Геохімічний спектр елементів торфів Малополіської торф'яної області за коефіцієнтами концентрації, нормованими відносно кларків у ґрунтах, виглядає наступним чином ($К_к$): Mo (4,13), Sr (2,49), Co (2,01), Be (1,11), Pb (0,77), Cu (0,55), Ni (0,52), Yb (0,45), P (0,41), Y (0,31), V (0,3), Ag (0,3), Sn (0,28), Mn (0,27), Cr (0,27), Sc (0,2), Ba (0,19), Zr (0,18), Zn (0,16), Ti (0,14), Ga (0,09).

Для торфів ***Лісостепової торф'яної області***, як і Малополіської, характерна сидеро-літофільна позитивна геохімічна спеціалізація за рахунок підвищених вмістів молібдену, ітербію та стронцію, проте на відміну від останніх кларки концентрації цих елементів вищі: Mo – $К_к$ = 4,9; Yb – $К_к$ = 4,83; Sr – $К_к$ = 2,02, та халько-літо-сидерофільна від'ємна, з меншим спектром елементів-дефіцитів: Ni, Y, Co, Cu, Sn, Mn, Zn, Zr, V, Ga, Cr, Ba, Sc, Ti, Be ($К_к$ < 0,7).

Геохімічний спектр елементів торфів Лісостепової торф'яної області за коефіцієнтами концентрації, нормованими відносно кларків у ґрунтах, виглядає наступним чином ($К_к$): Mo (4,49), Sr (2,75), Ag (1,26), Pb (1,2), Be (1,15), P (1,09), Co (1,09), Cu (0,73), Ni (0,58), Yb (0,53), Mn (0,41), Y (0,33), Zn (0,32), Ba (0,31), Sc (0,29), Cr (0,29), V (0,28), Sn (0,27), Ga (0,24), Zr (0,14), Ti (0,13).

Торфи ***Карпатської торф'яної області*** мають також сильну позитивну сидеро-літофільну геохімічну спеціалізацію, яка обумовлена підвищеним вмістом Yb ($К_к$ = 6,16) та Mo ($К_к$ = 5,80). Група дефіциту має від'ємну халько-сидеро-літофільну спеціалізацію за рахунок зменшеного вмісту Pb, Co, Y, P, Sn, V, Mn, Zn, Zr, Ni, Cr, Cu, Sc, Ti, Ba, Ga, Be ($К_к$ < 0,7).

Геохімічний спектр елементів торфів Карпатської торф'яної області за коефіцієнтами концентрації, нормованими відносно кларків у ґрунтах, виглядає наступним чином ($К_к$): Mo (5,32), Ag (1,64), Be (1,49), Co (1,48), Sr (1,17), Pb (0,9), Yb (0,68), P (0,65), Cu (0,58), Cr (0,5), V (0,5), Ni (0,49), Mn (0,48), Zn (0,42), Y (0,39), Sc (0,37), Sn (0,33), Ba (0,28), Ti (0,21), Zr (0,19), Ga (0,14).

Anna BOIKO, Volodymyr BODNARCHUK, Galyna MULA

SHALE ROCKS OF THE SPASSK SUITE AS THE PROSPECTIVE OBJECTS FOR EXTRACTING HYDROCARBONS

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Now a days, given the urgent need of humanity in hydrocarbon energy, the problem of search, exploration and development of new hydrocarbon deposits is in creasingly being addressed. Due to the relevance of this issue, research hers have begun considering previously unpredictable sources of energy. That is why there is the necessity of searching at large and very large depths of the sedimentary shell of the earth's crust, at the continents and in shelf zones of sea sand oceans, extracting coal bed methane, as well as natural oil or gas from black shale rocks. Earlier, the rocks of this type were considered purely as cap rocks, and laterassource rocks, capable of generating and containing oil and gas hydrocarbons.

Due to the emergence of the possibility of extracting hydrocarbons from the sealed blacks hale rocks, the reis a need for their detailed study. Previously, the sestrata we reconsidered as oil and source rocks. At present, it has been proved in the world that the deposits en riched in organic matter can be both source and reservoir rocks.

Consequently, there is a need for conducting research work in order to identify specific strata, which can be both source and reservoir rocks. The specified rocks must contain a significant percentage of organic matter. In the Western region of Ukraine these are the rocks of two stratigraphic types of the Oligocene Menilite suite and the Spassk suite of the Lower Cretaceous. This has led to conducting detailed field and microscopic studies of substantiating the presence of a significant amount of organic matter.

By this time, the most active researches of black shale rocks within the Western region of Ukraine were conducted by the scientists N. A. Bykhover, V. B. Porfiriev, I. V. Greenberg, N. R. Ladyzhenskyi, K. A. Gapaburska, Yu. V. Koltun, V. I. Uziyuk, B. Y. Mayevskyi, L. S. Monchak and others (Bykhover, 1941; Porfiriev, 1961; Koltun, 2013; Uzyuk, Shainoga, 2014).

These sediments are most common within the Inner zone of the Precarpathian foredeep (the Menilite suite), the Skybova zone of the Carpathians (the Menilite and Spassk suites) and the Krosno zone (the Spassk suite). That is why the given tectonic zones were selected as the main regions for the study of prospective areas for oil and gas exploration from sealed shale rocks.

Field studies related to the Spassk suite of the Lower Cretaceous, due to the lack of entrances to the day surface (they are opened only in the wells of Shevchenkovo-1, Lugy-1 and Mizun-1 in the Skybova zone), were conducted only in the Krosno zone, near the following settlements: Tershiv, Spas, Busovysko, Holyatin, Maidan, Strygalnya, ChomaTysa, Yasinya. Figures 1–3 indicate the areas where these studies were carried out.

Consequently, it is suggested below to consider the results of microscopic studies of the Spassk suite of the Lower Cretaceous, based on the detailed description of die finished rock sections, made from selected samples within the abovementioned settlements.

The finished rock sections, presented in Figures 4–6, are made from sealed shale rocks of the Lower Cretaceous Spassk suite, taken from the outcrops of Starosambirskyi district of Lviv region. The rocks are represented by argillites and siltstones. Clay mass with a high content of carbonated organic matter is 65–70 %. This substance has an admixture of iron oxides and is brownish in color. The structure of the clay mass is pelitic, and sometimes lumpy. According to the mineral composition, the clay substance is obviously kaolinite. Clastic material occupies 30–35 % and is represented by quartz, single grains of glauconite and quartzite.

Rocks are not very dense, voids make up about 7 %. Clastic material is deeply immersed in the organic-clay mass. The rocks are transitions from argillites to siltstones (Bodnarchuk, 2013).

There are also brownish shale rocks of clay and siltstone type, extremely rich in fine-dispersed organic matter, among the rocks described above. Clastic material occupies 25–30 %, the rest is clay organic substance, which acts as a cement mass. It has a clearly expressed oriented shale structure, which is obviously due to the processes of sedimentation and diagenesis.

Organic matter is uniformly distributed throughout the rock and has the form of bundles and microfiber. Voids have not been found. Clay substance is predominantly kaolinite by mineral composition.

There are also rock sections made from sealed shale rocks of the Spassk suite of the Lower Cretaceous, taken from the outcrops of the Mizhhirya district of the Zakarpattia region. The rocks are represented by siltstones and argillites. Siltstones are from brownish to black in color. The clastic part is 50 %, 30 % is clay-organic mass, voids and microcracks occupy 20 %. Rock clasts are represented by quartz grains of angular, non-circular form 0.01–0.02 mm in diameter. Clay mass is composed of kaolinite. The carbonated organic material occupies 20 % of the cementing material and has a pelitic structure (Bodnarchuk, 2013).

Microcracks and cavities are horizontally oriented determining the microlayer texture of the rock. Clastic material is deeply immersed in the cement mass. Consequently, siltstones, enriched with pelitomorphic, carbonaceous substance, are porous and microcracked.

There can also be found residues of higher plants stems, algae in some sediments. There are presented individual finished rock sections of argillites and siltstones of black color, intensively saturated with organic matter, the content of which, according to microscopic studies, reaches 50 %, and in some finished rock sections even 70 %, which allows them to be classified as combustible shale.

Consequently, we can conclude that the organic matter has a clearly expressed oriented shale structure, which is obviously due to the processes of sedimentation. It is evenly distributed throughout the rock and has the form of bundles and small lumps. The presented rocks are mostly very dense.

It should also be noted that, unlike Menilite sediments, the black shale rocks of the Spassk suite are quite porous, and occupy about 12 % of the total volume of the rock. Sometimes an organic matter in this stratigraphic unit forms clumps of up to 1 mm, and microcracks are filled with them.

If you take into account the laboratory research and the printed sources, it should be noted that the average percentage of organic matter in the rocks of the Spassk suite is 2–8 %. However, as we can see, there are areas where these figures are significantly higher.

It should be noted that field geological studies of the Lower Cretaceous Spassk suite in the Krosno zone allowed defining a prospective area, in which further geological and geochemical studies were carried out. This has allowed the construction of geological and geochemical sections through the prospective area. On the basis of the received information, preliminary conclusions about the prospects of the site were made and the hydrocarbon potential of the black shale rocks was estimated according to the D2 category.

It should also be noted that the rocks, located within the prospective area mentioned above, contain voids and microcracks, whicltsometimes occupy up to 20 % and the organic matter content is 40 %.

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HYDRO- AND GASOGEOCHEMICAL ZONALITY IN DRUZHKOVSKO-KONSTANTINOVSKAYA ANTICLINE (DONBAS)

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Hydro- and gasgeochemical zoning is a reflection of the geological processes occurring in the earth's stratum, under the influence of various geodynamic factors. One of the main factors in its formation is tectonic movements of the earth's stratum, which determine the ascending movement of fluids in bursting and folded structures. The phenomenon is characteristic of the hydrothermal ore fields of the Donbas region. Within them there is a hydrogeochemical and gasgeochemical inversion, which discover itself in a sharp change in the chemical composition of groundwater and gases.

Research of this item in the region was engaged by G. Yanovska, S. Kirikilitsa, I. Friedman, O. Suyarko, V. Suyarko and other geologists.

At Druzhkovsko-Konstantinovskaya anticline, consisting of Carboniferous and Permian breeds of the Paleozoic and controlled by Druzhkivsko-Konstantinovsky fault zone. Here is an ore mineralization that forms the same ore field.

Within the Druzhkovka-Konstantinovsky anticline there are modern and newest tectonic movements witness of its constant lifting to 10–15 mm/year. The result of tectonic movements are formation of hydro and gasgeochemical inversions. This inversion manifests itself in the form of gas-geochemical anomalies.

Here is a modern discharge of groundwater of deep formation and deep gases, which is a consequence of gas-hydrogeochemical inversion (table).

The chemical composition of groundwater Druzhkovsko-Konstantinovskaya anticline

№	Depth of test	Gas composition, mg/l	Hydrogeochemical type of groundwater
D1		CO_2 – 26,7	M7,3 SO_4-Mg pH-1,4
D2	122,5–129,9 м	CO_2 – 60,2	M1,2 Cl-Na pH-8,2
D3	10 м	CO_2 – 23,0	M0,2 HCO_3- Ca pH – 7,55
D4	60 м	CO_2 – 43,0	M0,2 HCO_3- Na pH – 7,2
D5	9,0–11,5	CO_2 – 32,6	M1,0 SO_4 - HCO_3- Na pH-7,2
D6	15,4–17,3	CO_2 –30,8	M1,0 SO_4 - Mg pH-7,0
D7	9,0–12,0	CO_2 – 54,3	M3,4 SO_4 - Na pH-7,0
D8	12,1–12,8	CO_2 – 52,5	M2,4 SO_4 - Na pH-7,0
D9	2,6–4,8	CO_2 – 36, 2	M 1,6 SO_4 - Ca pH-6,9
D10	3,5–3,7	CO_2 – 52,5	M 1,6 SO_4-Ca pH-7,1