

论文

白泥循环煅烧/碳酸化捕集CO<sub>2</sub>的反应特性

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摘要:

在双固定床反应器和热重分析仪上研究造纸白泥在循环煅烧/碳酸化过程中的CO<sub>2</sub>捕集性能。结果表明:当碳酸化温度为700℃时,白泥循环碳酸化转化率最高。随煅烧温度升高,白泥碳酸化转化率迅速降低。第1次循环白泥碳酸化速率和碳酸化转化率最高,5次循环后,碳酸化速率和碳酸化转化率基本不再衰减,从第5次循环到第100次循环转化率基本维持在0.21左右。白泥初始循环碳酸化转化率较低,15次循环后体现出优于石灰石的捕集CO<sub>2</sub>性能。煅烧白泥孔隙主要分布在1~10 nm,在碳酸化过程中容易被堵塞,所以初始循环碳酸化转化率较低;经多次循环后,煅烧后白泥表面孔隙结构优于煅烧后石灰石,因此白泥取得比石灰石更高的碳酸化转化率。

关键词: 造纸白泥; 钙循环法; 煅烧/碳酸化; CO<sub>2</sub>捕集

CO<sub>2</sub> capture behavior of white mud during its calcination/carbonation cycles

Abstract:

The CO<sub>2</sub> capture capacity of white mud at high temperature was investigated using a dual fixed bed reactor and a thermo gravimetric analyzer. The results show that the optimum carbonation temperature for white mud is 700 °C .The carbonation conversion of white mud decreases rapidly with increasing calcination temperature. The carbonation rate and carbonation conversion of white mud at the 1st cycle are the highest. The carbonation rate and carbonation conversion of white mud barely decrease after 5 cycles, and the carbonation conversions are basically maintained at 0.21 from the 5th cycle to the 100th cycle. The carbonation conversions during the previous cycles are relatively low, however, white mud demonstrates a higher CO<sub>2</sub> capture capacity than limestone after 15 cycles. The pore distributions of calcined white mud are mainly around 1-10 nm, which are easily blocked during the carbonation reaction process. That is why the carbonation conversions of white mud during the previous cycles are lower than that of limestone. The microstructure of calcined white mud after 100 cycles is more beneficial to the carbonation reaction. Therefore, white mud can achieve higher carbonation conversions than limestone after certain cycles.

Keywords: white mud; calcium looping; calcination/carbonation; CO<sub>2</sub> capture

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