

## **INFLUENCE OF SULFUR DIOXIDE ON DECOMPOSITION OF OIL SHALE MINERAL MATTER**

A. OTS, T. PIHU  
A. HLEBNIKOV, H. ARRO

Tallinn Technical University,  
Thermal Engineering Department  
116 Kopli St., Tallinn 11712, Estonia

*Estonian oil shale is a carbonate-rich fuel. Approximately half of its mineral matter is in the carbonate form, mainly as calcium carbonate. The carbonate part of oil shale contains also dolomite.*

*Because of high partial pressure of carbon dioxide, while burning oil shale under pressure, carbonates do not decompose directly (thermal decomposition). Decomposition of carbonates is possible in reactions with minerals of the sandy-clay part of oil shale or with sulfur dioxide from flue gas. At Thermal Engineering Department of Tallinn Technical University a laboratory pressurized test facility was used to investigate the influence of sulfur dioxide on transformation of the oil shale mineral matter components ( $\text{CaCO}_3$  and  $\text{CaMg}(\text{CO}_3)_2$ ). The experiments with oil shale mineral matter components were performed at the pressure range 0.1–1.2 MPa.*

*Experiments established that partial decomposition of carbonates takes place only under the pressure (1.2 MPa).  $\text{SO}_2$  in gas causes decomposition of carbonates. At a relatively low temperature (850 °C) the influence of  $\text{SO}_2$  on  $\text{CO}_2$  segregation is minimal. During sulfation of calcium and magnesium carbonates,  $\text{SO}_2$  reacts firstly with  $\text{CaO}$ .  $\text{MgO}$  stays in free form until all  $\text{CaO}$  has reacted with sulfur. Decomposition rate of oil shale carbonates depending on  $\text{CO}_2$  partial pressure is determined.*