

能源和环境工程

## 串行流化床煤气化试验

吴家桦, 沈来宏, 肖军, 卢海勇, 王雷

东南大学热能工程研究所, 江苏 南京 210096

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摘要

针对串行流化床煤气化技术特点, 以水蒸气为气化剂, 在串行流化床试验装置上进行煤气化特性的试验研究, 考察了气化反应器温度、蒸汽煤比对煤气组成、热值、冷煤气效率和碳转化率的影响。结果表明, 燃烧反应器内燃烧烟气不会串混至气化反应器, 该煤气化技术能够稳定连续地从气化反应器获得不含 $N_2$ 的高品质合成气。随着气化反应器温度的升高、蒸汽煤比的增加, 煤气热值和冷煤气效率均会提高, 但对碳转化率影响有所不同。在试验阶段获得的最高煤气热值为 $6.9 \text{ MJ}\cdot\text{m}^{-3}$ , 冷煤气效率为68%, 碳转化率为92%。

关键词

[串行流化床](#) [煤气化](#) [合成气](#)

分类号

## Experimental study on coal gasification in interconnected fluidized bed

WU Jiahua, SHEN Laihong, XIAO Jun, LU Haiyong, WANG Lei

### Abstract

Gasification of coal in a novel interconnected fluidized bed was proposed in this paper. The novel fluidized bed resembled a high velocity circulating fluidized bed in combination with a bubbling fluidized bed after a cyclone. The circulating fluidized bed was designed for coal combustion fed with air, the bubbling fluidized bed was for coal gasification fed with steam. The heat required for gasification was supplied by means of the circulation of inert heat carrier particles. Direct contact between the gasification and combustion processes was avoided. The experiments of coal gasification were performed in a laboratory apparatus of interconnected fluidized bed, and high quality syngas was produced free of  $N_2$  dilution. The effects of gasifier temperature and steam/coal ratio on gas composition, heating value, cold gas efficiency and total carbon conversion were discussed. The experimental results indicated that with the increase of gasifier temperature and steam/coal ratio, both heating value and cold gas efficiency increased rapidly. Total carbon conversion increased remarkably with the gasifier temperature at the lower temperature range of 900—950 $^{\circ}\text{C}$ , and reached its maximum of 92% at the gasifier temperature of 950 $^{\circ}\text{C}$ , and then kept nearly constant. The steam/coal ratio had little effect on the variation of total carbon conversion in the process of coal gasification in the novel interconnected fluidized bed. The maximum heating value and cold gas efficiency could reach  $6.9 \text{ MJ}\cdot\text{m}^{-3}$  and 68%, respectively.

### Key words

[interconnected fluidized bed](#) [coal gasification](#) [syngas](#)

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