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RESEARCH ARTICLE OPEN ACCESS

A Syntactic-Component Analysis of Chemical Terminological Combinations in Uzbek And English

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ABSTRACT

The paper studies English-Uzbek chemical term combinations as syntactic units rather than as isolated lexical equivalents. The material is taken from the IUPAC Gold Book and from Shokirova and Nurullayev's English-Uzbek-Russian Dictionary of Chemistry Terms; the Uzbek nomenclatural context is interpreted through Isaqov and Zokirova's work on chemical compound nomenclature. The theoretical position is based on the idea that a term may be a word or a word combination used in professional communication, and that its formal structure is part of terminological description. Twenty representative English-Uzbek pairs are segmented according to their internal models. The comparison shows that English Adj + N and N + N combinations are sometimes preserved in Uzbek, but they are also frequently adapted through possessive forms, adjectival derivation, verbal nouns, participles and postpositional constructions. The results suggest that Uzbek chemical terminology does not simply copy English compound patterns. It normally keeps the chemical concept and reorganizes the relation between components according to Uzbek grammatical norms. This approach is useful for scientific translation, bilingual lexicography and further work on the standardization of Uzbek chemical terminology.

Keywords: Chemical terminology; syntactic-component analysis; English-Uzbek comparison; Uzbek scientific language; term combination; IUPAC nomenclature.

INTRODUCTION

Chemical nomenclature is not a secondary matter in chemistry. It is one of the ways in which chemical knowledge is ordered, taught and exchanged. Isaqov and Zokirova describe nomenclature as the language of chemistry and point out that its difficulty grows from simple names of substances to the naming of compounds with complex structure [6, pp. 3-4]. For a linguistic study, this statement is important because it shows that a chemical name is both a scientific sign and a linguistic form.

The Uzbek case deserves separate attention. International chemical nomenclature is strongly connected with English; in Uzbek practice many forms have also passed through Russian scientific usage. Isaqov and Zokirova note that IUPAC recommendations are written in English and that names transferred into Uzbek should preserve their conceptual content while being adjusted to the structural features of Uzbek [6, pp. 4-6]. This creates a real comparative problem: the same chemical concept may be expressed by different syntactic means in English and Uzbek.

The present paper focuses on such means. English chemical terminology often uses compact units such as acid anhydride, activation energy, addition reaction or anion exchange. In Uzbek, these terms may appear as kislota angidridi, faollashtiruvchi energiya, birikish reaksiyasi and anionli almashinuv. These examples show that the difference is not only lexical. The relation between components is also reorganized.

The aim of the paper is to describe the main syntactic-component correspondences between selected English chemical term combinations and their Uzbek equivalents. The research asks three questions: which models are visible in the selected English terms; which Uzbek models correspond to them; and what kinds of grammatical adaptation are used in Uzbek chemical terminology.

THEORETICAL AND SOURCE BASIS

The theoretical basis of the article is terminology studies. Leichik treats the term, terminology and term system as central objects of terminological research and discusses the formal structure of a term as a separate issue [1, pp. 48-63]. This allows chemical names to be examined not only according to their meaning, but also according to their internal form.

Superanskaya, Podolskaya and Vasilyeva define a term as a special word or word combination accepted and used in professional activity [2, pp. 12-13]. This definition is used here in a narrow way: if a chemical unit consists of two or more lexical components and functions as a professional name, it can be analysed as a term combination. Such treatment is suitable for examples like acid treatment, absorption factor, amino group and addition reaction.

The role of syntax is especially relevant. Packeiser discusses the relevance of syntax in terminology and argues that terms, as language units, involve phonological, morphological, syntactic and semantic information [3, pp. 47-55]. For the present analysis, this means that a terminological unit should not be reduced to its definition only. Its component order, modifier-head relation and grammatical marking also require attention.

The chemical side of the material is checked through the IUPAC Compendium of Chemical Terminology, which gives internationally recognized English chemical terminology [4]. Uzbek equivalents are taken from Shokirova and Nurullayev's English-Uzbek-Russian Dictionary of Chemistry Terms. The dictionary is relevant because it contains more than 5,000 terms and gives English, Uzbek and Russian correspondences [5, pp. 2-4]. Isaqov and Zokirova's nomenclature guide is used to interpret the Uzbek naming context and the adaptation of international nomenclature to Uzbek [6, pp. 3-7].

METHODS

The material consists of twenty representative English-Uzbek chemical term pairs. The number is intentionally limited: the purpose of the paper is not to give a full statistical description of chemical terminology, but to show how selected source-based examples can be classified according to their syntactic-component models.

The selection followed three criteria. First, the unit had to be a two- or multi-component chemical term. Second, it had to have an Uzbek equivalent in the dictionary used as the main bilingual source. Third, the term had to be suitable for segmentation into structural components. The analysis was carried out in three steps: English segmentation, Uzbek segmentation and comparison of the two models.

The following categories were used in the classification: structural equivalence, possessive transformation, adjectival adaptation and verbal or expanded transformation. These categories were not imposed in advance as fixed universal types; they were formulated after the examples in Table 1 were grouped according to their visible grammatical behaviour.

Table 1. Selected English-Uzbek chemical term pairs and their syntactic-component models

No.	English term	Uzbek equivalent	English model	Uzbek model	Source
1	absolute alcohol	mutlaq spirt	Adj + N	Adj + N	[5, p. 19]
2	active electrode	faol elektrod	Adj + N	Adj + N	[5, p. 23]
3	aluminium bromide	aluminiy bromid	N + N	N + N	[5, p. 30]
4	alternating current	o‘zgaruvchan tok	Adj/Part + N	Adj + N	[5, p. 29]

5	acid anhydride	kislota angidridi	N + N	N + possessive N	[5, p. 21]
6	acid radical	kislota radikali	N + N	N + possessive N	[5, p. 21]
7	air bath	havo vannasi	N + N	N + possessive N	[5, p. 26]
8	amino group	amin guruhi	N + N	N + possessive N	[5, p. 31]
9	acid dye	kislotali bo‘yoq	N + N	Adj + N	[5, p. 21]
10	alkali metal	ishqoriy metal	N + N	Adj + N	[5, p. 28]
11	ammonia ash	ammiakli soda	N + N	Adj + N	[5, p. 31]
12	adsorption film	adsorbsion plyonka	N + N	Adj + N	[5, p. 25]
13	alkyl bromide	bromli alkil	N + N	Adj + N	[5, p. 29]
14	anion exchange	anionli almashinuv	N + N	Adj + N	[5, p. 33]
15	absorbing tower	yutish minorasi	Participle + N	verbal noun + possessive N	[5, p. 19]
16	activation energy	faollashtiruvchi energiya	N + N	participial modifier + N	[5, p. 22]
17	addition reaction	birikish reaksiyasi	N + N	verbal noun + possessive N	[5, p. 23]
18	acid extraction	kislota bilan chiqarib olish	N + N	N + postposition + verbal phrase	[5, p. 21]
19	acid treatment	kislota bilan ishlov berish	N + N	N + postposition + verbal phrase	[5, p. 22]
20	air-cooled	havo bilan sovitiladigan	compound adjective	N + postposition + participle	[5, p. 26]

ANALYSIS

The examples in Table 1 show that the Uzbek equivalent is often close to the English term in meaning but not always close in form. Four patterns are especially visible.

1. Structural equivalence

The first pattern includes examples where the English model is preserved or almost preserved in Uzbek: absolute alcohol - mutlaq spirt, active electrode - faol elektrod, aluminium bromide - aluminiy bromid and alternating current - o‘zgaruvchan tok. The relation between the modifier and the head remains transparent in both languages. This occurs when the English modifier has a direct Uzbek adjective, or when the components are internationally recognizable chemical names.

2. Possessive transformation

The second pattern is more characteristic of Uzbek. English N + N terms such as acid anhydride, acid radical, air bath and amino group correspond to kislota angidridi, kislota radikali, havo vannasi and amin guruhi. English leaves the component relation mostly implicit: the first noun modifies the second. Uzbek uses the possessive suffix -i/-si to make the dependency visible. This pattern is important because it shows that Uzbek chemical terminology often gives grammatical expression to the relation between the parts of a term.

3. Adjectival adaptation

The third pattern is adjectival adaptation. In acid dye - kislotali bo‘yoq, alkali metal - ishqoriy metal, ammonia ash - ammiakli soda, adsorption film - adsorbsion plyonka, alkyl bromide - bromli alkil and anion exchange - anionli almashinuv, the English noun modifier is represented by an Uzbek adjective or adjective-like modifier. The suffix -li is particularly visible in kislotali, ammiakli, bromli and anionli. The suffix -iy appears in ishqoriy, while adsorbsion is a borrowed adjectival form. The chemical relation remains, but the grammatical category of the first component changes.

4. Verbal and expanded models

The fourth pattern covers cases where Uzbek uses a verbal noun, a participle or a postpositional construction. Absorbing tower becomes yutish minorasi; addition reaction becomes birikish reaksiyasi; acid extraction becomes kislota bilan chiqarib olish; acid treatment becomes kislota bilan ishlov berish; air-cooled becomes havo bilan sovitiladigan. These examples are not simply longer translations. They show how Uzbek expresses processual or functional meaning by using forms such as -ish, -uvchi, -gan/-adigan and the postposition bilan.

Table 2. Summary of syntactic-component correspondence types

Correspondence type	Examples in selected material	Main structural feature
Structural equivalence	4	English and Uzbek structures remain formally close
Possessive transformation	4	English N + N becomes Uzbek N + possessive N
Adjectival adaptation	6	English noun modifier becomes an Uzbek adjective or adjective-like modifier
Verbal/expanded transformation	6	Uzbek uses a verbal noun, participle or descriptive construction

DISCUSSION

The comparison confirms that English-Uzbek chemical correspondence cannot be described as word-for-word replacement. The English terms in the selected material are mostly compact modifier-head structures. Uzbek keeps the concept but frequently changes the grammatical shape of the expression. This is consistent with Isaqov and Zokirova's view that international nomenclature should be adapted to the structural possibilities of Uzbek while keeping its scientific content [6, pp. 4-7].

The analysis also supports the theoretical claim that syntax belongs to terminology. If a term may be a professional word combination [2, pp. 12-13], and if terms activate syntactic information [3, pp. 47-55], then the internal grammar of a term is not accidental. It is part of how the term functions in scientific language.

For practical translation, the results suggest caution. A literal two-word Uzbek equivalent is not always the most natural or precise solution. Some English compounds need possessive marking, as in kislota angidridi; some need adjectival conversion, as in kislotali bo‘yoq; others require a process phrase, as in kislota bilan ishlov berish. These are not deviations from terminology. They are normal ways in which Uzbek scientific language organizes chemical concepts.

CONCLUSION

The study has shown that the syntactic form of a chemical term is significant in English-Uzbek comparison. The selected examples reveal four recurring types of correspondence: direct or near-direct structural equivalence, possessive transformation, adjectival adaptation and verbal or expanded transformation.

The main conclusion is that Uzbek chemical terminology preserves the conceptual content of international chemical terms but does not always preserve their English grammatical model. It adapts compact English structures to Uzbek by using possessive suffixes, adjective-forming devices, verbal nouns, participles and postpositional constructions. This conclusion may be useful for terminology research, scientific translation, bilingual dictionary-making and future work on Uzbek chemical nomenclature.

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