

热能工程

灰含量及助熔剂对气流床粉煤气化炉性能的影响

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摘要:

基于气流床粉煤气化炉的平衡模型, 考察了灰含量及添加助熔剂对气化炉性能的影响, 为工业气化炉变煤种操作提供指导。研究表明: 在相同气化操作温度下, 随着灰含量增加, 有效气产率和冷煤气效率降低, 比煤耗和比氧耗相应增加。在入炉氧煤比和蒸汽煤比一定时, 煤中的灰含量波动±1%, 北宿煤气化温度将产生约±27 °C的波动, 开阳煤气化温度将产生约±15°C的波动。对于高灰熔点开阳煤, 助熔剂(CaCO3)添加量占入炉粉煤量5.4% (质量分数)时, 比煤耗和比氧耗比未加入助熔剂时分别减少2.8%和6.9%。因此, 工业操作中应密切注意入炉煤的灰含量波动对气化温度的影响, 相应调整气化操作参数; 对于高灰熔点煤, 需确定适宜的助熔剂添加比例, 以降低气化操作温度, 减少煤耗氧耗, 降低操作成本。

关键词: 灰分含量 助熔剂 平衡模型 气流床粉煤气化

Effects of Ash Content and Flux on the Performance of Entrained-flow Pulverized Coal Gasifier

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Abstract:

In order to provide guidance for industrial gasifier operations such as changing coal type, the equilibrium model of entrained-flow pulverized coal gasifier was established and the effects of ash content and adding flux on the performance of gasifier were investigated. The simulation results show that at the same operating temperature of gasifier, the syngas productivity and cold gas efficiency decline while the coal consumption and oxygen consumption increase with the increase of the ash content. When the oxygen-coal ratio and steam-coal ratio are constant, the change of ±1% ash content in coal leads to ±27°C fluctuations of the gasifier temperature for Beisu coal, and ±15°C fluctuations of the gasifier temperature for Kaiyang coal. For high ash fusion coal (Kaiyang coal), the coal consumption and oxygen consumption decrease 2.8% and 6.9% respectively by adding 5.4% (weight percent) flux (CaCO3) in coal. The above simulation results indicate the effects of ash content on the gasifier temperature should be concerned and operating parameters need be adjusted during industrial operation. Also, for high ash fusion coal, the operating temperature of gasifier is reduced by adding optimal content flux. Accordingly, the coal and oxygen consumption are reduced and operating cost is decreased.

Keywords: ash content flux equilibrium model entrained-flow pulverized coal gasification

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