

工程热物理

添加Na₂CO₃对尿素作还原剂的选择性非催化还原工艺影响的实验研究

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摘要:

在自行研制的试验台上对尿素作还原剂及Na₂CO₃作添加剂的选择性非催化还原(selective non-catalytic reduction, SNCR)脱硝工艺进行实验研究, 并对NO_x的各种成分进行分析。无添加剂时, 在800~975 °C范围内, 随温度的升高NO的浓度先降低后升高, N₂O的浓度先升高后降低, 转折点为900 °C。随着氨氮比h 的增大, NO的去除率增大, N₂O的浓度随之升高, 900 °C下NO去除率在氨氮比为2.0时, 高达90.46%, 但总NO_x去除率受N₂O的影响要低得多。有Na₂CO₃作添加剂时, 随着Na₂CO₃添加量的增大, N₂O的浓度逐渐减小, NO的浓度在较低温度时先减小后增大, 较高温度时一直增大, 但变化幅度要比N₂O小。Na₂CO₃作添加剂去除了N₂O, 且没有对NO的去除形成很大影响, 在氨氮比为1.5时, 900 °C条件下可将总NO_x去除率从30%提高到70.45%。Na₂CO₃作添加剂对工艺的影响是产生活性基元和去除尿素分解生成的HNCO联合作用造成的, 但会引起烟气变为碱性。

关键词: 脱硝 Na₂CO₃ 添加剂 N₂O 总NO_x去除率 烟气碱性

Experimental Research on the Influence of the Addition of Na₂CO₃ to Selective Non-catalytic Reduction Process With Urea as Reducing Agent

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Abstract:

Experimental study of SNCR process with urea as reducing agent and Na₂CO₃ as additive was carried out and detail analysis of different compositions of NO_x was given out. In the temperature range of 800~975 °C, the components of NO decreases at first and then increases, while the component of N₂O increase at first and then decreases with the increasing of temperature with no additive. With increasing of h (h = 0.5[CO(NH₂)₂]/[NO_x]), NO removal efficiency increases and the components of N₂O also increases. At the optimum temperature 900 °C, NO removal efficiency can high to 90.46% with h = 2.0, but the total NO_x removal efficiency was much lower for the influence of N₂O. With Na₂CO₃ as additive, the component of N₂O decreases with Na₂CO₃ addition increasing at all temperatures, while the component of NO decreases at first and then increase at lower temperature and increases at higher temperature with Na₂CO₃ addition increasing, but the extent was smaller than N₂O. For Na₂CO₃ as additive, N₂O was decreased significantly and had no large effect on the removal of NO, the removal efficiency of total NO_x at 900 °C with h = 1.5 was improved from about 30% to 70.45% through the addition of Na₂CO₃. The influence of Na₂CO₃ as additive to the process is the combined effect of the production of active species and the removal of HNCO produced by the decomposition of urea, but it also caused the flue gas became alkaline gas.

Keywords: NO_xOUT Na₂CO₃ additive N₂O total NO_x removal efficiency flue gas alkaline

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