

### SO<sub>2</sub>对钙基CO<sub>2</sub>吸收剂循环煅烧/碳酸化反应的影响

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### Influence of SO<sub>2</sub> on the cyclic calcination and carbonation of calcium-based sorbent for CO<sub>2</sub> capture

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**摘要** 在循环煅烧/碳酸化反应系统中,研究了SO<sub>2</sub>对钙基吸收剂CaCO<sub>3</sub>捕集CO<sub>2</sub>的影响,获得了SO<sub>2</sub>对钙基吸收剂碳酸化特性、煅烧特性以及循环稳定性的影响规律,并结合SEM分析结果,从循环煅烧/碳酸化反应角度,分析了可能存在的原因。结果表明,钙基吸收剂吸收CO<sub>2</sub>的能力随着循环反应次数的增加逐渐发生衰减,在SO<sub>2</sub>影响下,这种衰减会进一步加剧,且衰减程度随着SO<sub>2</sub>浓度的增加而增大,经过十次循环后,碳酸化转化率分别为25.5%(0%SO<sub>2</sub>)、16.9%(0.1%SO<sub>2</sub>)和5.2%(0.2%SO<sub>2</sub>)。造成这种衰减加剧的主要原因是反应产生较厚的硫酸化产物层,硫酸化产物层使颗粒表面孔隙发生堵塞,阻碍了CO<sub>2</sub>在吸收剂内部的扩散,降低了碳酸化转化率。

**关键词:** 钙基吸收剂 煅烧 碳酸化 CO<sub>2</sub>捕集 SO<sub>2</sub>影响

**Abstract:** The effects of SO<sub>2</sub> on the cyclic calcination and carbonation characteristics and the cycling stability of calcium-based CaCO<sub>3</sub> sorbent for CO<sub>2</sub> capture were investigated in a cycling calcination/carbonation system. The results indicated that the capacity of CaCO<sub>3</sub> sorbent for CO<sub>2</sub> capture decreases with the increase of the number of calcination/carbonation cycling and the addition of SO<sub>2</sub> will further reduce the capacity for CO<sub>2</sub> capture; moreover, the decrease of the capacity for CO<sub>2</sub> capture may be aggravated at higher SO<sub>2</sub> concentration. After 10th cycling, the carbonation conversions of the sorbent under SO<sub>2</sub> concentration of 0, 0.1% and 0.2% are 25.5%, 16.9% and 5.2%, respectively. SEM characterization results revealed that sulfate products are formed on the surface of CaCO<sub>3</sub> particles in the presence of SO<sub>2</sub>; the sulfate products block the sorbent holes and then reduce the diffusion rate of CO<sub>2</sub> into the sorbent, which may then reduce the capacity of the calcium-based sorbent for CO<sub>2</sub> capture.

**Key words:** Ca-based sorbent calcination carbonation CO<sub>2</sub> capture SO<sub>2</sub> influence

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