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 mainly confined to the Jurassic and Cretaceous deposits, as well as the Devonian-Lower Carboniferous formations of the quasi-platform complex and disintegrated basement projections. Currently, there are 52 oil and gas fields, the depletion of the initial recoverable reserves of which is quite high. Oil and gas manifestations of the pre-Mesozoic formations up to industrial oil flows allow drawing conclusions about the presence of a certain oil and gas potential in them. In this regard, determining the origin of oil and forecasting the direction of hydrocarbon migration is relevant for substantiating deep drilling in order to replenish the country's mineral resource base.

Project objective: to identify potential oil and gas source strata of the Upper-Middle Jurassic clay deposits based on the Rock Eval (RE) pyrolytic data for samples from the Eastern and Central Akshabulak fields (Aryskum Depression, South Turgay Oil and Gas Basin, Kazakhstan).

Achieved results: the results of the study to identify potentially promising oil and gas source strata established:

1. The results of the analysis of the Eastern Akshabulak rocks showed that the S2 parameter, which characterizes the generation potential of the rock, ranges from satisfactory 0.58 and 2.48 mg HC/g of rock to very good (3.84 mg HC/g).
2. The TOC concentration of 0.78 has a satisfactory generation potential, samples from depths of 1960.9 m and 1967.65 m have very good oil and gas generation potential.
3. The type of organic matter was assessed using HI and Tmax, which allowed concluding that the studied samples contain type III kerogen, characterized by the release of mainly gaseous hydrocarbons.
4. The thermal maturity of organic matter was determined based on Tmax and PI values: according to PI, the studied rocks are immature, but the temperature values from depths of 1960.9 m and 1965.98 m indicate an early stage of maturity.

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

Table - Geochemical data obtained from pyrolysis analysis of the core

Месторождение	Горизонт	скв.	глубина	S_1	S_2	S_1+S_2	PI	T_{max}	TOC	HI	OI
Восточный Акшабулак	Ю-I	70	1960.9	0.12	2.36	2.48	0.05	438	2.22	106	11
Восточный Акшабулак	Ю-I	70	1967.65	0.14	3.84	3.98	0.03	434	3.37	114	18
Восточный Акшабулак	Ю-I	70	1965.98	0.05	0.58	0.63	0.08	436	0.78	74	41
Центральный Акшабулак	Ю-II	480	1738.9	0.06	0.35	0.41	0.14	450	0.23	152	135
Центральный Акшабулак	Ю-II	480	1742.55	0.03	0.18	0.21	0.14	608	0.05	360	180

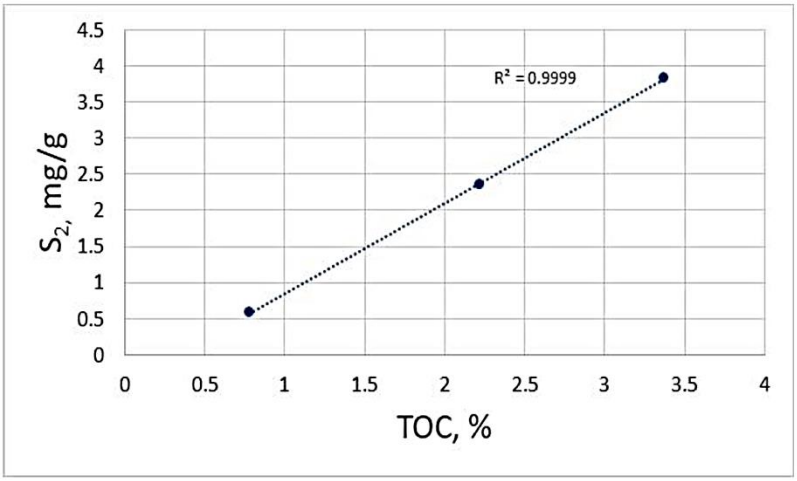
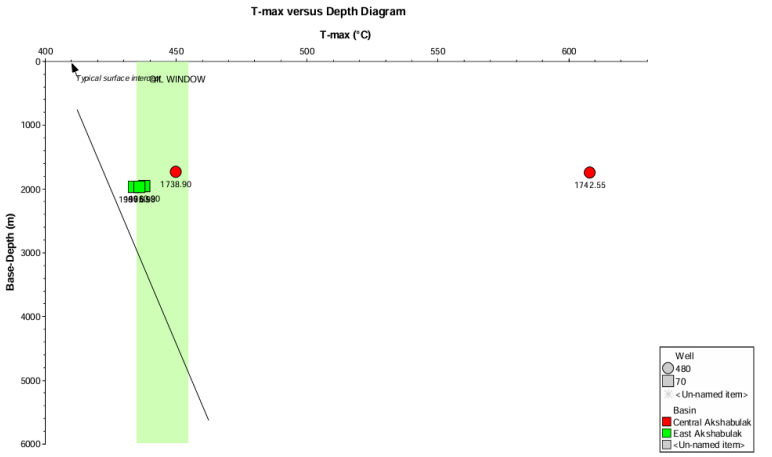
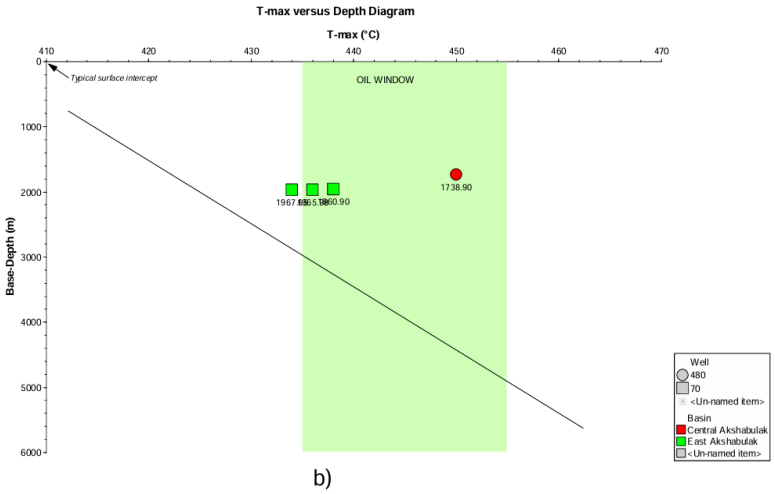


Figure 1 – S2 vs. TOC plot indicating hydrocarbon potential and source rock efficiency



a)



b)

Figure 2 – Diagram of Tmax dependence on depth

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List of publications

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

2. R.K. Madisheva, V.S. Portnov, A.N. Yesendosova. Oil and gas potential of the Aryskum 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. Mausymbayeva, B.V. Uspensky, A.B. Demeuova, G.B. Amangeldieva Geological and Geochemical Conditions of Hydrocarbon Formation in the Aryskum 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

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

5. Madisheva R.K. Geochemical characteristics of the Urikhtau deposit // Advances in science and technology, M., 2024. No. 1. P. 165-166. (in Russian)

6. R. Madisheva, D. Akhmetov, N. Tileuberdi, V. Fedotenko. Estimating source rock parameters by Rock-Eval in the Aryskum depression of the South Turgay oil and gas basin (Kazakhstan). 2024. No. 2. (in English, Scopus, percentile 59%). DOI: 10.17580/em.2024.02.05

7. Sedimentation and formation of oil and gas potential in the South Torgai sedimentary basin: Monograph / R.K. Madisheva, A. B. Demeuova, G. B. Amangeldiyeva. A Saginov Karaganda Technical University NJSC. Karaganda: Publishing house of the Karaganda Technical University, 2024. 170 p. (in English).

Information for potential consumers

The obtained experimental data and the conclusions drawn from them can be used to trace the migration routes of hydrocarbons and predict the scale of oil and gas accumulations in a given region.

Scope:

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

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