

## 循环灰对NH<sub>3</sub>氧化反应影响的实验研究

侯祥松<sup>1</sup>;常东武<sup>1</sup>;张海<sup>1</sup>;岳光溪<sup>1</sup>

清华大学热能工程系<sup>1</sup>

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### 摘要

循环灰对NH<sub>3</sub>氧化的催化作用对循环流化床锅炉的喷氨脱硝效果有重要影响。文中利用固定床反应器研究了石英砂、循环灰和循环灰主要成分对NH<sub>3</sub>氧化反应的影响。在实验中利用傅里叶红外光谱仪测量了NH<sub>3</sub>和O<sub>2</sub>通过反应器后产物气体中的NH<sub>3</sub>、NO和N<sub>2</sub>O的体积分数。与NH<sub>3</sub>气相反应氧化的结果对比,循环灰能够促进NH<sub>3</sub>的氧化,NH<sub>3</sub>的转化率显著提高,主要生成NO、N<sub>2</sub>O和N<sub>2</sub>。循环灰的主要成分中,铁氧化物Fe<sub>2</sub>O<sub>3</sub>和Fe<sub>3</sub>O<sub>4</sub>及CaO对NH<sub>3</sub>的氧化有较强的催化活性,并促进N<sub>2</sub>O的生成;而SiO<sub>2</sub>和Al<sub>2</sub>O<sub>3</sub>对NH<sub>3</sub>的氧化性能影响不大。NH<sub>3</sub>氧化生成产物的选择性与反应温度、循环灰的成分等因素有关。

关键词 [氨气](#) [循环流化床锅炉](#) [循环灰](#) [催化](#) [N<sub>2</sub>O](#)

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## Experimental Study on the Effect of Circulating Ashes on Ammonia Oxidation

HOU Xiang-song CHANG Dong-wu ZHANG Hai YUEGuang-xi

### Abstract

The de-NO<sub>x</sub> efficiency by ammonia injection in circulating fluidized bed (CFB) boiler is influenced by ammonia catalytic oxidation over circulating ash. In order to assess the mechanisms of thermal de-NO<sub>x</sub> in CFB boilers with ammonia (NH<sub>3</sub>) injection, the effect of circulating ashes on NH<sub>3</sub> oxidation was experiment- ally studied. The experiments were conducted on a fixed bed reactor using quartz sand, circulating ash and its major component as bed materials. The concentrations of NH<sub>3</sub>, NO and N<sub>2</sub>O in exhaust gas from the reactor were measured with Fourier transform infrared(FTIR). Compared with the quartz sand on which NH<sub>3</sub> is nearly completely oxidized by homogeneous reactions, circulating ashes showed catalytic effect on NH<sub>3</sub> oxidation, converting NH<sub>3</sub> into NO, N<sub>2</sub>O and N<sub>2</sub>. The results also showed that for the major component of circulating ash, SiO<sub>2</sub> and Al<sub>2</sub>O<sub>3</sub> are nearly inert, while Fe<sub>2</sub>O<sub>3</sub>, Fe<sub>3</sub>O<sub>4</sub> and CaO act as active catalysts. The formation of NO and N<sub>2</sub>O through NH<sub>3</sub> oxidation is selectively catalyzed by circulating ashes, and influenced by ash composition, reaction temperature and O<sub>2</sub> concentration.

Key words [NH<sub>3</sub>](#) [DCFBS](#) [circulating ash](#) [catalytic gasification](#) [N<sub>2</sub>O](#)

DOI:

通讯作者 侯祥松 [houxiangsong99@mails.tsinghua.edu.cn](mailto:houxiangsong99@mails.tsinghua.edu.cn)

作者个人主页 侯祥松 常东武 张海 岳光溪

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