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On Translation of Technical and Semi-technical Words in Chemistry*

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Term is a kind of limited language symbols, usually presented in a specific language or text and used to communicate and express ideas. With the globalization of economy, international trade has become more frequent, and chemical products have gradually become the hotspot of international import and export transactions, so the Chinese translation of the names of chemical products has become more important, and accurate translation can better promote the development of the domestic chemical industry and its dialogue and exchange with the international chemical industry. In this paper, we first explore the Chinese translation strategies of the semi-technical words in chemistry, and then investigate the translation strategies for technical words, subdividing the technical words into compounds, derivatives, and acronyms, with a view to providing ideas and references for translations of relevant texts.

Keywords: term translation, semi-technical word, technical words, chemistry

Introduction

Analyzed from the perspective of utility, English not only plays a significant role in social communication, cultural, economic, and trade exchanges, but also has a non-negligible role in the professional fields. This pragmatic phenomenon involves a special branch of English function, namely, "scientific and technological English expression", which refers to the translation and its application of basic scientific literature such as chemistry, physics, mathematics, and so on (Liu, 2022). Chemical English has the distinctive features of Science and Technology English, which covers a wide range of subjects such as chemistry, mathematics, physics, engineering, materials, etc., and contains a large number of terms with specific scientific meanings and usages (Li & Zheng, 2024). Hence, the English words of chemical industry can also be regarded as scientific and technological English. Chemical term is a special kind of linguistic symbols, which covers the basic knowledge of the chemical field and has its own uniqueness. The translation of chemical terminology needs to be realistic, standardized, and scientific (Zhao, 2022). And because of the wide range of disciplines involved, the number of chemical products in the chemical industry is also very large like organic chemicals, inorganic chemicals, organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements, or of isotopes, etc. So

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in this paper, we will analyze and discuss the translation strategies for the technical words and semi-technical words in industry.

Translation is the act of transforming linguistic information, such as language, words, graphics, symbols, and videos, into another linguistic information. In linguistics, the axis of translation is “conversion”, but translation is not only a simple conversion on the language level, but also includes the ideological connotation and culture behind it (Wang & Yuan, 2024). The chemical industry involves a large number of specialized terms, which are highly specialized and precise. In English translation, how to accurately and appropriately translate these terms is an important issue. Due to the differences in expression and vocabulary selection between different languages, some specialized terms may not find their exact counterparts in the target language. At this point, the translator needs to be flexible according to the meaning of the terms and the context, and choose the vocabulary or expression that is closest to the original meaning (Yuan, 2024). Therefore, in the process of translating chemistry-specific words, translators must take into account the cultural information behind the source language, in addition to their own academic accumulation, as well as their own national conditions and cultural knowledge background, in order to accurately translate the source language, especially the chemical terms in the chemical industry, whose normative of translation should be given more priority. This paper focuses on the chemical industry terminology often used in the translation of direct translation. This paper mainly analyzes and explores the literal translation plus phonetic translation and free translation, which are often used in the translation of terminology in the chemical industry.

Semi-Technical Words and the Corresponding Translation Strategies

Semi-technical words, in addition to its own basic meaning, have different specialized meanings in different professional fields. They are characterized by “multiple meanings, flexible usage and various forms of collocation” (Bu, 2013). This sort of words is very common in chemical English. By observing the examples in the following chart, we can find that the meanings of the chemical words in these examples are basically derived from their common meanings. For example, the word “intermediate” in the following chart originally means “in the center, in the middle (居中的，中间的)”, but in the field of chemical industry, it means “intermediate (中间体)”. Likewise, “inhibitor” means “抑制剂”, and “antagonist” means “抗体”, etc.

There are also some words whose chemistry-specific meaning may be far from their common meanings and it is difficult to associate their chemistry-specific meaning with their common meanings. For example, the common meaning of the word “base” is “基础，根基 (foundation, root)”, but its chemical-specific meaning is “碱”. The two meanings are actually very much different. There are also some other semi-technical chemical words that have different meanings in different fields. For instance, the word “isomer” means “同质异能素” in the nuclear field, yet in chemistry, “isomer” is translated into “异构体” in the chemical field. Therefore, as for the translation of semi-technical words in chemical English, the translator should, on the basis of checking the common meaning of the words, combine them with the specific context of the words and make a flexible derivative translation, rather than relying on subjective inference.

Table 1

Examples of Semi-technical Words in Chemistry

Examples	Common meaning	Chemistry-specific meaning
Intermediate	中间的	中间体
Factor	因素	因子
Inhibitor	抑制者	抑制剂
Antagonist	对手	抗体
Member	成员	节环
Co-ordination	协调	配位
Base	基础	碱
Function	功能	基
Capacity	能力	容器
Brighten	使明亮	增白
Strength	力量	浓度
Couple	成对	耦合

Technical Words and the Corresponding Translation Strategies

As for technical words, the semantic boundaries of these terms are very clear, characterized by normativity, lexical homogeneity, and narrow scope of use (Bu, 2013). Generally speaking, chemical technical words refer to the words that are applied to the chemical field with strong specialization and accuracy (Zhao, 2022). The translation of chemical terms should generally abide by the following principles: first, the scientific nature of translation, naming, definition, and classification of the chemical terminology; second, the standardization of editing, dissemination, and use of the chemical terms (Huang, 2019). Therefore, in order to ensure its specialization and accuracy, most of the time, these words are translated by literal translation, free translation and sometimes the phonetic translation will also be used.

The main word formation methods of English vocabulary are affixation, transclassification, compound, abbreviation (truncation, affixation), initial pinyin, and retroflexion (Hu & Jia, 2022). This paper will discuss on the basis of three major types of chemical words: compounds, derivatives, and acronyms.

Characteristics and Translation of Compounds in Technical Words

Compound, as the name suggests, is the combination of two or more words in a certain order into a new word. Compounds are a major feature of technical words (Hu & Jia, 2022). Like the chemical word Bromochlorodifluoromethan (溴氯二氟甲烷) showed in the table below, bromochloride means "溴氯", difluoro means "二氟", and methane means "甲烷". So in the constitution of bromochlorodifluoromethan, bromochloride's suffix "ide" has been deleted and added an "o", and methane's last letter "e" has also been deleted. And the same word forming logic exists in terms like monoethanolamine (单乙醇胺), Aminohydroxynaphthal-ene-sulphoni (氨基羟基萘磺), amino-alcohol-phenol (氨基醇酚), etc. Here literal translation, methods of adding and omitting are used. Besides, free translation and phonetic translation are also often used in the translation of chemical compounds like the translation of camphechlor (毒杀芬) and etaqualone (依他喹酮). Camphechlor is compounded by two single chemicals: octachloro (八氯) and camphene (莰烯). So camphechlor has also the name of "八氯莰烯". Because it is highly toxic and often used as pesticide, the translation "毒杀芬" not only conveys the nature of the chemical, but also takes good care of the language habits and cultural background of the target language readers. The Chinese character "毒" means "toxic" in English and

"杀" means "kill" in English, which are highly indicative of the nature of this chemical. We know that there are some other pesticides often used in agriculture, such as "norbormide" (鼠特灵), "pyrinuron" (杀鼠优), "chlorbenside" (杀螨醚), and so on whose translations also apply free translation.

Table 2

Examples of Lexical Technical Words in Chemistry

Compounds	Translation
Bromochlorodifluoromethan	溴氯二氟甲烷
Camphechlor	毒杀芬
Dipropalin	地乐灵
Monoethanolamine	单乙醇胺
Aminohydroxynaphthal-ene-sulphoni	氨基羟基萘磺
-4-Methcathinone	-4-甲基甲卡西酮
Amino-alcohol-phenol	氨基醇酚
Phenylacetoacetonitril	苯基乙酰基乙腈
Tetrahydrofuran	四氢呋喃
Tetrahydrocannabinol	四氢大麻酚
Methylphenobarbita	甲苯巴比妥
Etaqualone	依他喹酮
Dichloropentafluoropropane	二氯五氟丙烷

Characteristics and Translation of Derivatives in Technical Words

As for the words in English chemistry, its main feature is "three manys": many technical terms, many derivatives, and many changes of forms. Therefore, translators should not mechanically memorize them, but be good at finding their internal rules and learning by examples (Chen, 2022). There are many affixes and suffixes in chemical English. For example, "Iso", "Sec", "Tert" mean "异", "仲", "叔" respectively, and thus "Iso-Butyl alcohol", "Sec-Butyl alcohol", "Tert-Butgl alcohol" are translated into "异丁醇", "仲丁醇", "叔丁醇" respectively. Others like "-o-", "-m-", "-p-" mean "-邻", "-间", "-对" respectively which signify the location of chemical elements in chemicals. And "Me", "Et", "n-Pr", and "i-P" mean "甲", "乙", "正丙", and "异丙" respectively which embody the number of carbon atoms of chemicals' chemical formula. Besides, there are some other suffixes representing different chemicals like "-lene" (one kind of hydrocarbon that contains a C = C bond, whose molecular formula is C*n*H2*n*) means "-烯",and then "Ethylene-" is translated into "乙烯", "Propene (propylene)" "-丙烯", "Butene (butylene)" "-丁烯", etc. So when translating derivatives in chemistry, translators must be very clear with these chemical affixes and suffixes and then can use literal translation to achieve specialization and accuracy.

Table 3

Examples of Derivatives in Chemical Technical Words

Derivatives	Translation
Iso-Butyl alcohol	异丁醇
Sec-Butyl alcohol	仲丁醇
Tert-Butgl alcohol	叔丁醇
Ethohexadio	驱蚊醇

Table 3 to be continued

Mannito	甘露糖醇
-m-Phenoxy benzalcohol	间苯氧基苄醇
Methylcyclohexanone	甲基环乙酮
Flupropanat	四氟丙酸
2-Amidobutane	2-氨基丁烷
Hexamethylenediamin	六亚甲基二胺

Characteristics and Translation of Acronyms in Technical Words

In chemical English, abbreviations and acronyms are often used to simplify expression and improve efficiency (Li & Zheng, 2024). The author finds that most acronyms are constituted by two or more individual chemicals. For instance, like the 2-methyl-4-chloro-phenoxyacetic acid (2 甲 4 氯酸) showed in bellow excel, its acronym is MCPA, which is constituted by two single chemicals: methyl (甲基) and chloro-phenoxyacetic acid (氯酸) . So 2-methyl-4-chloro-phenoxyacetic acid has also the name as 2-甲基-4-氯苯氧乙酸. Additionally, in agriculture, 2-methyl-4-chloro-phenoxyacetic acid is used as plant growth stimulant in to prevent tomatoes and other fruits from dropping flowers and fruits early and grow seedless fruits, promote early maturity of crops, and accelerate rootage of quickset and it can also be used as herbicide. Thus 2-methyl-4-chloro-phenoxyacetic acid has also the name as “芳米大、兴丰宝” (which means a treasure that can make crops bigger and luxuriant). And the same word-forming logic as ACC (1-Aminocy-clopropan-1-carboxylic 氨基羧酸环丙烷), DNOC (-4，6-Dinitro-o-cresol-4，6-二硝基邻甲酚), MEC (Methylethcathinon 甲基乙卡西酮), etc. So when encountering chemical acronyms, literal translation is often used which means figuring out its constituents and then put their Chinese names together by order. Sometimes free translation is also used to increase the practicability like the translation of 2-methyl-4-chloro-phenoxyacetic acid (芳米大、兴丰宝); the translation gives more priority to the usage of the chemicals than its chemical constituents. Well basically, translators must have strong storage of chemical expertise and be very familiar with the words roots and affixes.

Table 4

Examples of Acronyms in Chemical Technical Words

Examples	Acronyms	Full name
2 甲 4 氯酸	MCPA	2-methyl-4-chloro-phenoxyacetic acid
氨基羧酸环丙烷	ACC	1-Aminocy-clopropan-1-carboxylic
-4，6-二硝基邻甲酚	DNOC	-4，6-Dinitro-o-cresol
甲基乙卡西酮	MEC	Methylethcathinon
甲苯二异氰酸酯	TDI	Toluene diisocyanate
二氯酚靛酚	DCIP	Dichlorodiisopropylether
三硝基甲苯 (TNT)	TNT	Trinitrotoluen
多氯三联苯 (PCT)	PCT	Polychlorinated terphenyl
生长激素	GH	Growth hormone

Conclusion

Through the above analysis and discussion, we can find that the number of chemical terminology is huge, the coverage is wide, and the translation is difficult (Zhao, 2022). And with the continuous development and progress of the times, more new chemical substances are bound to appear in the field of chemical industry in the

future, so how to categorize and differentiate this kind of new chemical terminology with strong professional attributes, and how to find the appropriate translations according to their different attributes that can be more conducive to their application in actual production and life, will be a major and core problem. This will be a challenge not only for the chemical industry, but also for translators.

The scientific and technological progress in the field of chemistry and chemical industry is changing day by day, and every breakthrough in chemical research and upgrading of chemical process will make the whole chemistry and chemical economic system produce great changes. Correspondingly, chemistry and chemical English translators should keep abreast of the times, constantly innovate and optimize the English translation strategy, so as to better bring into full play the value of chemistry and chemical English for communication and exchange, and to ensure the symmetry, comprehensiveness, and accuracy of the chemistry and chemical information in the Chinese and English translation (Chen, 2022). If you want to meet the accuracy and standardization of translation, translators first need to pay attention to the development of this industry, master the characteristics of the translation of chemical English, and use the corresponding translation methods according to these characteristics, and constantly devote themselves to the practice of terminology translation in this industry, keep pace with the times, accumulate experience, and constantly improve their English translation level and related professional knowledge. However, the above cases only discuss the translation methods of literal translation plus phonetic translation and free translation. Whereas in practice, in the actual terminology translation, more translation means and methods will be used, so we hope that on the basis of this analysis and research, we can provide some reference value for the subsequent translation researches.

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