

# PRODUCTIVE WAYS OF FORMATION OF CHEMICAL AND BIOLOGICAL TERMS (IN ENGLISH, RUSSIAN AND TATAR LANGUAGES)

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## ABSTRACT

Terminology is one of the most important problems of modern linguistics. The study of terminological systems of typologically different languages is of great scientific interest. The article deals with the productive methods of word formation in English, Russian and Tatar chemical and biological terminology on the example of suffixation, compounding, conversion and abbreviation. The purpose of the present study is to identify the features of these methods in the chemical and biological term systems of genetically unrelated and typologically diverse languages. The general models of word formation typical for the languages studied in this article are considered and presented.

## KEYWORDS

Linguistics, Language, Words, Chemical terminology, Biological terminology, Word formation, English, Russian, Tatar.

## 1. INTRODUCTION

In the modern world scientific knowledge plays an important role in the development of society. Due to the entry into global scientific and educational sphere, it is necessary to know features of academic style in English which is international language of scientific communication along with peculiarities of language of science in native language.

The importance of the question is proved by works of many researchers. Khuziahmetov and Valeev (2018) study peculiarities of bilingual learning of English and Tatar languages and pointed out that “it becomes necessary to pay special attention to the problem of the ability of students to effectively participate in the intercultural communication and a productive solution to this issue is the orientation toward bilingual education”.

Khisamova, Motygoullina and Moullagaliev (2015), consider “the process of globalization and unification of the modern sciences into a new organized idea of using results of one scientific area in some different researches. For example, in revising the peculiarities of translating Anglo-American fiction into the Tatar language they can refer to the different layers of the linguistics, such as comparative linguistics, typology, translation theory and the real modality”.

The research of terminology is among the most important problems of modern linguistics. In this regard studying term systems of typologically diverse languages is of great scientific interest.

Terminological vocabulary as a part of dictionary structure of language has several properties. It is the most developing part of dictionary structure in comparison with its other parts.

Study of terminology assumes not only consideration of terms and their functions, but also the analysis of sources and ways of their production. It is on the material of terminological vocabulary operation of laws of language, mainly of word-formation, is most shown (Kozhanova *et al.*, 2017; Kheirabadi & Mirzaei, 2019; Barati *et al.*, 2018; Kashisaz & Mobaraki, 2018).

The science which deals with studying of terminology is called term study. The contribution to development of this discipline was made by scientists Vinogradov, Lott, Vinokur, Reformatsky, Budagov, Akhmanova, Piotrovsky and many others (Reformatskii, 1967).

Studying of peculiarities of word formation in language of chemistry and biology represents undoubted interest as the correct understanding of regularities of modern terminological word formation helps to carry out the process of term formation (Abilgazyeva et al, 2018; Eslami & Ahmadi, 2019; Jabbari *et al.*, 2019; Nakhaee & Nasrabadi, 2019).

Now word formation in terminology is a source of many linguistic researches devoted to various term systems on the basis of different languages.

## 2. METHODS

We understand as ways of word formation “receptions, methods of formation of new words from any material units of language by creation between them the word-formation relations” (Zakiev *et al.*, 1995).

In this article we consider the most productive ways of formation of chemical and biological terms in the English, Russian and Tatar languages. Dictionaries of chemistry and biology in given languages are used in this article. The main method of our research is comparative analysis.

## 3. RESULTS AND DISCUSSION

One of the most productive ways to form chemical and biological terms in the English, Russian, and Tatar languages is affixation.

There are several terms formed by suffixation, that is, adding a suffix to the stem that is a morpheme which follows the root. Unlike prefixation, which affects the lexical-grammatical component of a word, suffixation, as a rule, allows to create words that relate to another part of speech or to another class of words.

Let's consider a group of suffixes which new terms or words are formed from and which fulfills the role of a noun. In English, this group includes the suffixes *-er*, *-or*, *-ent* and *-ant*, which are used to form nouns denoting a person or mechanism with a specific action: *to activate - activator*, *to absorb - absorbent*, *to carry - carrier*. The same group includes the suffixes *-ion*, *-ation*, *-ment*, *-ure*, *-age*, *-ence*, *-ance*, *-ing*, with the help of which new terms are formed from verbs that express some concepts of nouns: *exposure*, *oxidation*, *reaction*.

In the formation of chemical and biological terms that perform the role of a noun in the Tatar language, the most productive suffixes are: *-лык/-лек*, *-гыч/-геч* (*-кыч/-кеч*), *-чы/-че*, *-лы/-ле*, *-чан/-чэн*, *-ма/-мэ*, *-ла/-лэ*, *-лаштыр/-лэштер*. The suffix *-лык/-лек* is a word-forming formant in many Turkic languages. With the help of this suffix in Tatar chemical and biological terms from nouns are formed, denoting the presence of quality, indicated by the manufacturing basis: *'дымлылык' - 'humidity'*, *'сыеклык' - 'liquid'*, *'авырлык' - 'weight'*, *'жылылык' - 'heat'*, *'зурлык' - 'quantity' etc.*

The suffix *-лык*, can join the borrowed chemical or biological terms and form such words as: *'активлык' - 'activity'*, *'валентлык' - 'valence'*, *'изоморфлык' - 'isomorphism'*.

The suffix *-гыч/-геч*, *-кыч/-кеч* is among the most productive in formation of chemical and biological terms. It forms names of substances or medicines, expresses value of adaptation, installation or the tool for the action. For example: *'алмаштыргыч' - 'substitute'*, *'беркеткеч' - 'fixer'*, *'йоткыч' - 'absorbent'*, *'оксидлаштыргыч' - 'oxidant'*, etc.

In Russian a productive suffix for term formation is *-ия*. Such terms are formed from stems of the borrowed nouns and meant branches of science: *химия*, *биология*, *биохимия*; chemical and biological processes and phenomena: *автогамия*, *адаптация*, *аллотропия*, *дисперсия*, *диффузия*, *гомология*, *мезомерия*. The suffix *-ор* is also productive. Nouns with this suffix are names of technical devices, apparatus: *аспиратор*, *вентилятор*, *дистиллятор*, *конвертор*, *реактор* and names of substances, materials which carry out some actions: *активатор*, *анализатор*, *ингибитор*, *катализатор*, *репрессор*, *регулятор*.

The suffix *-ени-* means action as the phenomenon leading to any result: *беление, брожение, бромирование, вальцевание, водопоглощение, галогенирование, давление*. The suffix *-ость* in the terms formed from stems of descriptive adjectives means properties: *аффинность, вирулентность, газоустойчивость, матовость, мелкопористость, мылкость, неоднородность, основность, пластичность, продуктивность*.

In works of many scientists compounding is mentioned as one of the most important means of language. In the examined languages this way of a term formation is one of old ways of creation of words which does not lose its productivity. The compounding is an important source of language vocabulary supplement. It is the process of composition of two or several stems in one compound word.

There is certain relationship between components of a compounding in the studied languages. It is coordinating or subordinating relationship. At the coordinating relations all components of a compound word are equal in the structural and semantic plan and make two structural-semantic centers. For example:

*protein-ligand, enzyme-substrate;*

*винил-кушылма, атом-төш, балчык-бетон;*

*винил-соединение, глинобетон.*

At the subordinating relations one component of the word is dominant and is the structural and grammatical center which means that it defines belonging to a certain lexical and grammatical category and a part of speech.

The subordinating relation is a main type of word connection in language. There are the following types of compounding with the subordinating relation of components: the attributive relation of components, the objective relation of components and the adverbial relation of components.

In chemical and biological terminology of the studied languages compound words with the attributive relation of components prevail. The noun acts as the second component in them, the noun, an adjective, a pronoun, a numeral or a participle can be the first components.

Saidasheva (2006) pointed out that there are models of compounding common for English and Tatar. We found out that these models are also presented in Russian language.

They are:

1. Noun + noun (N + N):

*unit cell, radioactivity, wavelength, oxidation-reduction, activation energy*’;

*атом төше, балчык сөзгеч, аш тозы, вак бөртеклеклек, вак тишеклеклек, энже бөртеге;*

*аквасоединение, альфа-излучатель, газометр, гелеобразование, еж-рыба, жаба-рыба.*

2. Adjective + noun (A + N):

*acid-base, amino-terminal, free-energy, supercooling;*

*калай кисеге, тимер бактерияләре, түбә калае;*

*железобетон.*

3. Pronoun + noun (Pr + N):

*nonelectrolyte;*

*үздиффузия, үзагач;*

*неэлектролит, самодиффузия.*

4. Numeral + noun (Num + N):

*first-order reactions, two-component;*

*беркетү, беркислоталы, икеүзәкле бэйләнеш, икенигезле, өчнигезле кислоталар;*

*одноклеточные, двухклеточник, двухрылатка, триостренник, триперстовые.*

5. Participle + noun (P + N):

*boiling-point, branched-chain;*

*цинкланган тимер, чәчелүчәнлек.*

Along with a suffixation and a compounding, conversion in the studied languages is a highly productive way of a term formation. Conversion is the word formation process in which a word of one grammatical form becomes a word of another grammatical form without any changes to spelling or pronunciation. Thus conversion is a lexical and grammatical way of formation of new words. This way of enrichment of terminology is applied in English and Russian, and in Tatar languages.

In Tatar nouns, adjectives, adverbs, postpositions, particles, interjections and conjunctions are formed by means of conversion. The most productive is formation of nouns, adjectives, adverbs and postpositions (Zakiev *et al.*, 1995).

In chemical terminology nouns denoting materials, metals, chemicals and their types become adjectives (Zakieva, 2011):

*Алтын – алтын ‘gold-golden’, көмеш – көмеш ‘silver – silvery’, энҗе – энҗе ‘pearl – pearly’.*

As for English, the most productive is the model noun – verb. It is the only productive way of formation of verbs from nouns:

*fuel, n, – fuel, v*

*water n – water, v*

*heat, n – heat, v.*

In Russian there are three types of conversion: substantivation, adjectivization and adverbialization. Substantivation is transition of a word from the category of adjectives in the category of nouns. Adjectivization is transition of words



to the category of adjectives. As a rule, verbs and verbal forms (participles) form conversion base for formation of this sort of adjectives: *дрессированный, опубликованный, закрытый* etc.

Substantivation is characteristic feature for the language of biology. Such adjectives as *альбатросовые, баклановые, веерокрылые* etc. became nouns.

There are many abbreviations in language of chemistry and biology in English, Russian and Tatar. With the development of science many new terms in the form of compound words and phrases which come to terminological contraction appear.

There are various types of structural contractions. For the English, Russian and Tatar languages the general are graphic and lexical types.

Graphic contraction is use of symbols, reduction of words and phrases in a written language, at the same time in oral speech full forms are used. Symbols and signs belong to examples of graphic abbreviation in chemistry and biology: *C - Celsius degree of temperature, температура, Цельсий градусында, температура по Цельсию; e. g. - for example; h.б.ш. - һәм башка шушында; d - density, плотность, тыгызлык; K - temperature of Kelvin, температура по Кельвину, температура, Кельвинда.*

Lexical abbreviations are formed by means of process of simultaneous contraction and compounding. This way includes initial abbreviation. It is a way of word formation by addition of the reduced initial letters or sounds of a phrase. This contracted form is used also at pronunciation: *ACFOR scale (Abundant Common Frequent Occasional Rare), АСТН (Adrenocorticotropic hormone), ДНА (deoxyribonucleic acid), KE (kinetic energy), RNA (ribonucleic acid), STP (standard temperature and pressure), EFG (Epidermal Growth Factor); АТФ (аденозинтрифосфат), БАК (белок-активатор), ЗПА (зона поляризующей активности); РНК (рибонуклеин кислотасы), ДНК (дезоксирибонуклеин кислотасы), ХКС (халыкара классификация системасы).*

## 4. SUMMARY

Suffixation is the most productive way of term formation in all three languages. The suffixes of noun formation with the same meaning occur in all of them. In compounding many complex chemical and biological terms is formed by addition of stems with the attributive relation of components where the first component is attribute of the second. This feature is characteristic for the English and Russian languages, and for Tatar. As for conversion which is common for all three languages in English first place is taken by the noun – verb model, in Russian noun – noun, and in Tatar highly productive model is noun – adjective. Abbreviation along with compounding and conversion represents a productive way of word formation. For the languages investigated in this article the general are such types of contractions as graphic and lexical.

## 5. CONCLUSIONS

We studied suffixation, compounding, conversion and abbreviation as the most productive ways of a term formation and identified the features of these methods of word formation in the chemical and biological term systems of three genetically unrelated and typologically diverse languages. Suffixation is the most productive way of term formation in them. The general models of word composition typical for the languages studied in this article are considered and presented. There are differences in models that are productive for each language in case of conversion. In the presentation of the abbreviation we showed models which are common for the English, Russian and Tatar languages.

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