

论文

瘦煤制取生物甲烷过程模拟实验研究

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摘要:

在实验室条件下模拟煤层生物甲烷生成过程。采用红外光谱法、气相色谱法及X-射线衍射法对实验结果进行处理分析。结果显示: (1) 在反应过程中, 煤微晶层片直径La、层片堆砌高度Lc、层片间距d002和层片数Nc均有所降低; 氢键力逐渐减弱, 有氧官能团含量发生不同程度的减少。(2) 反应过程中产出了乙醇、乙酸和丁酸3种有机物, 并随着反应进行逐渐被消耗。(3) 反应液pH值呈现先下降后上升的趋势, 最终维持在8.4左右至反应结束。由此可得, CO2还原是生物甲烷生成的主要途径, 乙酸发酵在前期对生物甲烷的生成贡献较小。

关键词: 瘦煤; 生物甲烷; 微生物降解; 二氧化碳还原

Experimental study on the simulated biological methane production process with lean coal

Abstract:

A simulation experiment of the bio methane generation process was performed under laboratory conditions, researching and analyzing the different stages of the product. The data from the experiment were investigated through FTIR and XRD analysis, gas chromatography analysis and XRD analysis. Results show that: (1) During the simulation process, Lamellar diameter (La), Lamellar stack height (Lc), Lamellar spacing (d002), and Aromatic layer (Nc) have all been reduced; hydrogen bonding is gradually weakened, while the content of oxygen functional groups show varying degrees of reduction; (2) In the reaction process, there is the production of three kinds of organic matters, which are gradually consumed as the reaction proceeds; (3) The pH value of the reaction solution has decreased at early time, then increased to 8.4 and eventually remained at this value until the end of the reaction. From this experiment it can be concluded that the CO2 reduction is the main method of bio methane generation, and the acid fermentation contributes minutely to bio methane generation in the early period.

Keywords: lean coal; bio methane; microbial degradation; reduction of carbon dioxide

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