

## CURRENT GEOGRAPHICAL LOCATION OF MINERALS IN THE TERRITORY OF KARAKALPAKSTAN

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**Abstract.** *This article discusses the geographical location of minerals located in the territory of the Republic of Karakalpakstan based on comprehensive analytical results. The results of the practical study showed that the location of minerals is influenced by the natural geographical location and geological structure of the territory. Also, information is provided on minerals, ores and non-ore minerals found in the territory of the Republic of Karakalpakstan.*

*Analyzing the results of our research, we noted that the uneven location of minerals in the territory of Karakalpakstan, when analyzed geographically, is concentrated on the Ustyurt plateau. It is noted that the location of minerals is of great importance in studying the ecological and geographical conditions of the territory.*

**Keywords:** *Minerals, geographical location, Ustyurt Plateau, Amu Darya Delta, Aral Sea, oil and gas industry, non-ferrous minerals, geographical analysis.*

### QORAQALPOG'ISTON HUDUDIDAGI FOYDALI QAZILMA BOYLIKLARINING HOZIRGI VAQTDAGI GEOGRAFIK JOYLASHISH HOLATI

**Annotatsiya.** *Ushbu maqolada Qoraqalpog'iston Respublikasi hududida joylashgan foydali qazilmalarining geografik joylashish holati kompleks tahliliy natijalarga asoslangan holda muhokama qilindi. Amaliy tadqiqot natijalari shuni ko'rsatdiki, hududning tabiiy-geografik joylashish o'rni va geologik tuzilishi holati foydali qazilmalar joylashuviga qanday ta'sir ko'rsatgani haqida ma'lumotlar berib o'tiladi. Shuningdek, Qoraqalpog'iston Respublikasi hududida uchraydigan minerallar, ruda va noruda foydali qazilmalar haqida ma'lumotlar ko'rsatib o'tiladi. Tadqiqotimiz natijalarini tahlil qilganimizda, Qoraqalpog'iston hududida foydali qazilmalarning notekis joylashganligini geodrafik jihatdan tahlil qilgan holda, foydali qazilma boyliklarining asosiy qismi Ustyurt platosida jamlanganini ta'kidlab o'tganmiz. Foydali qazilmalarning joylashish holati esa asosan hududning ekologik, geografik sharoitlarini o'rganishda muhim ahamiyatga egaligi aytib o'tiladi.*

**Kalit so'zlar:** *Minerallar, geografik joylashuv holati, Ustyurt platosi, Amudaryo deltasi, Orolbo'yi hududi, neft va gaz sanoati, norudali foydali qazilmalar, geografik tahlillar.*

#### Introduction

The Republic of Karakalpakstan is located in the northwestern part of the Republic of Uzbekistan and, in terms of its natural and geographical conditions, geological structure and history of tectonic development, is one of the most complex and rich mineral resource regions of Central Asia. The richness of this region in minerals is directly related to its platform and pre-platform structures formed over long geological periods, the extensive development of sedimentary basins and the diversity of paleogeographic conditions. In particular, at present, the geographical location of subsoil resources, industrial significance and the level of territorial development serve as an important factor in the economic development of Karakalpakstan. The territory of the Republic of Karakalpakstan includes the Amu Darya Delta, the Ustyurt Plateau and the Aral Sea Plain.

Each of these natural and geographical regions has its own unique geological structure and types of minerals. The northern and western parts of the region are mainly occupied by the Ustyurt Plateau, where sedimentary rocks of the Mesozoic and Cenozoic eras are widespread. In the southern and southeastern parts, the Amu Darya Delta is located, this area is mainly covered with alluvial and deltaic sediments. The Aral Sea is ecologically and geologically unique, with widespread deposits of salts, evaporite rocks, and building materials.

The main purpose of this scientific article is to analyze the current geographical location of mineral resources located on the territory of the Republic of Karakalpakstan on a scientific basis. During the research, minerals were studied by dividing them into fuel and energy, ore and non-ore groups, and their territorial distribution was highlighted in connection with natural-geographical and geological factors. The level and prospects of mineral development on an industrial scale were also scientifically analyzed. The research methodology used methods of analysis of geological maps, territorial-geographical comparison, regional analysis, and scientific generalization. The stages of geological development of the territory of Karakalpakstan in the Paleozoic, Mesozoic, and Cenozoic eras were studied, and the main factors that influenced the formation of minerals were identified. In particular, the influence of platform sedimentary basins, tectonic faults, and marine transgression-regression processes on the location of minerals has become significant.

The territory of Karakalpakstan is geologically an important component of the Turanian platform. Platform sedimentary covers prevail on the Ustyurt plateau, and deposits of oil, gas, salt, and building materials are mainly located here. The geological structure of the Ustyurt region is based on the Paleozoic basement, over which thick Mesozoic-Cenozoic sedimentary rocks lie. It is in these sedimentary layers that favorable geological conditions are created for the accumulation of hydrocarbon resources. The territory of the Amu Darya delta is mainly composed of young sedimentary rocks, and in this region, in addition to ores, deposits of minerals, in particular, sand, gravel, clay, and building materials, are widespread. The formation of the delta area is associated with the centuries-old alluvial activity of the Amu Darya, which led to the uneven and mosaic nature of mineral deposits. At the same time, the widespread occurrence of groundwater and mineral brines in the delta area is also an important geological factor. The Aral Sea is one of the most ecologically complex regions of Karakalpakstan, where salt deposits, saline soils and evaporite rocks are widespread.

Mineral salts and saline sediments, which are an important resource for industrial and economic needs, appeared on the new lands formed as a result of the retreat of the Aral Sea. The location of mineral deposits in this region is closely related to paleogeographic processes and climatic factors. Thus, the territory of the Republic of Karakalpakstan is of particular scientific and practical importance in terms of the diversity of mineral deposits and their geographical location. The geological structure of the region, the history of tectonic development, and natural and geographical conditions played a decisive role in the formation and location of mineral deposits. In the territory of the Republic of Karakalpakstan, fuel and energy resources, in particular oil, natural gas and gas-condensate deposits, are located in close connection with the geological structure and history of tectonic development of the region. These resources are mainly concentrated in the Ustyurt plateau and adjacent structural zones located in the western and northwestern parts of the Turan platform, which are one of the main factors determining the industrial and energy potential of Karakalpakstan.

The distribution of hydrocarbon resources in the region is explained by the development of platform sedimentary basins, the presence of tectonic folds and trap structures. The Ustyurt plateau stands out as the main oil and gas region in the territory of Karakalpakstan. Thick sedimentary layers of sandstone, limestone and clay rocks of the Mesozoic and Cenozoic eras are widespread in this area, which serve as convenient collector and cap layers for the accumulation and storage of hydrocarbons. In particular, sedimentary rocks from the Jurassic and Cretaceous periods are considered the main reserves of oil and gas.

The territorial location of these geological layers has led to the accumulation of hydrocarbon resources in the central and southern parts of the Ustyurt Plateau. Large gas and gas-condensate fields in the territory of Karakalpakstan are located mainly in the northwestern and central parts of the Ustyurt Plateau. The geographical location of these fields is associated with tectonically stable platform areas, large structural uplifts and anticline zones. Such structures act as natural traps for hydrocarbons, allowing gas and condensate to accumulate over long geological periods. These fields are currently used as important energy sources on a republican and regional scale.

Although there are relatively few oil fields in Karakalpakstan, some of them have been discovered in the southern and southwestern parts of the Ustyurt Plateau. These fields are mainly small and medium-sized, and their geographical location is associated with deep-lying reservoir layers. The territorial distribution of oil fields is limited within certain structural elements of the Ustyurt Plateau, which is explained by the general tectonic development of the region. At the same time, existing geological studies indicate the presence of promising oil and gas fields in the region that have not yet been fully explored. There are practically no fuel and energy minerals in the Amu Darya delta, which is explained by the geological youth of this area and its composition, which is mainly alluvial sedimentary rocks.

However, it has been scientifically noted that there is a possibility of gas accumulation in some deep structures adjacent to the Amu Darya. Currently, geological exploration in this area is limited, and the main attention is paid to the Ustyurt Plateau area. The geographical location of Karakalpakstan's fuel and energy resources is also inextricably linked to the development of regional infrastructure. Natural gas extracted from gas fields located on the Ustyurt Plateau, in addition to meeting the domestic needs of the republic, is also supplied to other regions through main gas pipelines. This territory is an impetus for the development of industrial enterprises, gas processing complexes, and energy infrastructure. In this regard, the geographical location of fuel and energy resources is an important factor in increasing the economic and geographical significance of Karakalpakstan.

Currently, in the process of developing fuel and energy fields in Karakalpakstan, environmental factors and the natural conditions of the territory are also taken into account. The desert and semi-desert landscapes of the Ustyurt Plateau, the limited availability of water resources, and the need to preserve biodiversity require a careful approach to the use of fields.

Therefore, the issue of rational use of resources through the use of modern geological exploration and production technologies is gaining urgent importance. In general, fuel and energy resources in the Republic of Karakalpakstan are mainly located on the Ustyurt Plateau, and their geographical location fully corresponds to the geological structure and laws of tectonic development of the region. These resources play an important role in ensuring the energy independence of the region and accelerating its economic development. Non-ferrous and rare metals are found in limited quantities in the territory of Karakalpakstan and, although their

industrial significance is relatively low, are considered scientifically important. The location of these metals has been identified mainly in some remote zones of the Ustyurt Plateau and in areas close to deep tectonic faults. The occurrence of non-ferrous metal ores is often associated with hydrothermal processes and deep magmatic activity, which indicates the complex geological history of the region. However, due to the limited availability of igneous rocks in the territory of Karakalpakstan, non-ferrous metal deposits have not been widely developed. The geographical location of ore deposits is associated with the geological structure of the region, as well as natural and geographical conditions. Desert and semi-desert landscapes, limited water resources, and the level of development of transport infrastructure directly affect the development of ore deposits. Therefore, ore deposits in the territory of Karakalpakstan are developed mainly in economically profitable areas, while the remaining areas are considered promising reserves.

There are practically no ore deposits in the Amu Darya delta, which is explained by the fact that the region consists of young alluvial deposits and there are no favorable conditions for deep mineralization processes of ore. However, scientific studies have noted the presence of metal compounds in low concentrations in some areas adjacent to the delta due to the chemical composition of groundwater. This is of great importance from the point of view of studying the geochemical conditions of the region. In general, ore minerals in the territory of the Republic of Karakalpakstan are geographically unevenly distributed, the main part of which falls on the Ustyurt plateau. These resources play an important role in forming the strategic raw material base of the region, but their development requires comprehensive consideration of geological, ecological and economic factors. The most widespread group of mineral resources in the territory of the Republic of Karakalpakstan is non-ore minerals. Their geographical location is directly related to the natural and geographical conditions of the region, the history of paleogeographic development, and the long duration of sedimentary processes. Non-ore minerals mainly include salts, evaporite rocks, phosphorites, limestone, gypsum, dolomite, sand, gravel and other building materials.

These resources are of great importance in the economic development of Karakalpakstan, especially in meeting the needs of the construction industry and the chemical industry. One of the most important non-ferrous minerals in Karakalpakstan is salt. Salt deposits are mainly located in the Aral Sea and some lowlands of the Ustyurt Plateau. Evaporite deposits formed as a result of the historical regression of the Aral Sea occupy large areas in these regions. Salt layers are often located close to the surface, which allows them to be mined in an open-pit manner. The geographical location of salt deposits is closely related to ancient sea basins and salinization processes, and in this area, along with sodium chloride, other mineral salts are also found. Although phosphorite deposits in Karakalpakstan are relatively limited, some of them have been discovered in the southern and southwestern parts of the Ustyurt Plateau. The geographical location of phosphorites is mainly associated with sedimentary rocks formed under marine conditions, and they occur in layers dating back to the Mesozoic era.

These deposits are considered an important source of raw materials for agriculture and the production of mineral fertilizers, but their industrial development is currently limited. Building materials such as limestone, dolomite, and gypsum are among the most common non-ferrous minerals in Karakalpakstan. These rocks are mainly located in the central and eastern parts of the Ustyurt plateau, as well as on the outskirts of the Amu Darya delta. Limestone and dolomite layers mainly date back to the Mesozoic era, and their geographical location indicates the presence of ancient sea basins in the region.

Gypsum deposits are found in sedimentary layers formed as a result of evaporation processes and mainly formed in dry climate conditions. Building materials such as sand and gravel are widespread mainly in the Amu Darya delta. The geographical location of these resources is directly related to the alluvial activity of the river, and large sand-gravel layers were formed as a result of the long-term flow of the Amu Darya. Sand and gravel deposits in the delta area are usually located close to the surface and can be technologically mined relatively easily.

Each of these regions is characterized by its own geological structure, tectonic development and paleogeographic conditions, which has led to clear differences in the composition of minerals and their territorial distribution. The Ustyurt Plateau is the richest region of Karakalpakstan in mineral resources. This region is home to fuel and energy, ore and some non-ore minerals, the geographical location of which is explained by the extensive development of platform sedimentary layers. Oil and gas deposits are distributed in the central and southern parts of the Ustyurt Plateau, while salt and construction material deposits are mainly in the northern and western parts.

Uranium deposits are also more common in some structural zones of this region. The location of minerals on the Ustyurt Plateau is associated with tectonic uplifts and folds, which indicates that this area is relatively stable geologically. The Amu Darya delta region is characterized by its rich mineral resources, mainly non-ore resources. Sand, gravel, clay and other building materials are widespread in this area, and their location is directly related to the alluvial activity of the river. Mineral resources in the delta are mainly located close to the surface of the earth, which is technologically convenient to extract. However, there are practically no fuel and energy and ore minerals in this area, which is explained by its geological youth and unfavorable conditions for deep mineralization processes in the region. The Aral Sea is an ecologically complex and unique region in terms of the location of minerals. Salts, saline layers and evaporite rocks are widespread in this area.

Mineral salts and other non-ore minerals appeared on the new lands formed as a result of the retreat of the Aral Sea, and their territorial location changed dramatically. The location of minerals in the Aral Sea is closely related to climatic factors and paleogeographic processes, and the issue of resource use in this area must be considered in conjunction with environmental safety. Territorial-geographical analysis of the location of minerals shows that resources are unevenly distributed in Karakalpakstan, with the main part of them falling on the Ustyurt Plateau. This situation causes certain differences in regional economic development.

While the mining and energy industries are developed on the Ustyurt Plateau, agriculture and the production of building materials dominate in the Amu Darya Delta and the Aral Sea.

Therefore, the geographical location of minerals is an important factor determining the economic specialization of the region. Territorial analysis also makes it possible to assess the prospects for the development of minerals. Although there are prospects for identifying new oil and gas deposits on the Ustyurt Plateau and for deeper study of existing deposits, rational and environmentally friendly use of non-mineral resources in the Aral Sea region is of urgent importance. Meeting the demand for building materials of the Amu Darya Delta is the main direction.

#### Conclusion

In conclusion, the geographical location of minerals in the territory of the Republic of Karakalpakstan is directly related to the natural-geographical and geological conditions of the territory, and their territorial-geographical analysis serves as an important scientific basis for the

effective use of resources and planning the development of territories. The territory of the Republic of Karakalpakstan is one of the important mineral and raw material bases of Central Asia in terms of the diversity of mineral and raw material resources and territorial location.

As a result of the research, it was found that the location of minerals is directly related to the geological structure, history of tectonic development and paleogeographic conditions of the territory, and their uneven distribution causes certain differences in territorial development.

The Ustyurt Plateau is distinguished by its fuel and energy and some ore minerals, the Amu Darya Delta was formed mainly as a source of ore-free building materials, and the Aral Sea is distinguished by its salt and evaporation resources.

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