

Effect of calcination temperature and extent on the CO₂ carrying capacity of lime-based sorbents

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The effect of calcination temperature and duration on the cyclic CO₂ capture performance of natural lime-based sorbents was conducted in this research. Tests showed that increasing calcination temperature considerably reduced the sorbent reactivity over the first few cycles. No significant variation in performance was observed when a sorbent remained at the calcination temperature after completing limestone decomposition. On the other hand, incomplete limestone calcination significantly altered the sorbent cyclic utilization and CO₂ carrying capacity. A semi-empirical method is proposed to estimate the fast reaction-controlled carbonation extent at different reaction cycles, calcination extents and temperatures. This method is shown to work well for two different naturally derived limestones exposed to different calcination conditions.