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胜利褐煤液化沥青烯光谱表征

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Spectral characterization of asphaltene from direct liquefaction of Shengli lignite

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摘要 以胜利褐煤为原料，通过不同条件下加氢液化制备了相应的沥青烯，利用元素分析、红外光谱、紫外可见光谱和荧光光谱等分析技术对所制备的沥青烯进行了结构表征，探讨了氢气初压和液化温度对沥青烯结构的影响。结果表明，胜利褐煤液化活性高，沥青烯和前沥青烯等重质中间物收率较低。胜利褐煤沥青烯中芳香体系主要以2~3环缩合芳环及联苯类芳香结构为主。提高氢气初始压力，可以促进煤的加氢裂解及AS脱羟基。高温、高氢压有利于AS中芳环取代基的加氢裂解。相对而言，荧光光谱是沥青烯芳香结构的有效表征手段，其荧光光谱特征结果与元素分析、H/C原子比间存在明显的相关性。

关键词： 煤液化　沥青烯　荧光光谱　结构表征

Abstract： A series of asphaltenes were prepared by the direct liquefaction of Shengli lignite under different conditions in this paper. Their structures and compositions were characterized by elemental analysis, FT-IR spectroscopy, UV-vis spectroscopy and Fluorescent spectroscopy. The influences of initial pressure of H_2 and liquefaction temperature on the structure of asphaltene were also discussed. The results indicate that Shengli lignite displays high conversion of liquefaction, and low yield of heavy intermediates such as asphaltene and preasphaltene. The aromatic systems mainly consist of 2~3 rings condensed nucleus and multi-phenyl compounds. To increase the initial pressure of H_2 can promote the hydro-cracking of coal matrix and the removal of hydroxyl group by hydrogenation. High temperature and high pressure of H_2 is favorable for the hydro-cracking of the substituent in AS. By contrast, the fluorescent spectroscopy is an effective technique to characterize the aromatic nucleus of asphaltne. The results characterized by the fluorescence spectra of asphaltene are relation with its H/C atomic ratio.

Key words： coal liquefaction　asphaltene　fluorescent spectroscopy　structural characterization

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