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**Batrak O.S., student of group 103-22-1, Dereviahina N.I., Ph.D., Head of the Department of Hydrogeology and Engineering Geology**

*(Dnipro University of Technology, Dnipro, Ukraine)*

## **ANALYSIS OF THE GEOLOGICAL CHARACTERISTICS OF ALUMINUM DEPOSITS IN UKRAINE**

Aluminum is one of the most widespread elements in the Earth's crust, being a component of over two hundred minerals; however, only a few of them have industrial significance. The main sources of aluminum raw materials are bauxites, nepheline ores, kaolins, and alunite rocks. Ukraine possesses significant reserves of these resources, which makes the study of their geological structure, distribution, and occurrence conditions an important aspect.

The largest aluminum reserves are found in residual and re-deposited weathering crusts of acidic, alkaline, and basic rocks. In Ukraine, the main forms in which aluminum occurs are bauxites, nephelines, alunites, and kaolinites. Bauxites are represented by relatively small explored reserves, concentrated in the Smila, Vysokopillia, and Nikopol deposits, located within the weathering crusts of Precambrian formations. Bauxites are also found in the Pryazovia region and the Carpathians.

The Vysokopillia deposit is composed of amphibolites, chlorite-hornblende and micaceous schists, ultrabasic rocks, diabases, granites, and their migmatites. The deposit consists of small bauxite bodies forming an irregular strip, with the distances between them generally not exceeding a few hundred meters. The shapes of the deposits are irregular, and the thickness of the bauxite layers varies from 0.5 to 7 meters. The bedding is mostly horizontal, with some exceptions. The bauxites occur in rocky, loose, and less frequently clayey varieties.

Second to bauxites in terms of reserves are nepheline ores, found in the alkaline complex of the Zhovtnevyi Massif in the Donbas region, notable for the complex composition of these ores. Nepheline syenites have also been recorded in the Dniester region and the upper Buh area.

Kaolin and high-alumina argillites, as aluminum raw materials, are available for extraction within the central part of Ukraine (Dnipropetrovsk, Zaporizhzhia, and Vinnytsia regions). Here, kaolins appear as the primary component along with quartz, containing admixtures of hydromica, iron hydroxides, and carbonaceous material. They can only be used after preliminary beneficiation.

Alunite deposits and ore occurrences in the Zakarpattia region are associated with secondary quartzites and, provided they are extracted as part of a complex mining operation (due to the low alunite content), they can serve as a source of aluminum. Within this group, the Bihanske deposit is typical and is one of the largest. Here, secondary quartzites act as alunite ores, with an alunite content starting from 20%. The ore body has a lens-like shape with a thickness of up to 60 meters. The alunite content varies widely, reaching up to 60%.

Several promising aluminum raw material deposits have been identified in Ukraine; however, their industrial development requires advanced extraction and beneficiation technologies

Bauxites remain the primary source of aluminum, while nepheline and alunite ores are considered promising, particularly due to the potential for complex extraction of associated metals

For the effective utilization of the resource base, additional geological and economic studies are needed to assess the feasibility of deposit development and to implement modern processing technologies

### **References**

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