

CARBON DIOXIDE BINDING IN THE HETEROGENEOUS SYSTEMS FORMED BY COMBUSTION OF OIL SHALE

1. CARBON DIOXIDE BINDING AT OIL SHALE ASH DEPOSITS

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About 95 % of electricity production in the Republic of Estonia is based on the firing of pulverised local solid fuel – oil shale. This process is accompanied by high CO₂ emission and followed by the formation of waste alkali ash in huge quantities. Ash is removed by hydrotransport and deposited in wet dumps.

A complex of laboratory and field experiments with different ashes and their transport water samples from operating power plant (1610 MW) was carried out. Low activity and low carbonation rate of dry ash were determined as well as a much higher activity of previously hydrated ash, which in favourable conditions could be completely carbonated. An up to 50–60 % degree of carbonation of transport waters by binding CO₂ from the air in the production cycle was established.

The total amount of CO₂ bound from the air and calculated basing on the results of laboratory model experiments reached 37 kg per 1 ton of oil shale burnt in the electricity production. The relative part of bound CO₂ formed 20.5 % and 4.2 % from the carbonate and total emission of CO₂, respectively. The recommendations to increase the amount of CO₂ bound at natural field conditions have been worked out. By implementing them, the amount of bound CO₂ could be essentially increased – up to 35–36 and 6–7 %, respectively.

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