

工程热物理

O₂/CO₂气氛下烟煤燃烧过程中S的析出特性

段伦博 赵长遂 李英杰 卢骏营 周骛 陈晓平

东南大学能源与环境学院 东南大学能源与环境学院 东南大学能源与环境学院 东南大学能源与环境学院 东南大学能源与环境学院 东南大学能源与环境学院

摘要: 通过X射线光电子能谱仪对徐州烟煤中S的存在形态进行分析,在常压热重分析仪上进行了烟煤在模拟空气和不同O₂/CO₂浓度下的燃烧试验,并通过傅里叶变换红外光谱仪对其中S的释放进行测量。结果发现,在模拟空气气氛和30%O₂/70%CO₂气氛下,煤燃烧过程中SO₂的排放浓度随时间呈双峰析出;在21%O₂/79%CO₂气氛下,SO₂浓度随时间变化出现3个峰值;在高O₂浓度下(不小于40%)时,SO₂随时间呈单峰析出。在空气气氛下,烟煤燃烧的SO₂总生成量比在同等O₂浓度的O₂/CO₂气氛下小;随着O₂浓度的提高,O₂/CO₂气氛下烟煤燃烧的SO₂总生成量先升高后减小。

关键词: O₂/CO₂燃烧 O₂浓度 S析出 X射线光电子能谱 热重红外联用

Investigation on Sulfur Release From Bituminous Coal Combustion in O₂/CO₂ Atmosphere

DUAN Lun-bo ZHAO Chang-sui LI Ying-jie LU Jun-ying ZHOU Wu CHEN Xiao-ping

Abstract: The X-ray photoelectron spectroscopy (XPS) was used to study sulfur functionality in the bituminous coal and a thermogravimetric analyzer (TGA) was used to evaluate its combustion behavior in O₂/N₂ and O₂/CO₂ atmosphere by changing O₂ fraction in the mixture. The Fourier Transform Infrared (FTIR) spectrometer was employed to detect the gas evolved from bituminous coal during the combustion process. Results show that in 21%O₂/79%N₂ or 30%O₂/70%CO₂ atmosphere, there are two SO₂ absorbance peaks appearing; in 21%O₂/79%CO₂ atmosphere, a third peak appears; in higher O₂ concentration (no less than 40%) atmosphere, there is only one peak left. The integrals of the SO₂ absorbance unit show that total SO₂ emission from coal combustion in air is less than that in O₂/CO₂ mixture with the same O₂ fraction, and SO₂ emission in O₂/CO₂ mixture goes up first and declines then as O₂ concentration increases.

Keywords: O₂/CO₂ combustion oxygen concentration sulfur release X-ray photoelectron spectroscopy thermogra-vimetry coupled with infrared spectroscopy

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通讯作者: 赵长遂

作者简介:

作者Email: cszhao@seu.edu.cn

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