

INFLUENCE OF SULPHUR DIOXIDE AND HYDROGEN CHLORIDE ON PROPERTIES OF OIL SHALE ASH

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Chlorine in Estonian oil shale is bound with the organic part, and that determines its behavior in boiler. The behavior of chlorine is also affected by sulphur dioxide present in flue gas.

The objective of the present paper was to study the influence of sulphur dioxide and hydrogen chloride present in flue gas on hardness and chemical composition of possible deposits on heating surfaces of CFB boilers.

A laboratory test facility at the Department of Thermal Engineering of the Tallinn University of Technology was used for the study. Experiments with filter and cyclone ashes of circulating fluidized-bed combustion of oil shale were carried out at 700 °C at atmospheric pressure. Gas mixtures studied contained hydrogen chloride, sulphur dioxide, oxygen, and nitrogen as the balance gas. Experiments established that sulphur dioxide present in the surrounding gas fosters hardening of ash (test samples). Experiments with a gas mixture containing sulphur showed that CFBC fly ashes relatively rich in free lime are able to bind sulphur from flue gas. At heating of samples in a chlorine-containing atmosphere sulphur does not volatilize in these conditions.

The results of chemical analysis of some deposits collected after approximately 4000 hours of operation of industrial CFBC boilers are presented. These results show high chlorine content of deposits formed on economizer tubes. Chlorine content of these deposits is comparable with chlorine content of a test sample heated for one hour.

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