

CARBON DIOXIDE BINDING IN THE HETEROGENEOUS SYSTEMS FORMED AT COMBUSTION OF OIL SHALE 4. REACTIVITY OF ASHES TOWARDS ACID GASES IN THE SYSTEM FLY ASH-FLUE GASES

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The results obtained studying the binding efficiency of different ashes formed at Estonian Power Plant (EPP) and in the fluidized-bed combustion facilities towards CO₂ and SO₂, and the possibilities of activation of these ashes are presented. Experiments were carried out with thermogravimetric equipment at isothermal conditions in the temperature range of 400–800 °C in the atmosphere of CO₂-air (+/-H₂O) or SO₂-air mixture. Chemical, X-ray diffraction, IR spectroscopy, BET nitrogen dynamic desorption, and other methods were used for characterizing the initial samples and the products of experiments.

The CO₂- as well as SO₂-binding efficiency of ash samples taken from EPP was quite poor without preliminary activation. The best binding occurred at 750–800 °C. After a 5-min contact between solid and gaseous phases (at CO₂ or SO₂ partial pressure 190 mmHg) 0.06–0.12 mmole CO₂ or 0.10–0.15 mmole SO₂ was bound per 100 mg sample depending on the kind of ash. Preliminary activation of the samples increased their binding capacity towards CO₂ and SO₂ up to 2.2 and 3.8 times, respectively, reaching the level of binding efficiency of ashes formed in fluidized-bed conditions. The results of these studies confirm that the reactivity of oil shale ashes at binding acid gases greatly depends on ash formation conditions as well as on the binding conditions and preliminary activation of ashes.

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