Problems of translating chemical terms into Uzbek language

PhD Khakimova M.M.
TSTU Almalyk branch,
m.malika.makhmudovna@gmail.com

Abstract
This article examines the main challenges faced in translating chemical terms into the Uzbek language. The study emphasizes the complexity of scientific terminology, particularly in chemistry, due to its international character, historical development, and rapid expansion. It analyzes issues such as lexical equivalence, borrowing, standardization, and semantic accuracy. Furthermore, the paper highlights the necessity of unified terminology in Uzbek scientific discourse to ensure clarity, consistency, and accessibility in education, research, and industry.
Keywords: *chemical terminology, translation studies, Uzbek language, IUPAC nomenclature, scientific terminology, lexical borrowing, standardization, polysemy, linguistic adaptation.*

The development of national scientific terminology plays a decisive role in strengthening the intellectual and cultural potential of any language. As Sapir noted, “language is the symbolic guide to culture,” and thus, the enrichment of terminology directly impacts the development of scientific thinking within a nation [7]. In Uzbekistan, the translation and adaptation of scientific concepts, particularly in the natural sciences such as chemistry, requires special attention because of their central role in education, research, and industrial development [5].
Chemistry, being a field with thousands of internationally recognized terms, poses unique challenges for translators, educators, and students. Most chemical terminology originates from Greek and Latin, later enriched by English, German, and French, which are dominant languages in modern science [3]. This historical layering of terms creates difficulties when adapting them into Uzbek, a Turkic language with different phonological and morphological systems. Moreover, the absence of a unified approach to translating chemical terms has resulted in inconsistencies across textbooks, scientific publications, and educational practices [8]. For example, some chemistry textbooks still rely heavily on Russian-based translations, while others attempt to introduce newly coined Uzbek equivalents, leading to confusion among students and researchers.
It is essential to emphasize that the translation of scientific terms is not a mere mechanical replacement of words but a process requiring a deep understanding of both linguistic and disciplinary contexts. Newmark argued that “the translation of technical terms must balance accuracy, clarity, and cultural acceptability,” which is especially relevant in chemistry, where misunderstanding a term may result in conceptual or experimental errors. In the field of chemistry, terms can be classified into three main categories [4]:

1. Systematic nomenclature terms – These are terms based on internationally recognized naming rules, such as *sulfuric acid* (H_2SO_4) or *sodium chloride* (*NaCl*). Their Uzbek equivalents (*oltingugurt kislotasi*, *natriy xlorid*) must preserve the systematic logic of IUPAC while remaining comprehensible to Uzbek speakers.
2. Eponyms and historical terms – These include names derived from scientists or historical traditions, such as *Avogadro’s number* or *Boyle’s law*. Such terms often resist direct translation, requiring careful adaptation to preserve both the scientific meaning and the recognition of historical figures [1].
3. Common and everyday terms with specific scientific meanings – Words such as *solution, base, oxidation* are used in everyday language but acquire specialized meanings in chemistry. In Uzbek, *solution* is translated as *eritma*, distinct from *yechim* in mathematics, while *base* oscillates between *ishqor* and *asos* depending on the context [5].

Therefore, the process of translating chemical terminology in Uzbekistan must consider not only linguistic precision but also pedagogical clarity, international compatibility, and cultural-linguistic identity. Without a standardized approach, students and professionals may face barriers in both domestic and international scientific communication.

The complexity of translating chemical terminology into Uzbek lies in the need to preserve scientific precision while ensuring comprehensibility for native speakers. As Newmark argues, scientific translation is “a matter of exactness, not elegance,” meaning that accuracy must not be compromised for stylistic convenience[4]. This principle becomes crucial in chemistry, where minor deviations in terminology may distort the meaning of concepts and hinder effective learning.

Many chemical terms in Uzbek are borrowed directly without phonological or morphological adaptation, such as *atom*, *molekula*, and *ion*. Borrowing has been a common strategy in scientific terminology worldwide, yet excessive reliance on loanwords can weaken the development of native equivalents [3]. For example, *acid* is translated as *kislota*, a borrowing from Russian, while a native equivalent such as *nordon* theoretically exists but is rarely used [5]. Similarly, *oxidation* is commonly rendered as *oksidlanish*, yet older Uzbek literature sometimes used *kislorodlanish*. These inconsistencies not only create confusion for learners but also highlight the absence of a unified linguistic policy in scientific translation [8].

Another challenge is polysemy and semantic overlap. Certain chemical terms carry multiple meanings in different contexts. For instance, *base* in chemistry corresponds to *ishqor*, whereas in general English it also means *asos*. Uzbek translations sometimes fluctuate between these two forms, causing ambiguity. Likewise, *solution* is translated as *eritma* in chemistry but as *yechim* in mathematics [1]. As Baker emphasizes, context-sensitive strategies are vital for managing polysemy, since a single target-language equivalent may not suffice across disciplines [2].

A further issue concerns the relationship between international standards and local practice. The International Union of Pure and Applied Chemistry (IUPAC) constantly updates its nomenclature rules to ensure uniformity worldwide [4]. However, Uzbek equivalents often lag behind these updates, leaving academic resources outdated or inconsistent. While IUPAC recommends systematic names, Uzbek scientific literature still relies heavily on Russian-based terminology, which reflects a historical legacy of Soviet-era linguistic influence [5]. This gap underscores the need for harmonization between global standards and national linguistic norms.

Borrowed chemical terms are also not always adapted according to Uzbek phonetic and orthographic rules. For example, *polyethylene* becomes *polietilen*, *phenol* becomes *fenol*, yet *phosphorus* appears as both *fosfor* and *phosfor* in different sources. Such irregularities reduce terminological stability and complicate the teaching of chemistry in Uzbek [8].

Despite efforts to create Uzbek–Russian–English chemical dictionaries, there is still no fully standardized reference that incorporates modern Uzbek equivalents of all IUPAC terms [4]. As a result, scientific articles, textbooks, and educational resources display significant terminological variation. This lack of standardization hampers both academic instruction and international scientific communication [5].

The translation of chemical terms into Uzbek is a complex but crucial process in the development of the national scientific language. Challenges such as excessive lexical borrowing, semantic ambiguity, inconsistency with international standards, and the absence of unified dictionaries continue to hinder effective communication in educational and research contexts. Overcoming these barriers requires a comprehensive approach that integrates standardization, interdisciplinary collaboration, and modernization of scientific resources [8].

Establishing a unified system of Uzbek chemical terminology will not only enhance the clarity and accessibility of scientific texts but also enrich the intellectual potential of the Uzbek language. Furthermore, alignment with international nomenclature ensures that Uzbek

scientists can participate fully in global academic exchange. As Newmark asserts, scientific translation is not merely linguistic substitution but a cultural and intellectual endeavor that shapes the future of knowledge transmission. Therefore, the systematic development of Uzbek chemical terminology is both a linguistic necessity and a strategic step toward strengthening Uzbekistan's role in the global scientific community.

References

Alpatov, V. (2009). Problemy nauchnoy terminologii. Moskva: Nauka.

Xakimova, M. (2023). Contrastive analysis of paradigmatic relations of words in English and Uzbek. *Namangan davlat universiteti Ilmiy axborotnomasi*.

Malika, X. (2025). Challenges of teaching linguistic competence of students. *Current Research Journal of Pedagogics*, *6*(01), 38-40.

Xakimov, S. (2024). ВАЖНОСТЬ КОММУНИКАТИВНОЙ КОМПЕТЕНТНОСТИ В ОБУЧЕНИИ РАЗГОВОРНОЙ РЕЧИ. *Modern Science and Research*, *3*(7).

Xusniddin o'g'li, X. S. (2024). ВАЖНОСТЬ КОММУНИКАТИВНОЙ КОМПЕТЕНТНОСТИ В ОБУЧЕНИИ РАЗГОВОРНОЙ РЕЧИ.

Baker, M. (1992). In other words: A coursebook on translation. London:Routledge.

Crystal, D. (2003). The Cambridge encyclopedia of the English language.Cambridge: Cambridge University Press.

International Union of Pure and Applied Chemistry (IUPAC). (2019). Nomenclature of chemistry: IUPAC recommendations. Retrieved from https://iupac.org

Karimov, A. (2018). Kimyo terminologiyasining tarjimaviy muammolari. O'zbek tili va adabiyoti, (4), 45–52.

Newmark, P. (1988). A textbook of translation. London: Prentice Hall.

Sapir, E. (1921). Language: An introduction to the study of speech. New York: Harcourt, Brace.

Xolmatov, R. (2021). Fan va texnika sohalarida o'zbek terminologiyasi masalalari. Toshkent: Fan nashriyoti.