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能源和环境工程

混煤热解过程中的表面形态

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摘要

以管式电炉为热解室，改变热解终温，在惰性气氛下对无烟煤与烟煤的混煤进行快速加热条件下的热解。采用低温氮气吸附方法研究混煤焦表面形态的变化规律。通过对吸附等温线的分析，表明煤焦具有连续、完整的孔隙结构，无定形孔的存在使得吸附迴线存在不闭合的状态。随着热解终温的升高，混煤焦的比表面积先增加后减小；随着烟煤掺混比例的增加，混煤焦的微孔容积和表面积也先增加后减小，A1B2混煤焦具有最大微孔容积和表面积。对煤焦孔隙的分形研究发现煤焦孔隙分形维数与微孔结构关系密切。混煤焦表面形态的变化规律体现了混煤热解的独立性以及相互作用。

关键词 等温吸附 微观结构 孔隙分布 分形维数

分类号

Surface structure of blended coals during pyrolysis

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Abstract

The blended coals of anthracite and bituminous coal were pyrolyzed in a tubular electric furnace in an inert atmosphere at different final temperatures.The coal chars were tested by means of the adsorption of nitrogen at a low temperature to study the surface structure.From the analysis of isotherm adsorption, it was shown that coal chars had continuous and complete pore structures.The presence of amorphous pores perhaps led to the phenomenon of non-dosure of adsorption hysteresis loop.Bituminous coal and A1B1 blended coal char had the same rule that the specific surface area increased with increasing pyrolysis temperature up to 700℃ and then decreased.When the pyrolysis temperature was 1000℃, the micro-pore volume of blended coal chars increased with increasing blend ratio of bituminous coal; however, when the blend ratio was higher than 2/3, the micro-pore volume of blended coal chars decreased.A1B2 blended coal had the maximum micro-pore volume and specific surface area.The fractal analysis showed that micro-pore ratio had close relation to fractal dimension.The variation of surface structure revealed the independence and interaction of parent coals during the pyrolysis of blended coals.

Key words

adsorption isotherm microstructure porous distribution fractal dimension

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