

**AP13268843 “Investigation of oil and gas content of the pre-Mesozoic complex of the Aryskum trough of the South Torgai Basin” – p.m. Madisheva R.K.**

***Relevance:***

In the Aryskum trough, oil and gas deposits are confined mainly in Jurassic and Cretaceous sediments, as well as Devonian-Lower Carboniferous formations of the quasi-platform complex and disintegrated protrusions of the basement. At present there are 52 oil and gas fields, the depletion of initial recoverable reserves of which is rather high. Oil and gas occurrences of pre-Mesozoic formations up to commercial oil inflows allow to draw conclusions about the presence of certain potential of oil and gas bearing capacity in them. In this regard, the determination of the origin of oil and the forecast of the direction of hydrocarbon migration is relevant to justify deep drilling in order to replenish the mineral resource base of the country.

***The project purpose:***

Genetic typing of hydrocarbons, determination of fluid-communicability of structures and determination of migration direction based on the results of biomarker analysis and fingerprinting of oils from fields of Aryskum trough of South-Torgai oil and gas bearing basin.

***Expected and achieved results:***

The results of the study on identification of potentially promising oil and gas mother strata have established:

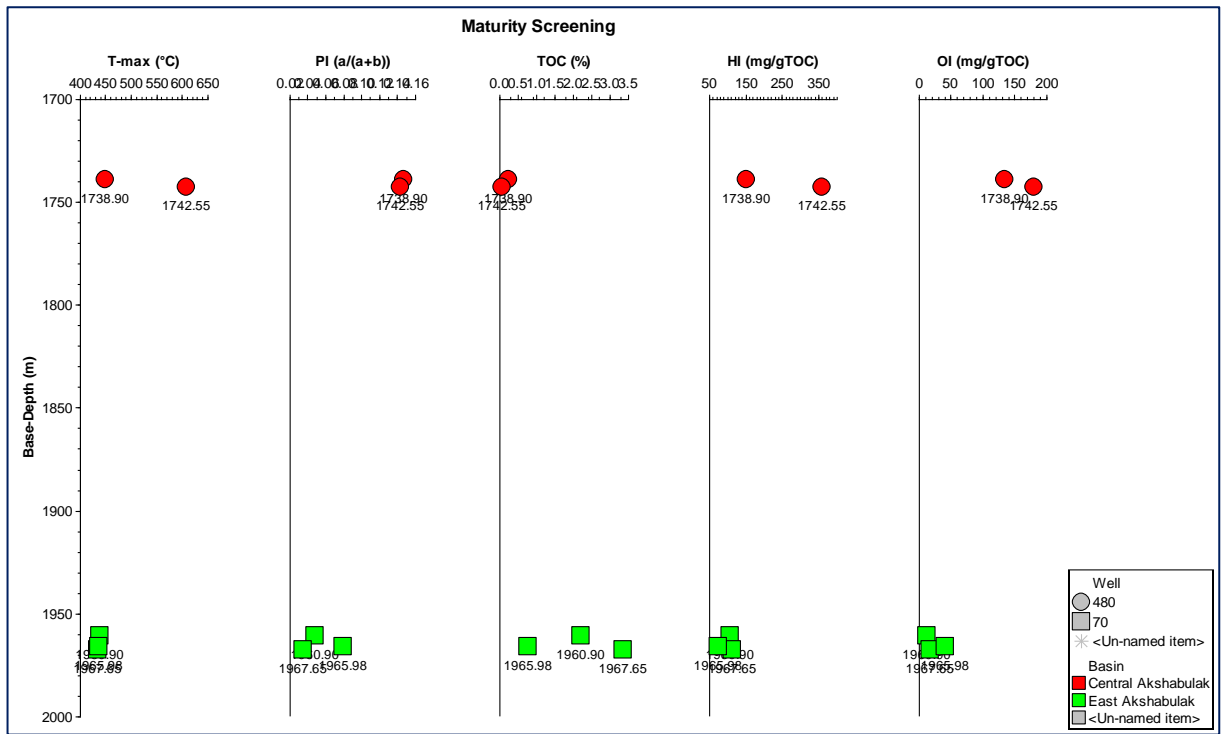
1. Generative potential of the parent rock determined from the obtained results of geochemical studies of the analyzed samples allowed us to conclude that the parameter S2 varies from 0.18 to 3.84 mg. hydrocarbons per gram of rock, with the highest values of generative potential of the rock S2 in well #70 - up to 3.84, which also gives us a fairly wide range of generative potential from scarce to medium.

The concentration of total organic carbon (TOC) varies from 0.05 to 3.37 mg HC/g of rock, with the most enriched OM with higher TOC values confined to J-I deposits. High TOC values are observed in samples from the East Akshabulak deposit, which may be associated with high residual carbon (RC) content with low generative potential. Samples from the Central Akshabulak field most likely have a scarce generative potential. It is worth noting that the graph of TOC vs. S2 dependence, which allows estimating the oil and gas bearing potential of the rock, shows a linear relationship with correlation coefficient  $R^2=0.7838$ , indicating that.

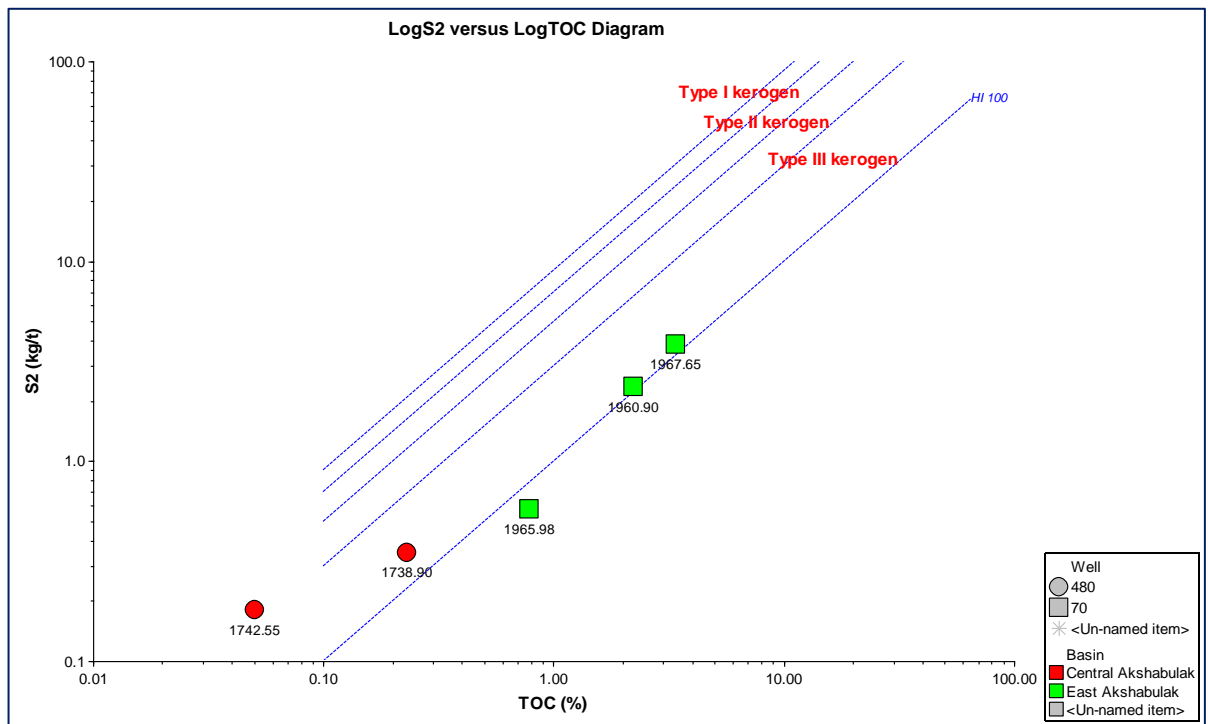
2. Organic matter type. In this study, the kerogen type was analyzed using the Hydrogen Index (HI) and the temperature of maximum hydrocarbon generation (T-max). The observed low HI values in the samples indicate the absence of appreciable concentration of organic matter in the rocks, which confirms their proximity to kerogen type III, characterized by the release of predominantly gaseous hydrocarbons. To clarify the kerogen type, the hydrogen index HI and oxygen index OI were also used, the results of which are in agreement with the obtained data. This emphasizes the importance of complex analysis in determining the type of kerogen and its relation to the oil-generating potential of rocks.

3. thermal maturity of organic matter. Thermal maturity of parent rocks was determined by studying geochemical parameters such as rock pyrolysis temperature Tmax and productive index PI. The studied samples of Akshabulak East deposit are thermally mature, which showed the anomalous thermal regime that predetermined high catagenetic transformation of OB.

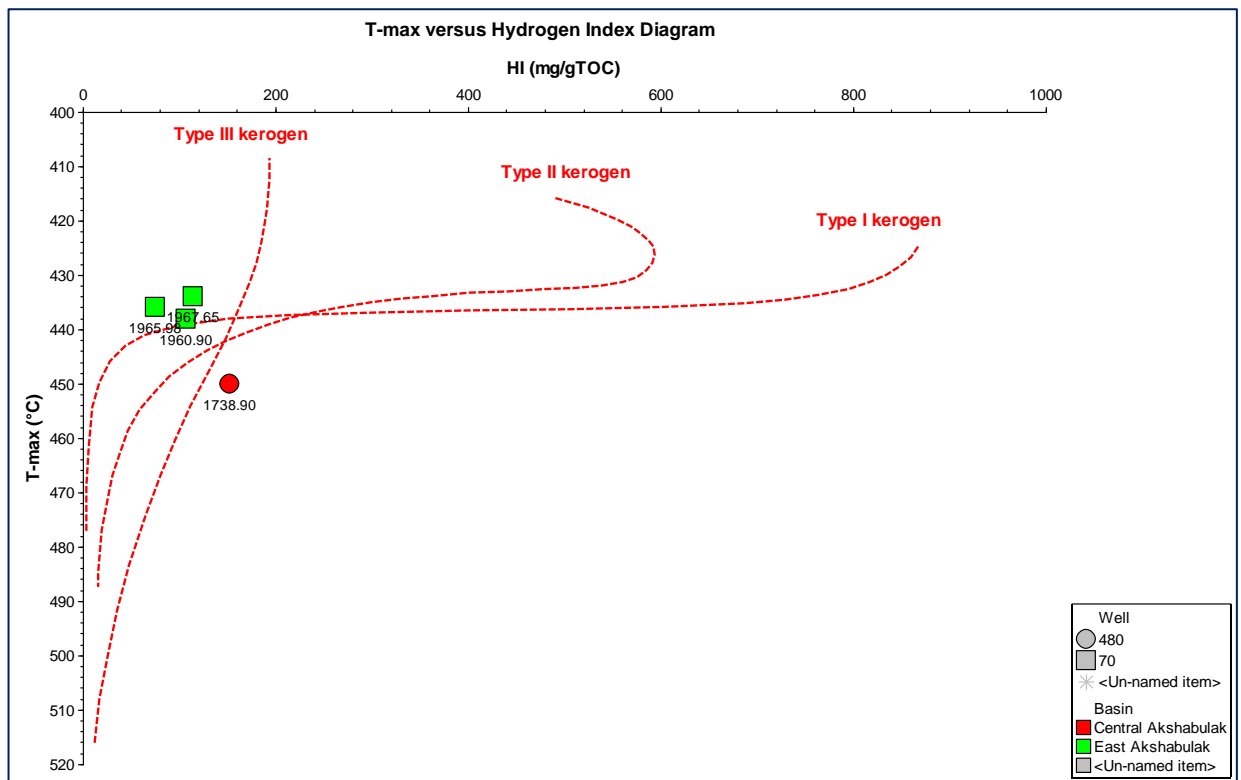
The results of these studies allow us to conclude that there are potentially promising oil and gas mother strata in the studied fields of the Aryskum trough.



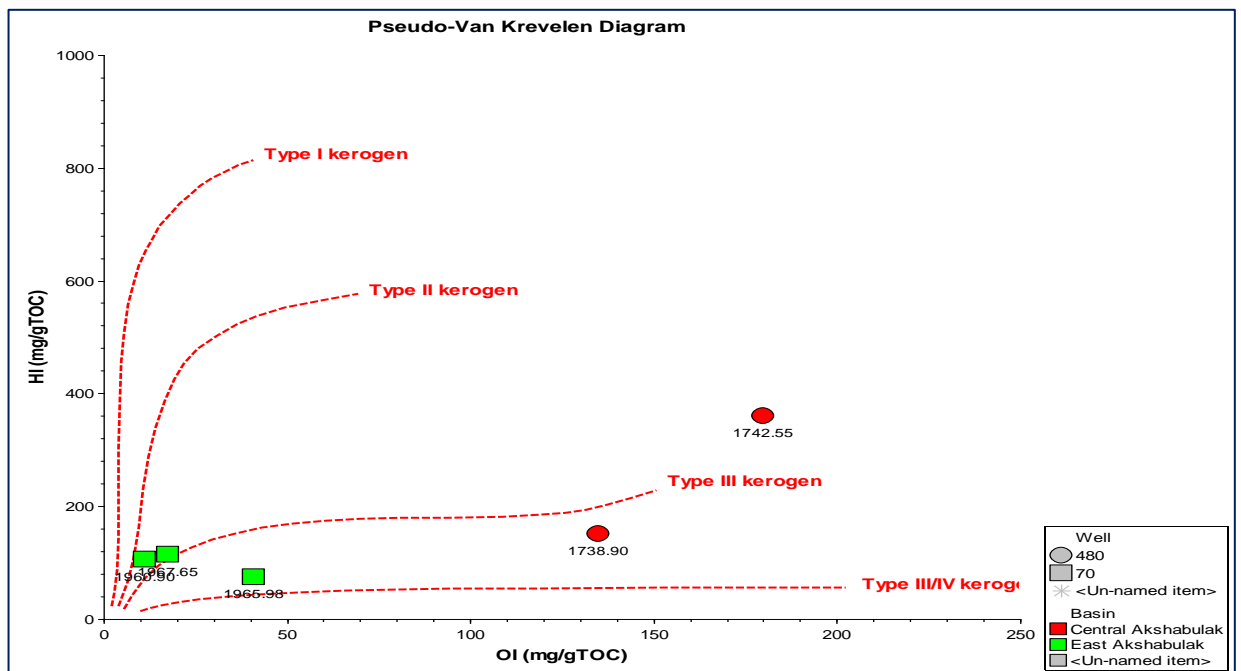
**Figure 1 - Geochemical section**



**Figure 2 - Graph of TOC dependence on hydrocarbon potential in the core samples studied**



**Figure 3 - Graph of hydrogen index dependence on the temperature of maximum HC generation (Tmax) in the studied samples**



**Figure 4 - Van Krawlen diagram (Dependence of Hydrogen Index on Oxygen Index) in the studied areas**

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***List of publications:***

1. Madisheva R.K., Portnov V.S. On oil and gas content of the Arysium trough of the South Torgai sedimentary basin // Oil and Gas. No.5 (131). 2022. P. 26-37. <http://neft-gas.kz/f/nig5-67-78.pdf>

2. R.K. Madisheva, V.S. Portnov, A.N. Yesendosova. Oil and gas content of the Arysium trough of the South Torgai sedimentary basin // Innovative approaches in modern science. - No.14 (122). - M.: 2022. - P. 5-10. <https://www.internauka.org/conf/inno/cxxii>

3. R.K. Madisheva, A.D. Mausymbaeva, B.V. Uspensky, A.B. Demeuova, G.B. Amangeldieva Geological and Geochemical Conditions of Hydrocarbon Formation in the Arysium Depression of the South Turgay Basin // Proceedings of the University, Karaganda, 2024. -No.2(95). - P.1821-188. [DOI 10.52209/1609-1825\\_2024\\_2\\_182](https://doi.org/10.52209/1609-1825_2024_2_182)

4. Madisheva, R.K., Portnov, V.S., Amangeldiyeva, G.B. et al. Geochemical prerequisites for the formation of oil and gas accumulation zones in the South Turgay basin, Kazakhstan. Acta Geochimica 43, 520–534 (2024). <https://doi.org/10.1007/s11631-023-00660-4>

***Information for potential users:***

The experimental data obtained and the conclusions drawn from them can be used to trace hydrocarbon migration paths and to predict the extent of oil and gas accumulation in the region.

***Scope***

Geology, extraction and processing of mineral and hydrocarbon raw materials, new materials, technology, safe products and structures.

*Information update date: 05.07.2024.*