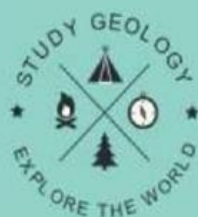


XVI Всеукраїнська молодіжна
наукова конференція-школа
«СУЧАСНІ ПРОБЛЕМИ НАУК ПРО ЗЕМЛЮ»

8 – 9 квітня 2026



50°23'16.6" N
30°28'49.8" E



**Програма
конференції**

ННІ «Інститут геології»
Київського національного університету
імені Тараса Шевченка

Матеріали

**XVI ВСЕУКРАЇНСЬКОЇ МОЛОДІЖНОЇ НАУКОВОЇ
КОНФЕРЕНЦІЇ – ШКОЛИ**

«СУЧАСНІ ПРОБЛЕМИ НАУК ПРО ЗЕМЛЮ»

Київ - 2026

XVI Всеукраїнська конференція-школа «Сучасні проблеми наук про Землю»
Київ, 8-9 квітня 2026 р.

УДК: 504+550+551+552+624

XVI Всеукраїнська молодіжна наукова конференція - школа «Сучасні проблеми наук про Землю». – К., 2026. – 189 с.

Організаційний комітет: Шабатура О.В., Стахів І.Р., Бугай К.Р., Мигаленко А.Р.

XVI Всеукраїнська молодіжна наукова конференція - школа «Сучасні проблеми наук про Землю» проведена 8-9 квітня 2026 року в Навчально-науковому інституті «Інститут геології» Київського національного університету імені Тараса Шевченка. У цьому збірнику праць подано матеріали конференції, надруковані в авторській редакції.

OCCURRENCE OF NIOBIUM (Nb) IN COAL SEAMS OF THE WESTERN DONBAS

Kozii Ye.S.

Candidate of Geological Sciences (Ph.D),

Senior Research Fellow

(M.S. Poliakov Institute of Geotechnical Mechanics of the National Academy of Sciences of
Ukraine),

Senior Research Fellow (Dnipro University of Technology),

Associate Professor (LLC "Technical University "Metinvest Polytechnic")

The distribution of niobium in the coal seams of the Western Donbas has been investigated, specifically within the Lozivska and Pavlohrad-Petropavlivka areas. In these areas, niobium is characterized by a high occurrence rate of 75–99% and concentrations that exceed the niobium clark for the Earth's crust.

Keywords: niobium, coal seams, Western Donbas, critical raw materials, associated recovery.

Досліджено поширення ніобію у вугільних пластах Західного Донбасу, зокрема Лозівського та Павлоградсько-Петропавлівського районів, де ніобій характеризується високою зустрічальністю на рівні 75–99% та концентраціями, які перевищують кларк ніобію для земної кори.

Ключові слова: ніобій, вугільні пласти, Західний Донбас, критична сировина, супутнє вилучення.

The modern energy transition strategy and the implementation of the EU Critical Raw Materials Act are aimed at reducing dependency and increasing the resilience of essential supply chains for mineral raw materials and their processed products within the EU. This document emphasizes the urgent need to diversify sources and secure supply routes, particularly through strengthened external partnerships (Державна служба геології та надр України, 2023a).

Currently, researchers are specifically focused on identifying alternative sources of rare and rare-earth elements. Ukraine, possessing significant coal reserves, holds high potential for the extraction of associated valuable components, among which niobium (Nb) holds a prominent place. On July 14, 2025, the Cabinet of Ministers of Ukraine adopted Resolution No. 845, "On the Approval of Lists of Minerals and Components of Strategic and Critical Importance, and Lists of Subsoil Plots (Mineral Deposits) of Strategic and/or Critical Importance" (Державна служба геології та надр України, 2023b). According to the approved resolution, niobium is classified both as a mineral/component of strategic importance and as a mineral/component of critical importance.

Today, niobium is one of the most sought-after metals in high-tech industries due to its unique physicochemical properties, including a high melting point, exceptional corrosion resistance, and the ability to transition into a superconducting state.

Despite the existence of potential substitutes for niobium, such as tantalum, molybdenum, tungsten, or ceramic matrix composites, their use in high-temperature systems and superalloys often leads to a significant decrease in operational performance or a substantial increase in the cost of the final product. Specifically, in the production of stainless and high-strength steels, replacing niobium with titanium or molybdenum does not always achieve the same level of corrosion resistance and strength, making niobium an indispensable component for many industries (U.S. Geological Survey, 2026).

Niobium is frequently found in the coal seams of the Western Donbas, with an occurrence rate ranging between 75% and 99% (Fig. 1). The total share of seams with an occurrence rate exceeding 50% (the "100%" and "50–99%" segments) dominates the distribution structure. This serves as a compelling argument for the industrial significance of the Western Donbas deposits as

a potential source of niobium: high occurrence guarantees predictable extraction and stability of the valuable component's content in the coal delivered to processing plants. Instances of the element's absence or low content are isolated, which simplifies the technological planning of its associated recovery. Maximum niobium concentrations in the coal seams of the Lozivska and Pavlohrad-Petropavlivka geological-industrial areas reach up to 30 g/t, which is 1.43 times higher than the Earth's crust clarke according to A.P. Vinogradov. Average niobium content values across various areas and mine fields vary from 8 to 10 g/t.

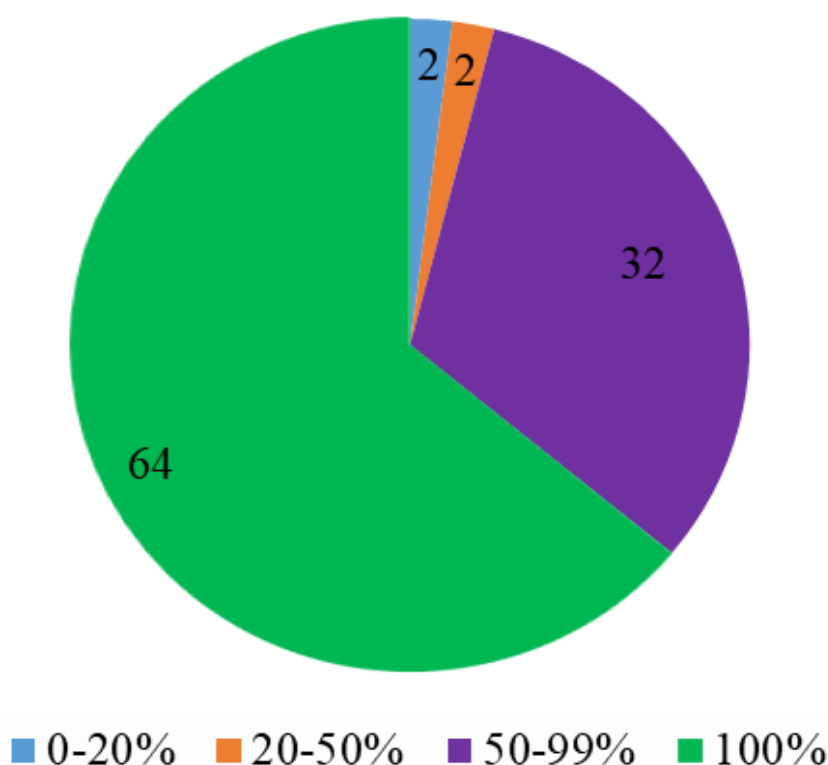


Fig. 1 – Occurrence rate of niobium in the coal seams of the Western Donbas

An examination of the niobium distribution balance in coal using density fraction analysis (within combined fractions of 1.3-1.6 g/cm³, 1.6-2.1 g/cm³, and 2.1-2.89 g/cm³) reveals that 70% to 90% of the element transitions into the light fractions (density 1.3-1.6 g/cm³). The distribution of element recovery between the 1.6-2.1 g/cm³ and 2.1-2.89 g/cm³ fractions is identical, fluctuating between 5% and 15%.

The study of the potential of Western Donbas coal deposits as an alternative source of critical raw materials, specifically niobium, is driven by the high demand for this metal in high-tech industries. A significant advantage of utilizing coal seams for the recovery of associated trace elements, including niobium, is that these deposits are already under active exploitation. This substantially enhances the economic efficiency of extraction, as it allows for the utilization of existing mining infrastructure, established logistics chains, and coal processing facilities. Thus, obtaining associated metals as a by-product of primary energy resource extraction minimizes capital expenditures for deposit development and reduces the production cost of the final concentrate.

Alongside elevated niobium concentrations in the Western Donbas coal seams that exceed clarke values, the coal is characterized by high contents of several other critical and strategic

elements. This creates the prerequisites for implementing multi-component extraction methods, making the recovery of the entire group of valuable associated elements more comprehensive and economically viable.

Державна служба геології та надр України. (2023, 17 березня). *Єврокомісія представила законопроект щодо критичної сировини.* <https://www.geo.gov.ua/yevrokomisiia-predstavyla-zakonoproekt-shchodo-krytychnoyi-syrovyny/>

Державна служба геології та надр України. (2023, 16 лютого). *Кабмін затвердив переліки критичних і стратегічних корисних копалин та ділянок надр, родовищ для проведення конкурсів УРП і аукціонів.* <https://www.geo.gov.ua/kabmin-zatverdyy-pereliky-krytychnykh-i-stratehichnykh-korysnykh-kopalyn-ta-dilianok-nadr-rodovysch-dlia-provedennia-konkursiv-urp-i-auksioniv/>

U.S. Geological Survey. (2026). *Niobium (Columbium)* [Mineral Commodity Summaries]. <https://pubs.usgs.gov/periodicals/mcs2026/mcs2026-niobium.pdf>

Kozii Ye.S., OCCURRENCE OF NIOBIUM IN COAL SEAMS OF THE WESTERN DONBAS