

工程热物理

烟气组分对脱硫灰吸附及催化氧化汞的影响

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摘要: 半干法脱硫工艺协同控制燃煤汞排放的技术中, 脱硫灰将作为汞脱除的吸附剂。选取2种典型半干法脱硫工艺的脱硫灰样品, 使用固定床反应器, 在模拟烟气条件下研究了烟气组分对半干法脱硫灰吸附和催化氧化汞的影响。汞的吸附率在总体上均随汞氧化率升高而增加; HCl和NO2在脱硫灰的催化作用下能有效氧化Hg0, 从而使气态汞吸附在脱硫灰表面; HCl、NO2不能进一步促进Cl2对Hg0的氧化; SO2与氧化性气体竞争脱硫灰活性位, 可能是导致其抑制汞氧化和吸附的主要原因; NO在不同气氛条件下对Hg0吸附与氧化的影响存在差异; 半干法脱硫灰对汞的吸附能力与飞灰接近, 而在脱硫塔内通常具有更高的浓度, 这使得半干法脱硫系统具备了较好的脱汞效果。

关键词: 脱硫灰 汞吸附 催化氧化 烟气组分

Effects of Flue Gas Components on Hg Adsorption and Catalytic Oxidation by Flue Gas Desulfurization Ash

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Abstract: Desulfurization ash would be used as mercury removal sorbents in process of mercury emission control combined with semi-dry FGD (flue gas desulfurization). Two kinds of typical semi-dry FGD ashes were chosen as samples. Effects of flue gas components on Hg adsorption and catalytic oxidation were studied by exposing the samples to a simulated flue gas stream in a fix-bed reactor. It was found that extents of Hg captured, in general, were higher with extents of Hg oxidized increasing. HCl and NO2 oxidized Hg0 effectively with the catalysis of desulfurization ash, which finally led to the adsorption of mercury on surface of samples. HCl and NO2 didn't promote the oxidation of Hg by Cl2. SO2 inhibited the adsorption and oxidation of Hg, probably because of the competition of active sites to oxidative components. Effects of NO on mercury adsorption and oxidation were varied in different gas matrixes. Capture capacity of desulfurization ash was close to that of fly ash while the former usually existed with higher concentration in semi-dry FGD devices, which made the semi-dry FGD system to possessed a good performance on mercury removal.

Keywords: desulfurization ash mercury adsorption catalytic oxidation flue gas components

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