

分离工程

EtOH-H₂O对钙基吸收剂分离CO₂的影响

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收稿日期 2007-6-7 修回日期 2007-11-16 网络版发布日期 2008-2-20 接受日期

摘要

采用不同体积浓度的乙醇溶液分别对石灰石和石灰石的煅烧产物CaO进行调质处理, 研究它们的碳酸化反应, 并与水合调质CaO的碳酸化进行比较。通过SEM和N₂吸附法考察吸收剂多次煅烧的微观结构特性, 进一步揭示了乙醇溶液促进CaO碳酸化的机理。结果表明: 随着循环反应次数的增加, 乙醇溶液调质后CaO的碳酸化转化率明显高于石灰石和水合调质的CaO, 对于石灰石, 乙醇溶液则没有明显的调质效果。CaO经乙醇溶液调质后在650~700℃内有利于碳酸化的进行。乙醇浓度越高, 则经调质后CaO的转化率越高, 抗烧结性能越好。经乙醇溶液调质的CaO煅烧后比表面积和比孔容均比单纯水合大, 远高于煅烧后的石灰石; 比孔容分布和孔比表面积分布明显优于煅烧后的水合CaO和石灰石。乙醇溶液调质对CaO的孔有明显的增扩效应。

关键词

[EtOH-H₂O调质](#) [钙基吸收剂](#) [CCR](#) [CO₂分离](#)

分类号

Effect of EtOH-H₂O on calcium sorbents for CO₂ sequestration

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Abstract

Calcium sorbents of limestone and CaO derived from calcined limestone were modified by ethanol water solutions with different bulk ethanol concentrations. The carbonation reaction of the sorbents was investigated and was compared with that of hydrated CaO. The microstructure of the sorbents was examined further with SEM and N₂ adsorption method, and the potential mechanism for ethanol water solutions to improve the carbonation conversion was revealed. The results showed that the carbonation conversion of CaO modified by ethanol water solution was higher than that of limestone or CaO hydrated by distilled water with an increase in cycle number. The modification by ethanol water solution had no effect on the conversion of limestone. The CO₂ sorption capacity of CaO modified by ethanol water solution at a temperature of 650—700℃ was beneficial to carbonation. The higher the ethanol concentration in solution, the higher the carbonation conversion of modified CaO, and the better the anti-sintering performance. The specific surface area and pore volume of CaO modified by ethanol water solution were higher than those of CaO hydrated by distilled water, and were much greater than those of calcined limestone. The distributions of pore volume and pore area of CaO modified by ethanol water solution were superior to those of hydrated CaO and calcined limestone. The pores in CaO were obviously expanded by an ethanol water solution.

Key words

[EtOH-H₂O modification](#) [calcium sorbents](#) [CCR](#) [CO₂ sequestration](#)

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