

变温镁基CO₂吸附剂的制备及应用 I. Na/Mg物质的量比

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Preparation and application of magnesium-based CO₂ sorbent for temperature swing absorption I. Na/Mg mol ratio

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摘要 以Mg(NO₃)₂和Na₂CO₃为原料, 采用正加沉淀法制备镁基CO₂吸附剂, 利用XRD、SEM-EDS和DTG等方法对吸附剂进行了表征, 研究了 $n(\text{Na})/n(\text{Mg})$ 比对吸附剂的物质组成、形貌和分解温度的影响; 在此基础上, 通过变温吸附脱附动态循环实验考察了不同吸附剂的CO₂吸附性能。实验结果表明, 当 $n(\text{Na})/n(\text{Mg})$ 为8.15时, 吸附剂颗粒粒径小、大小均匀、分解温度低, 吸附容量达到9.584% (质量分数); 经过20次变温吸附脱附循环后, 吸附能力仍保持初始吸附量的95.8%, 表现出良好的稳定性。

关键词: 镁基吸附剂 二氧化碳 变温吸附

Abstract: A series of magnesium-based CO₂ absorbents with different Na/Mg molar ratios were prepared by precipitation method with Mg(NO₃)₂ and Na₂CO₃ as raw materials, and characterized by various methods (including XRD, SEM-EDS and DTG) to study the compositions, morphology and decomposition temperature and so on. The CO₂ absorption performance was evaluated by temperature swing absorption-desorption dynamic cyclic tests to check the impact of Na/Mg molar ratio. It can be seen that optimum molecular ratio of Na to Mg is 8.15, and the sorbents is homogeneous with lower decomposition temperature caused by small particles of the sample, and initial CO₂ adsorption capacity can reach 9.584%. Good recycling capability can be obtained as well. Compared with the initial absorption capacity, there was only 4.2% decrease after 20 recycles.

Key words: magnesium-based absorbent CO₂ temperature swing absorption

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