21世纪高等院校学术发展系列

分析化学专业英语及文献阅读指南

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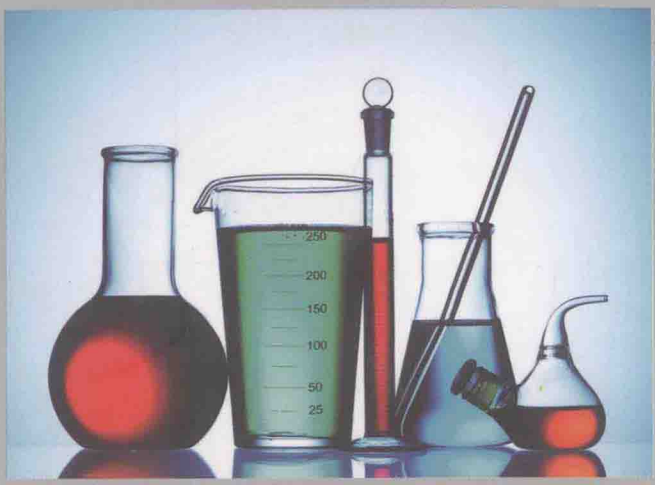

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内容提要

《分析化学专业英语及文献阅读指南》是根据沈阳药科大学一线教师多年教学经验，以分析化学学科内容为主，并选录拓展阅读材料和英语论文编写而成。旨在通过专业英语学习，传播国内外本领域内知名专家研究成果及学科前沿动向，为化学及药学专业学生和广大读者在阅读文献时提供有价值的参考，并为毕业论文写作打下良好的基础。

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分析化学专业英语及文献阅读指南

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前　言

为适应我国高等教育发展的新形势，深化教学改革，提高教学质量，加强专业学习，满足新时期国家和社会对人才培养的需要，我们编写了这本《分析化学专业英语及文献阅读指南》。

现有的其他教材对专业方面只是英语的简单介绍，而本书的特点是深入专业，与专业同步。既是英语学习，又是专业延伸。

编写依据：从2009年起沈阳药科大学为加强培养青年教师，帮助青年教师快速成长以尽快满足和适应我校特有的教学要求和需要，创造性地提出了解专业知识，走进专业领域并为专业服务的新理念。为此，也创立了培养青年教师的新模式。两年多来外语部青年教师做了很多工作——与专业教师会谈、走进专业课堂、专业实验室、收集相关材料、整理专业词汇等。在此基础上，我们开始进行药学专业词汇语料库的建设。在工作中，我们认为有必要把本专业方面知名专家和学科前沿动向介绍给学生。尤其是论文的选摘与专业联系紧密，这将为学生们的毕业论文写作打下良好的基础。

适用对象：化学专业、药学专业、应用化学专业、化学工程与工艺、高分子材料与工程、有机合成、精细化工、煤化工专业的大三至大四学生。论文部分适用于药学、药剂学、制药工程学、生物工程学专业的大三、大四学生、硕士及博士研究生。

本书构成：本书共分两部分：

1. 专业英语

   分析化学专业英语参考书

   Modern Analytical Chemistry

David Harvey, DePauw University

2. 英语论文选录及翻译

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专业论文翻译：沈阳药科大学药学、药剂学、制药工程学、生物工程学等专业的硕士研究生及部分博士研究生。

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本书在编写过程中得到校、院领导的亲切关怀和大力支持，在此表示衷心感谢。

以外语教学的视角编写专业英语及文献阅读指南尚属尝试，由于经验不足，错误或不当之处在所难免，敬请读者指正。

编 者

2012年11月

目 录

Section A

Specialized English for Analytical Chemistry Students 分析化学专业英语

Unit 1

Part I Reading

What is Analytical Chemistry

What is analytical chemistry? Like all fields of chemistry, analytical Chemistry is too broad and active a discipline for us to easily or completely define in an introductory textbook. Instead, we will try to say a little about what analytical chemistry is, as well as a little about what analytical chemistry is not.

Analytical chemistry is often described as the area of chemistry responsible for characterizing the composition of matter, both qualitatively (what is present) and quantitatively (how much is present). This description is misleading. After all, almost all chemists routinely make qualitative or quantitative measurements. The argument has been made that analytical chemistry is not a separate branch of chemistry, but simply the application of chemical knowledge. In fact you probably have performed quantitative and qualitative analyses in other chemistry courses. For example, many introductory courses in chemistry include qualitative schemes for identifying inorganic ions and quantitative analyses involving titrations.

Unfortunately, this description ignores the unique perspective that analytical chemists bring to the study of chemistry. The craft of analytical chemistry is not in performing a routine analysis on a routine sample (which is more appropriately called chemical analysis), but in improving established methods, extending existing methods to new types of samples, and developing new methods for measuring chemical phenomena.

Here's one example of this distinction between analytical chemistry and chemical analysis. Mining engineers evaluate the economic feasibility of extracting an ore by comparing the cost of removing the ore. The challenge of developing and validating the method providing this information is the analytical chemist's responsibility. Once developed, the routine, daily application of the method becomes the job of the chemical analyst.

Another distinction between analytical chemistry and chemical analysis is that analytical chemists work to improve established methods.

In summary, a more appropriate description of analytical chemistry is "...the science of inventing and applying the concepts, principles, and...strategies for measuring the characteristics of chemical systems and species." Analytical chemists typically operate at the extreme edges of analysis, extending and improving the ability of all chemists to make meaningful measurement on smaller samples, on more complex samples, on shorter time scales, and on species present at lower concentration. Throughout its history, analytical chemistry has provided many of the tools and methods necessary for research in the other four traditional areas of chemistry, as well as fostering multidisciplinary research in, to name a few, medicinal chemistry, clinical chemistry, toxicology, forensic chemistry, material science, geochemistry, and environmental chemistry.

Many problem in analytical chemistry begin with the need to identify what is present in a sample. This is the scope of a qualitative analysis, example of which include identifying the products of a chemical reaction, screening an athlete's urine for the presence of a performance-enhancing drug,

or determining the spatial distribution of Pb on the surface of an airborne particulate. Much of the early work in analytical chemistry involved the development of simple chemical tests to identify the presence of inorganic ions and organic functional groups. The classical laboratory courses in inorganic and organic qualitative analysis, still taught at some schools, are based on this work. Currently, most qualitative analyses use methods such as infrared spectroscopy, nuclear magnetic resonance, and mass spectrometry. These qualitative application of identifying organic and inorganic compounds are covered adequately elsewhere in the undergraduate curriculum and, so, will receive no further consideration in this text.

Perhaps the most common type of problem encountered in the analytical lab is a quantitative analysis. Examples of typical quantitative analyses include the elemental analysis of a newly synthesized compound, measuring the concentration of glucose in blood, or determining the difference between the bulk and surface concentrations of Cr in steel. Much of the analytical work in clinical, pharmaceutical, environmental, and industrial labs involves developing new methods for determining the concentration of targeted species in complex samples. Most of the examples in this text come from the area of quantitative analysis.

Another important area of analytical chemistry, which receives some attention in this text, is the development of new methods for characterizing physical and chemical properties. Determinations of chemical structure, equilibrium constants, particle size, and surface structure are examples of a characterization analysis.

The purpose of a qualitative, quantitative, and characterization analysis is to solve a problem associated with a sample. A fundamental analysis, on the other hand, is directed toward improving the experimental methods used in the other areas of analytical chemistry. Extending and improving the theory on which a method is based, studying a method's limitations, and designing new and modifying old methods are examples of fundamental studies in analytical chemistry.

New Words

discipline ['dɪsɪplɪn] *vt.*	训练；使有纪律；处罚；使有条理
n.	训练；纪律；学科；符合行为准则的行为（或举止）
titration [taɪ'treɪʃən] *n.*	滴定（法）
perspective [pə'spektɪv] *n.*	透视；观点，看法；远景，景色；洞察力
a.	（按照）透视画法的；透视的
craft [krɑ:ft] *n.*	技术，手艺，技艺；狡诈；行会成员
vt.	手工制作；精巧地制作
distinction [dɪs'tɪŋkʃən] *n.*	区别；荣誉；特质；卓越
feasibility [ˌfi:zəbɪlətɪ] *n.*	可行性
ore [ɔ:] *n.*	矿；矿石，矿砂
validate ['vælɪdeɪt] *vt.*	使合法化，使有法律效力；使生效；批准，确认；证实
complex ['kɒmpleks] *a.*	复杂的；合成的
n.	复杂；合成体；[数学]复数
foster ['fɒstə] *vt.*	培养，促进
vt. & vi.	收养，养育
a.	（与收养有关的名词连用）养育的；领养的；照顾孤儿的
toxicology [ˌtɒksɪ'kɒlədʒi] *n.*	毒理学，毒物学
forensic [fə'rensɪk,-zɪk] *a.*	法庭的，法院的；公开辩论的，论争的；适于法庭的
n.	辩论练习；辩论学，辩论术
spatial ['speɪʃəl] *a.*	空间的；存在于空间的；受空间条件限制的；占大篇幅的
infrared ['ɪnfrə'red] *a.*	[物]红外线的
n.	红外线
spectroscopy [spek'trɒskəpi] *n.*	[光]光谱学
resonance ['rezənəns] *n.*	共鸣；反响；共振

compound ['kɒmpaʊnd] *n.*	场地；化合物；（筑有围墙的）院子；复合词
[kəm'paʊnd] *vt.*	调和；使混合；使严重；调停；复合
a.	[语法学]（句子）复合的；合成的；多功能的
vi.	妥协；和解；达成协议
curriculum [kə'rɪkjʊləm] *n.*	全部课程，课程
synthesize ['sɪnθɪsaɪz] *vt.*	综合；人工合成；（通过化学手段或生物过程）合成；（音响）合成
vi.	合成；综合
glucose ['gluːkəʊs] *n.*	[化]葡萄糖，右旋糖
equilibrium [ˌiːkwɪ'lɪbriːəm, ˌekwə-] *n.*	平衡，均势；均衡
constant ['kɒnstənt] *a.*	不断的，持续的；永恒的，始终如一的；坚定的；忠实的
n.	[数]常数，常量；不变的事物；永恒值

构词法：

1. mis-用于动词和名词前，形成新的动词和名词，表示“坏(的)、错误(的)、糟糕(的)、不当(的)”

   如：misreport (错误地报道), misuse (误用), mislead (误导), mistake (错误), misjudge (误判), misadvise (给出错误的劝告), misaddress (错误的地址), misadventure (运气不佳的遭遇), misfortune (不幸)等

2. in-常加在形容词、名词之前构成反义词，表示“不、无、非”

   如：inorganic (无机的), incomplete (不完整的), insecure (缺乏安全感的), inaccessible (难以接近的), inadequate (不足的), inability (无能), insufficiency (不充足)等

3. -bility加在形容词后使其名词化，表示“动作，性质，状态”

   如：possibility (可能性), feasibility (可行性), responsibility (责任)

4. -tion, -ation都是名词后缀，常常表示“行为，过程，结果”

   如：distinction (区别), information (信息), description (描述), titration (滴定), composition (结构), concentration (集中), starvation (饥饿)等

5. -fy常常加在名词和形容词之后，使其成为动词“使成为，使进入状态”
如：identity — identify (认出，识别，使参与), modification — modify (改变，修改，修饰), beauty — beautify (美化), specific — specify (具体说明), horrible — horrify (使恐怖), intensity — intensify (使强化，加强)

Notes

1. Analytical chemistry is often described as the area of chemistry responsible for characterizing the composition of matter, both qualitatively (what is present) and quantitatively (how much is present). 分析化学经常被描述为负责表征物质成分的化学研究领域，包括定性的（什么物质）和定量的分析（呈现多少）。
2. The craft of analytical chemistry is not in performing a routine analysis on a routine sample (which is more appropriately called chemical analysis), but in improving established methods, extending existing methods to new types of samples, and developing new methods for measuring chemical phenomena. 分析化学工艺并不是常规样品进行例行分析（这更贴切称为化学分析），而是改进既有的方法、将现有的方法扩展到新的样品类型以及建立测量化学现象的新方法。
3. This is the scope of a qualitative analysis, example of which include identifying the products of a chemical reaction, screening an athlete's urine for the presence of a performance-enhancing drug, or determining the spatial distribution of Pb on the surface of an airborne particulate. 这是定性分析的范围，例如它包括确定化学反应的产物，检测运动员尿液以确定是否含有兴奋剂，或者分析在空气中微粒表面的铅的空间分布。
4. Examples of typical quantitative analyses include the elemental analysis of a newly synthesized compound, measuring the concentration of glucose in blood, or determining the difference between the bulk and surface concentrations of Cr in steel. 典型的定性分析的例子包括新合成化合物的元素分析，测量血液中的葡萄糖浓度，或者比较钢铁中大块和表面铬的浓度的差别。

课文译文

什么是分析化学?

什么是分析化学?正如化学的所有领域,分析化学对我们来说是一个过于宽泛而活跃的学科,而不能在教科书绪论中给出一个简单的或者完全的定义。取而代之的是,我们将试图谈谈什么是分析化学,以及什么不是分析化学。

分析化学经常被描述为负责表征物质成分的化学研究领域,包括定性的(什么物质)和定量的(呈现多少)分析。这种描述很容易让人产生误解。毕竟,几乎所有的分析工作者都会例行公事地进行数量和质量的测量。争议产生于分析化学不是化学中一个分离的分支,而是化学知识的简单应用。事实上,你很可能在其他化学路线中进行了数量和质量分析。例如,许多化学类学科的绪论包括鉴别无机离子的定性内容以及涉及滴定的定量分析。

不幸的是,此类描述忽略了分析化学家使化学研究得以恢复生气这一独特的见解。分析化学工艺不包括进行常规样品的常量分析(这更贴切地称为化学分析),而是包括改进已建立的方法、扩展适合新的样品类型的已存在的方法,以及建立测量化学现象的新方法。

下面是一个区别分析化学和化学分析的例子。采矿工程师通过比较除去此种矿石的费用来对提炼一种矿石的经济可行性进行评估。建立和确认提供此类信息的方法就是分析化学家的责任。一旦建立,这种方法的日常应用就是化学分析家的工作了。

化学分析与分析化学的另外一个区别就是分析化学家的工作是改进已建立的方法。

总之,分析化学更恰当的定义是创造和运用概念、原理以及……测量化学体系和种类的特征的一门科学。分析化学家通常从事于最边缘的分析工作,扩展和提高所有的化学家的能力,从对更小的样品、更复杂的样本、更短的时间范围以及更低浓度的种类做出有目的、有意义的测定。在整个历史中,分析化学为其他四类传统的化学领域的研究提供了

许多手段和方法，同样促进了多学科的研究，如医学化学、临床化学、毒理学、法医化学、材料科学、地球化学和环境化学。

分析化学的许多问题源于需要确定样品中存在的物质。这是定性分析的范围，例如它包括确定化学反应的产物，检测运动员尿液以确定是否含有兴奋剂，或者分析在空气中微粒表面的铅的空间分布。分析化学早期的很多工作涉及简单的化学测试的发展来确定无机离子和有机官能团的存在。仍在某些学校教授的无机和有机定性分析中经典的实验课程（这些仍在某些学校教予学生）就是基于这些工作的。目前，所有的定性分析都使用这些方法，如红外光谱学，核磁共振法和质谱法。这些应用于确定有机和无机化合物的定性方法经常被涵盖在大学课程中，因此在此文中不再赘述。

可能在分析实验室最常遇到的问题类型就是定量分析。典型的定量分析例子包括新合成化合物的元素分析，测量血浆中的葡萄糖浓度，或者比较钢铁中大块和表面铬的浓度的差别。在临床、制药、环境和工业的实验室的分析工作包括建立新的方法以检测在复杂样品中目标物的浓度。此文中的大部分例子都是来自于定量分析领域。

分析化学的另一个重要的领域，这在本文中受到某种关注，就是建立新的方法来表征其物理和化学性质。化学结构、平衡常数、粒子大小和表面结构的测定都是特征分析的例子。

定性、定量和特征分析的目的是解决与样品有关的问题。另一方面，基础分析对改进应用于其他分析化学领域的实验方法具有指导性。扩展和改进分析方法所依据的理论、了解方法的局限性、设计新方法和改进老方法都是分析化学中基础研究的例子。

Part II Extended Reading

The History of Chemistry

Chemistry did not emerge as a science until after the scientific revolution in the seventeenth century and then only rather slowly and laboriously. But chemical knowledge is as old as history, being almost entirely concerned with the practical arts of living. Cooking is essentially a chemical process; so is the melting of metals and the administration of drugs and poisons. This basic chemical knowledge, which was applied in most cases as a rule of thumb, was nevertheless dependent on previous experiment. It also served to stimulate a fundamental curiosity about the processes themselves. New information was always being gained as artisans improved techniques to gain better results. The development of a scientific approach to chemistry was, however, hampered by several factors. The most serious problem was the vast range of material available and the consequent difficulty of organizing it into some system. In addition, there were social and intellectual difficulties, chemistry is nothing if not practical; those who practice it must use their hands, they must have a certain practical flair. Yet in many ancient civilizations, practical tasks were primarily the province of a slave population. The thinker or philosopher stood apart from this mundane world, where the practical arts appeared to lack any intellectual content or interest. The final problem for early chemical science was the element of secrecy. Experts in specific trades had developed their own techniques and guarded their knowledge to prevent others from stealing their livelihood. Another factor that contributed to secrecy was the esoteric nature of the knowledge of a alchemists, who were trying to transform base metals into gold or were concerned with the hunt for the elixir that would bestow the blessing of eternal life. In one sense, the second of these was the more serious impediment because the records of the chemical processes that early alchemists had discovered were often written down in symbolic language intelligible to very few or in symbols that were purposely obscure.

课文译文

化学的历史

化学在17世纪的科技革命后才成为一门科学，其发展是缓慢而艰难的。但化学知识却像人类历史一样古老，与人们日常生活密切相关。做饭基本上是一个化学过程。同样，金属熔炼、使用药品或毒剂也是如此。人们在大多数情况下只是凭经验运用这些基本化学知识，但这些基本知识的确是来自于前人的实验。它们同时也激发了人们对化学本身的兴趣。工匠们利用新技术来改良工艺，就增加了对化学的了解。但是，化学科学方法的发展却有许多阻碍的因素。其中最严重的问题就是要把浩如烟海的物质归纳为若干系统，确实很困难。此外，还有社会和知识的原因。离开实际用途，化学就毫无价值；研究化学的人必须亲自动手，这就要求他们要有很强的动手能力。但在许多古代文明中，动手的活都是奴隶干的。思想家与哲学家与此劳碌决不沾边，因为在他们看来，实际操作技能低智而乏味。最后，还有一个原因妨碍早期化学的发展，那就是保密。某个行家一旦发现了新技术，就竭力保密以防被人偷了饭碗。另一个原因加剧了知识封锁，就是炼金术士知识的神秘性。这些术士们要么想把便宜的金属变成黄金，要么期望找到一种长生不老药。从某种意义上说，这第二个因素带来了更严重的阻碍，因为早期术士们的研究成果记载于鲜为人知的或故意让人不懂的符号中。