxidation of NO by SO₂. The results of XRD analysis of the products and the components of flue gas from reactor outlet showed the oxidation mechanism of NO over KMnO₄ that the NO and SO₂ firstly reacted with KMnO₄ in the presence of H₂O, and then were transferred to alkaline site and absorbed.

Key words

[oxidation of NO](#) [KMnO₄](#) [simultaneous removal of NO_x and SO₂](#) [fixed bed reactor](#)

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