应用化学专业英语

（修订版）

主编　唐冬雁　刘本才

English in Applied Chemistry

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ENGLISH IN APPLIED CHEMISTRY

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内 容 提 要

本书由哈尔滨工业大学牵头，联合东北林业大学、哈尔滨理工大学、大庆石油学院、哈尔滨工程大学、黑龙江大学等院校，在总结多年专业英语教学经验的基础上编写而成。

全书共八个单元。其中：第一单元为化学化工一般知识；第二单元为化学化工基本理论；第三单元为化学化工技术；第四单元为仪器分析和化学分析方法；第五单元为化学命名法；第六单元为专业英语阅读材料；第七单元为化学化工文献介绍；第八单元为科技英语写作及翻译。另外还附有化学元素表、常用数学符号和数学式写法、SI单位、实验室常用仪器名称及词汇索引。

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修订版前言

应用化学专业英语一书自1999年5月出版以来,受到了广大高校师生和英语爱好者的欢迎,目前国内已有20余所高等院校将此书作为教材,并在教学中收到良好效果。还有许多化学化工人员将此书作为科研工作中查阅英文资料的重要参考书。本书自出版以来已修订1次,重印2次。为进一步满足教学的要求,哈尔滨工业大学出版社建议我们根据目前使用的情况,作必要的充实和修改,再次修订再版。

为增强本书的科学性、新颖性和实用性,综合各校使用的情况和体会,在保证本书基本体系和主要内容的前提下,作了如下补充和修改。

(1) 为突出体系的完整性,在内容编排上进行了调整,删除了内容有交叠的课文,充实了能突出反映与化学各学科紧密结合的内容,并增添了化学实验的内容。

(2) 为增强本书的规范性,便于阅读和掌握,在课文后增添了惯用短语(Phrases)和难句注释(Notes)部分,并对各课生词进行了核准。

(3) 为使构词部分内容进一步完善,第五单元的无机物命名法中新增了配合物构词法介绍。

(4) 考虑到近年来利用Internet查阅化学化工文献已成为必不可少的获取文献的方法,补充了Internet上化学化工文献资源及其检索方法。

(5) 附录中补充了化学实验常见仪器、装置的中、英文对照内容和元素周期表中各元素的音标。

(6) 书后给出词汇索引(按字母顺序排列),并给出其首次出现的课文序号,以方便查阅。

为真实地反映每位编者对本书的贡献,本次修订再版对个别副主编参编的顺序进行了调整,参加本次修订再版工作的有哈尔滨工业大学唐冬雁、李欣、刘玉文、潘丽等。

由于编者水平所限,即使进行了较为细致的修改,也还难免有疏漏和不妥之处,恳请读者提出宝贵意见,以便进一步完善。

作　者

2005 年 1 月

前　　言

应用化学专业英语是继大学基础英语之后为提高应用化学各专业学生专业英文文献的读写能力而开设的必修课，是大学英语学习的重要环节。通过本课程的学习，可以进一步增加学生对专业英语词汇、语法和结构的了解，为将来从事化学化工方面英文资料的查阅、翻译和写作打下坚实的基础。

随着我国化学工业的发展，各类应用化学信息的交流日益广泛，全社会对化学化工人才素质的要求也越来越高，尤其是通过英文文献熟练获取和共享信息资源的能力。全国现有高等工科院校多数设有应用化学方面的专业，由于地域、历史发展等方面的原因，各校的专业方向又不尽相同，专业英语教学大都自成体系，且偏重于各自的专业方向，覆盖面较窄。急需一本能够兼顾各校实际情况、通用性较强的应用化学专业英语教材。为此，我们几所院校的教师总结多年的专业英语教学经验，联合编写了这本应用化学专业英语教材。本教材的主要特点是：

1.有较强的系统性和完整性，内容编排由浅入深，符合教学规律，且紧密结合应用化学学科各个专业，使学习化学知识和掌握专业英语融为一体。

2.信息涵盖面大，既包括化学化工基本知识、基本理论，也涉及化学化工文献检索方法、初步的写作技巧和翻译方法，还有结合各校专业实际难易适中的阅读资料。

3.突出了适用性和灵活性，各校可结合其专业实际，有针对性

地选择教学内容，并在 30～120 学时的范围内组织教学。

4.附有化学元素表、常用数学符号及数学式写法和 SI 单位，以方便查阅和对照。

本书内容广泛，知识介绍循序渐进，涵盖了化学化工的多个领域，既可作为高等院校应用化学各专业本、专科学生的专业英语教材，也可作为应用化学领域广大研究人员英语学习的参考书。

本书由哈尔滨工业大学唐冬雁、佳木斯大学张磊主编，大庆石油学院黎钢、哈尔滨建筑大学周胜绪、哈尔滨工业大学王鹏、龙军任副主编，参加编写的还有哈尔滨工程大学朱元凯、黑龙江大学闫鹏飞、付宏刚、哈尔滨师范大学附属中学唐海燕。全书由哈尔滨理工大学李玉铭主审。本书在编写过程中还有上述各校的一些同志做了工作，在此不一一列举，仅表谢意。

本书的编写得到了哈尔滨工业大学强亮生教授的关心和指导，在此表示衷心的感谢。哈尔滨工业大学夏保佳、王金玉、尹鸽平、姚杰、王铀等同志对本书的编写提出了许多很好的建议，在此一并表示感谢。

本书是为解决教学之急需编写的，加之参编者较多，水平有限，难免有疏漏和其他不妥之处，恳请读者提出宝贵意见，以便完善。

作　者

1999 年 5 月

CONTENTS

7 化学化工文献介绍

8 科技英语写作及翻译

Appendixes

1

General Knowledge of Chemistry and Chemical Engineering

1.1 CHEMISTRY AND CHEMICAL ENGINEERING

1.1.1 What is Chemistry about

The different kinds of matter that compose the universe are termed materials. Each material has its own distinguishing characteristics, which is termed its properties. These properties enable the material to be recognized or separated from other materials.

The study of materials is the joint concern of chemistry and physics. These two sciences are so closely related that no one can learn very much about either without considerable training in the other[1]. In many of their applications it is hard to tell where the one science leaves off and the other begins.

Roughly stated, physics is concerned with the general properties and energy and with events which result in what are termed physical changes[2]. Physical changes are those in which materials are not so thoroughly altered as to be converted into other materials distinct from those present at the beginning[3].

Chemistry, by contrast, is chiefly concerned with properties that distinguish materials from one another and with events which result in chemical changes. Chemical changes are those in which materials are transformed into completely different materials. Who but a chemist would ever guess that common salt can be resolved into a greenish gas and silvery metal[4]? Or that two odorless gases, nitrogen and hydrogen, can be combined to form ammonia? Or that ordinary air and water can be converted into nitric acid ? Or that coal tar contains ingredients that can be transformed into dyestuffs and perfumes?

Such thoroughgoing transformations, in which all the properties of a material are altered, so that a completely different material is obtained, are called chemical transformations, chemical changes or chemical reactions.

Chemistry as an art is concerned with identifying, separating and transforming materials, in applying them to definite uses[5].

Chemistry as a science is a manner of thinking about transformations of materials which helps us to understand, predict and control them. It furnishes directing intelligence in the use of materials.

1.1.2 The Scope of Chemistry

Chemistry is sometimes called the "central science" because it relates to so many areas of human endeavor and curiosity. Chemists who develop new materials to improve electronic devices such as solar cells, transistors, and fiber optic cables work at the interfaces of chemistry with physics and engineering. Those who develop new pharmaceuticals for use against cancer or AIDS work at the interfaces of chemistry with pharmacology and medicine.

Many chemists work in more traditional fields of chemistry. Biochemists are interested in chemical processes that occur in living organisms. Physical chemists work with fundamental principles of physics and chemistry in an attempt to answer the basic questions that apply to all of chemistry: Why do some substances react with one another while others do not? How fast will a particular chemical reaction occur? How much useful energy can be extracted from a chemical reaction? Analytical chemists are investigators; they study ways to separate and identify chemical substances. Many of the techniques developed by analytical chemists are used extensively by environmental scientists. Organic chemists focus their attention on substances that contain carbon and hydrogen in combination with a few other elements. The vast majority of substances are organic chemicals. Inorganic chemists focus on most of the elements other than carbon, though the fields of organic and inorganic chemistry overlap in some ways.

Although chemistry is considered a "mature" science, the landscape of chemistry is dotted with unanswered questions and challenges. Modern technology demands new materials with unusual properties, and chemists must devise new methods of producing these materials. Modern medicine requires drugs targeted to perform specific tasks in the human body, and chemists must design strategies to synthesize these drugs from simple starting materials. Society requires improved methods of pollution control, substitutes for scarce materials, nonhazardous means of disposing of toxic wastes, and more efficient ways to extract energy from fuels. Chemists are at work in all these areas.

1.1.3 Chemical Engineering

Chemical engineering is the profession concerned with the creative application of the scientific principles underlying the transport of mass, energy and momentum, and the physical and chemical change of matter[6]. The broad implications of this definition have been justified over the past few decades by the kinds of problems that chemical engineers have solved, though the profession has devoted its attention in the main to the chemical process industries. As a result chemical engineers have been defined more traditionally as those applied scientists trained to deal with the research, development, design and operation problems of the chemicals, petroleum and related industries. Experience has shown that the principles required to meet the needs of the process industries are applicable to a significantly wider class of problems, and the modern chemical engineer is bringing his established tools to bear on such new areas as the environmental and life sciences[7].

Chemical engineering developed as a distinct discipline during the twentieth century in answer to the needs of a chemical industry no longer able to operate efficiently with manufacturing processes which in many cases were simply larger scale versions of laboratory equipment[8]. Thus, the primary emphasis in the profession was initially devoted to the general subject of how to use the results of laboratory experiments to design process equipment capable of meeting industrial production rates[9]. This led naturally to the characterization of design procedures in terms of the unit operations, those elements common to many different processes. The basic unit operations include fluid flow, heat exchange, distillation, extraction, etc. A typical manufacturing process will be made up of combinations of the unit operations. Hence, skill in designing each of the units at a production scale would provide the means of designing the entire process.

The unit operations concept dominated chemical engineering education and practice until the mid-1950s, when a movement away from this equipment-oriented philosophy toward an *engineering science* approach began[10]. This approach holds that the unifying concept is not specific processing operations, but rather the understanding of the fundamental phenomena of mass, energy and momentum transport that are common to all of the unit operations, and it is argued that concentration on unit operations obscures the similarity of many operations at a fundamental level[11].

Although there is no real conflict between the goals of the unit operations and engineering science approaches, the latter has tended to emphasize mathematical skills and to de-emphasize the design aspects of engineering education. Such a conflict need not exist, and recent educational effort has been directed toward the development of the skills that will enable the creative engineering use of the fundamentals, or a synthesis of the engineering science and unit operations approaches. One essential skill in reaching this goal is the ability to express engineering problems meaningfully in precise quantitative terms. Only in this way can the chemical engineer correctly formulate, interpret, and use fundamental experiments and physical principles in real world applications outside of the laboratory. This skill which is distinct from ability in mathematics, we call analysis[12].

Vocabulary

1. property	['prɔpəti]	*n*.性质
2. greenish	['gri:niʃ]	*a*.浅绿色的
3. silvery	['silvəri]	*a*.银的、银色的、银制的
4. odorless	['əudəlis]	*n*.没有气味的
5. nitrogen	['naitridʒən]	*n*.氮
6. hydrogen	['haidridʒən]	*n*.氢
7. ammonia	[ə'məuniə]	*n*.氨、氨水
8. nitric	['naitrik]	*a*.含氮的、硝酸根
9. ingredient	[in'gri:diənt]	*n*.组成、组成部分、配料
10. dyestuff	[daistʌf]	*n*.染料
11. perfume	[pə'fju:m]	*n*.香料、香水、芳香剂
12. endeavor	[in'devə]	*n*.努力
13. transistor	[træn'sistə]	*n*.晶体管
14. interface	['intəfeis]	*n*.界面、分界面、接触面
15. pharmaceutical	[fa:mə'sju:tikəl]	*a*.配药学的
16. pharmacology	[fa:mə'kɔlədʒi]	*n*.药理学

17. extract [iks'trækt] *n*.萃取物、浓缩物;*vt*.榨取、萃取
18. overlap ['əuvə'læp] *n*. *vi*.叠盖;*vt*.重叠、重复
19. dispose [dis'pəuz] *v*.处理
20. toxic ['tɔksik] *a*.有毒的、有害的
21. underlying [ʌndə'laiiŋ] *a*.在下面的、根本的、潜在的
22. momentum [məu'mentəm] *n*.动量
23. implication ['impli'keiʃən] *n*.牵连、含义、暗示
24. procedure [prə'siːdʒə] *n*.程序、手续、步骤
25. distillation [disti'leiʃən] *n*.蒸馏
26. unify ['juːnifai] *v*.使……相同、使……一致、使成一体
27. obscure [əb'skjuə] *v*.使朦胧、遮蔽、使阴暗

Phrases

1. common salt 食盐
2. resolve into 分解
3. coal tar 煤焦油
4. interface of A with B A与B交叉
5. extract A from B 从B中提取(萃取)A
6. in combination with 与……结合,和……联合
7. in the main 主要地,基本上
8. process industry 加工业
9. bring ... to bear on 将……用于,使……受……的影响
10. in answer to 响应,满足
11. in terms of 用……术语,按照
12. common to 对……通用,为……共用

Notes

1. These two sciences are so ... in the other. 句中"that"引导结果状语从句。全句可译为:这两门学科被如此紧密地联系在一起以至于没有一个人能不通过其中一个学科相当多的训练而很好地学习另一学科。
2. Roughly stated, physics is concerned ... physical changes. 句中"roughly stated"