

能源和环境工程

以煤焦混合物为燃料的循环流化床锅炉SO₂排放特性

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摘要

在工业运行的410 t·h⁻¹循环流化床锅炉上进行烟煤、70%烟煤+30%石油焦和50%无烟煤+50%石油焦的燃烧试验,研究了运行参数对SO₂排放特性的影响。结果表明,3种燃料均能达到良好的燃烧效果,炉内温度场分布均匀。在相同燃烧条件下,不同燃料SO₂排放量与其中的含硫量呈正相关关系。SO₂排放量随温度的升高先减小后增大,存在最佳脱硫温度;随钙硫比的增大而减小;随过量空气系数的增大而减小;随飞灰再循环量的增大而减小。对于不同种类的石灰石,大比表面积和高比孔容积的石灰石对SO₂有较好的脱除效果。考察了燃用不同燃料的最佳温度、钙硫比和过量空气系数,阐述了飞灰再循环和石灰石微观结构在循环流化床锅炉脱硫中的机理和作用,以期对循环流化床的设计和运行工作提供指导。

关键词 [循环流化床](#) [石油焦](#) [SO₂排放](#) [飞灰再循环](#) [微观结构](#)

分类号

SO₂ emission characteristics of circulating fluidized bed boiler co-firing coal and petroleum coke

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Abstract

The combustion characteristics of a 410 t·h⁻¹ circulating fluidized bed (CFB) boiler burning the fuels of bituminous coal (BC), 70% BC+30% petroleum coke (PC) and 50% anthracite (AN) +50% PC were studied. The effects of operation parameters, including bed temperature, molar ratio of Ca to S, excess air coefficient, fly ash recirculation rate and limestone microstructure on SO₂ emission were investigated. Test results indicated that all the three kinds of fuels burned adequately in the boiler, and the bed temperature distribution was uniform. For different fuels, SO₂ emission was correspondingly related to fuel sulfur content with the same operation parameters. With increasing bed temperature, SO₂ concentration in the flue gas reduced first and then increased. There was an optimal desulfurization temperature. For burning BC only or 70% BC +30% PC, the optimal desulfurization temperature was about 850°C, while it was between 850—870°C for burning 50% AN +50% PC, because of the different sulfur contents in the fuel. The SO₂ concentration decreased with increasing Ca/S ratio, excess air coefficient and fly ash recirculation rate. The results also showed that the microstructures of limestones including specific surface area and specific pore volume had distinct impact on their SO₂ retention. Larger specific surface area and higher specific pore volume could enhance their SO₂ capture activities to a certain extent. The optimal temperatures, Ca/S ratios and excess air coefficients for different fuels were recommended for industrial application.

Key words

[circulating fluidized bed](#) [petroleum coke](#) [SO₂ emission](#) [fly ash recirculation](#) [microstructure](#)

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