

工程热物理

湿法烟气脱硫装置和静电除尘器联合脱除烟气中汞的试验研究

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摘要: 采用国际上通用的安大略方法(Ontario hydro method, OHM)对某燃煤电站静电除尘器(electrostatic precipitator, ESP)和湿法烟气脱硫装置(wet flue gas desulphurization, WFGD)前、后的烟气进行采样,应用美国环境总署(eniroment protection agency, EPA)标准方法测定了烟气中Hg0、Hg2+和HgP的浓度,应用全自动汞分析仪DMA80测定固体样品(煤、底灰、ESP飞灰、脱硫产物)中的汞浓度。由汞平衡得出各个环节中的汞所占的份额,分析了ESP和WFGD对烟气中汞的脱除性能。实验结果表明:此燃煤电站烟气中的汞主要以Hg0形态存在,所占份额均大于80%,Hg2+的份额小于20%,ESP可以有效脱除HgP且部分Hg0被氧化为Hg2+。WFGD装置对总汞的脱除率和Hg2+的吸附率均为零,研究发现烟气中大于50%的Hg2+经过WFGD装置后被还原为Hg0。电厂底渣和飞灰中汞的富集因子均小于1,脱硫产物中汞的富集因子均大于1,表明在此电厂中汞在底渣和飞灰中是耗尽的,在脱硫产物中是富集的。

关键词: 燃煤电站 汞 静电除尘器 湿法脱硫装置

Experimental Study on Mercury Removal by Combined Wet Flue Gas Desulphurization With Electrostatic Precipitator

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Abstract: Applying the Ontario hydro method (OHM) and the US Enviroment Protection Agency (EPA) standard methods, the flue gas mercury sampling before and after electrostatic precipitator (ESP) and wet flue gas desulphurization (WFGD) located at coal-fired power plants was carried out on site and various mercury speciations, such as Hg0, Hg2+ and HgP in flue gas, were analyzed. The solid samples, such as coal, bottom ash and ESP ash desulphurization product, were analyzed by direct mercury analyzer DMA 80. According to mercury balance, mercury speciation and its distribution in different locations downstream the flue gas were obtained. Results show that the flue gas mercury exists mainly as Hg0. The share of Hg0 is over than 80% and Hg2+ less than 20%. HgP can be removed by ESP efficiently, and partial Hg0 is oxidized to Hg2+. The total mercury removal and Hg2+ adsorption efficiency by WFGD are both zero, but more than 50% Hg2+ is reduced to Hg0. The enrichment factors are less than 1 in both bottom ash and fly ash, but it is over than 1 in desulphurization products. Mercury is exhausted in bottom ash and fly ash but enriched in desulphurization products.

Keywords: coal-fired power plant mercury electrostatic precipitator wet flue gas desulphurization

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