

论文

活性炭微结构与吸附、解吸CO₂的关系

简相坤, 刘石彩

中国林业科学研究院 林产化学工业研究所, 江苏 南京 210042

摘要:

采用6种不同活性炭, 在常压动态吸附装置中研究0, 15, 25和38 °C时活性炭对CO₂的吸附及解吸性能。通过CO₂和N₂的吸附等温线表征活性炭的孔隙结构, 用红外光谱和Boehm滴定法表征活性炭的表面化学性质。结果表明: 微孔孔径的大小是决定活性炭对CO₂吸附性能好坏的关键因素, 其中0.5~1.0 nm的微孔对CO₂吸附能力的影响较大, 同时2.0~4.5 nm的中孔也对CO₂吸附有积极的贡献, 温度升高使活性炭的吸附和解吸速率都加快, 活性炭表面官能团中羧基和羟基对CO₂的吸附有明显的促进作用, 而羰基不利于解吸。

关键词: 活性炭; 微结构; 吸附; 解吸; CO₂; 表面化学性质

Effect of adsorption and desorption CO₂ on micro-structures of activated carbon

Abstract:

The adsorption and desorption properties of carbon dioxide(CO₂) on six activated carbons were investigated at 0, 15, 25, 38 °C in an atmospheric dynamic adsorption reactor.The adsorbents were characterized by CO₂ and N₂ adsorption isotherms, FT-IR analysis and Boehm titration.The results show that micropore volume of activated carbons is an important factor to characterize the adsorption performance of CO₂, the pore size distribution in the range of 0.5-1.0 nm or 2.0-4.5 nm trend to enhance the adsorption of CO₂.The rate of adsorption or desorption increases with the increase of temperature.The adsorption capacity of CO₂ increases with an increase of carboxyl and hydroxy groups on activated carbons.However, the increase of carbonyl groups would reduce the desorption capacity of CO₂.

Keywords: activated carbon; micro-structure; adsorption; desorption; carbon dioxide; surface chemical property

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通讯作者: 简相坤

作者简介: 简相坤(1988—), 男, 河南信阳人, 硕士研究生

作者Email: jianxiangkun@163.com

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