

工程热物理

兖州煤气化半焦表面官能团特征试验研究

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摘要:

为揭示煤气化过程中煤焦结构的变化规律, 在管式炉中分别在不同温度(300~1 000 ℃)下制取了兖州煤半焦, 并采用傅里叶变换红外分析获得不同气化条件下样品的红外光谱, 测定兖州煤颗粒表面官能团。实验结果表明, 煤的脂肪族构成有限, 导致煤低温气化生烃能力较小, 而高温气化下芳香结构的裂解和缩合协同效应提高了半焦富氢程度; 低温时脂肪结构和芳环结构都不受影响, 随着温度的升高, 原始脂肪结构首先脱落, 当温度较高时芳环才开始开链成脂肪结构并逐渐脱落; CO<sub>2</sub>参与气化反应, 介入酚、醚、醇、酯的C=O基官能团中, 影响气化半焦的富总氧度。

关键词: 煤表面结构 脂肪结构 芳环结构 制焦温度 傅里叶变换红外光谱法

Experimental Study on Surface Functional Groups Characteristics of Yanzhou Semi-cokes of Gasification

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Abstract:

In order to reveal the changing rule of coal structure during coal gasification, the Yanzhou semi-cokes were made in tube furnace at 300~1 000 ℃, and the infrared spectrums were monitored by Fourier transform infrared spectroscopy (FTIR) at different gasification conditions, to analyze the surface functional groups of Yanzhou coal. It was found that limited aliphatic structure in coal lead to small hydrocarbon capacity during coal gasification at low temperature, but the synergy of aromatic structure cracking and condensation could increase the hydrogen-enriched degree of semi-cokes at high temperature; aliphatic structure and aromatic structure are affected little at low temperature, and the original aliphatic structure break off firstly with temperature increasing, while at high temperature, aromatic structure begin to crack to aliphatic structure and to break off gradually; CO<sub>2</sub> participating in gasification, intervening C=O group of phenols, ethers, alcohols and esters, could influence the total-oxygen-enriched efficiency of semi-cokes.

Keywords: coal surface structure aliphatic structure aromatic structure char-making temperature Fourier transform infrared spectroscopy (FTIR)

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