

Title:

Investigation of the Properties of Products of Oil Shale Decomposition through the Bitumen Stage

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Introduction: Conversion of oil shale to produce petroleum products is relevant at the present time and it is an alternative way to compensate the lack of crude oil in the world. It is known that decomposition of Estonian oil shale goes through the bitumen formation, when the organic matter is transferred to plastic condition, soluble in organic solvents.

Methods: The oil shale's organic matter was separated from the mineral part through the bitumen stage. The experiments were carried out at low temperature range (370-410 °C), in different isothermal times in Fischer assay and the laboratory batch-scale retort. Extraction with organic solvents was used for separation organic matter from mineral part after the thermal sample processing. The obtained bitumen was processed in different thermal treatment conditions. The products' analyses were done by analytical instrumental methods such as IR-spectroscopy, gas chromatography, elemental analysis and etc. to provide the characteristics of products.

Results: A high level of separation was determined and the complex compounds formation during the thermal processing of oil shale was researched. The liquid product formation was observed at the temperature of the bitumen conversion. The potential liquid compounds yield (bitumen and oil) of organic matter of oil shale depends on the experiment conditions, described by equation $y = 0,0024x^3 - 2,842x^2 + 1132,4x - 150250$, where y is the potential liquid compounds and x is the process temperature °C. The obtained maximum yield of potential liquid compounds was about 90 %. It is higher than the oil yield obtained in Fischer retort. Group and elemental composition of the products were investigated.

Discussion: The low temperature processing of oil shale increases the oil yield and decreases emission of CO₂. The method of oil shale decomposition, going through the bitumen stage could be in perspective used to design the new technology to produce the liquid petroleum products from oil shale.

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