Thermochemical Particle Behaviour in the Flue Gas of Waste Incineration Plants

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ABSTRACT

Corrosion in plants for heterogeneous fuel, as waste-to-energy plants, is a severe problem. It causes lower steam parameters and with that a significantly lower electricity efficiency com-pared to plants with homogeneous fuel, as coal combustion plants.

It is evident that the corrosion is caused by chlorine. This chlorine can be released as gaseous or aerosol phase. It had been proven that the impact of gaseous chlorine as HCl is less significant especially at the super-heaters so that the particulate phase is of more interest concerning corrosion problems.

On the one hands side the particles have to be investigated during their flight through the boiler. This flight lasts some seconds and is characterised by a significant temperature de-crease from about 1,200 °*C* to 600 °*C* in front of the superheater, where the main corrosion takes place. On the other hands side the particles are relevant on the superheater tubes as well, where they have time to react for some hours at a temperature of about 600 °*C*.

The investigation of particles and fouling which trigger the severe corrosion at superheaters in waste-to-energy plants by thermodynamic calculation can give a good help for the under-standing of the relevant processes.

The significant relevance of the ratio of calcium and sulphur delivers an important information for the corrosion processes. High reactive calcium content can prevent sodium, potassium, lead and zinc chlorines from the sulphation. When calcium is available as $CaCl_2$, the release of chlorine in presence of sulphur is “guaranteed”.