

RAPID CHARACTERISATION AND INVESTIGATION OF OIL SHALES BY THERMAL
DESORPTION-PYROLYSIS-GC/MS USING MULTI-FUNCTIONAL PYROLYZER

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The analytical system using a vertical type of micro-furnace pyrolyzer combined with capillary column GC/MS has been demonstrated itself as one of powerful tool for rapid characterisation of various artificial and natural polymers. In this work, the multi-functional pyrolyzer (Frontier Laboratories; Japan) was introduced with oil shale sample for the first time to estimate its potential in investigation of the oil shale organic matter.

The system enables both flash pyrolysis and stepwise programmed pyrolysis using deactivated stainless steel capillary column (Ultra ALLOY column; Frontier Laboratories Ltd.), and evolved gas analysis of the oil shale with simultaneous destruction products identification in widely varied temperature region as from 100 to 800 °C. As a specific feature for the Kukersite straight chain aliphatic hydrocarbons with carbon number up to C17 and rare long alkyl chain homologous 5-alkylresorcinols have been displayed in rapidly generated summary chromatograms. Flash and programmed pyrolysis express the same regularities in pyrolysate compound composition while the concentration of similar compounds differ. One can see in the chromatograms abundance of aromatic compounds typical for many oil shales.

The potential of the system includes thorough investigation the compounds formed, studying the regularities of formation different compounds depending on pyrolysis temperature creating the fundamentals of advanced technologies for oil shale more effective liquefaction in obtaining liquid fuel and chemicals. With this aim the Estonian Kukersite and Dictyonema oil shales are investigated in the frames of international collaboration between Frontier Laboratories Ltd. and Laboratory of Oil Shale and Renewables Research at Tallinn Technical University.