高职高专“十一五”规划教材

——精细化工技术系列

JINGXI HUAGONG JISHU XILIE

精细化工专业英语

JINGXI HUAGONG ZHUANYE YINGYU

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·北京·

本书由全国化工高职教学指导委员会精细化工专业委员会组织编写，书中选材难易适中，内容覆盖面宽，全书共分5章，包括精细化工简介、精细化工产品介绍、单元反应、单元操作、工厂典型设备。每章含有课文正文、词组、难点注释、理解练习、阅读材料等部分，内容上循序渐进，遵循学生的认知规律。

本书可作为高职高专化学、化工及相关专业的教材，也可供有关厂矿企业技术人员参考。

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前　言

随着经济全球化浪潮的涌起和我国精细化工产业的不断发展，社会和企业对精细化工人才素质的需求也在不断发展和变化，除要求从业人员具备一定的专业知识和技能外，也要求其具备一定的专业英语阅读、写作能力。为适应新时期社会经济变化对高职精细化工专业人才素质的需求，全国化工高职教学指导委员会精细化工专业委员会组织全国部分高等职业院校编写本书。

在吸取其他专业英语教材优点的基础上，编者力求编出一本符合高等职业教育特点、遵循学生认知规律的教材。本教材的特点如下。

1. 选材难易适中、内容覆盖面宽。考虑到目前高职学生的英语实际水平，课文和阅读材料均选自于英美国家的专业书籍和其他文献，以科普类文章为主。选材内容包含精细化工简介、精细化工产品介绍、单元反应、单元操作、工厂典型设备，覆盖面宽。

2. 课后练习以阅读理解和英汉对译为主。考虑到高职学生就业后专业英语应用的实际需要，练习以精细化工专业技术词汇和语句的英汉对译为主，多选择产品说明书、设备说明书原文，贯彻“学以致用”的原则。

3. 循序渐进，遵循学生的认知规律，有利于学生自学。在教材第一部分介绍了科技英语的特点、构词特点，课文后介绍了句子的分析方法、翻译技巧、毕业设计（论文）题目、关键词的翻译等知识，有利于学生自学，提高阅读、写作和翻译能力。

本教材由吴红、胡瑾主编。参加编写的人员有：吴红（Part 2）、胡瑾（Part 1、Part 5）、李永真（Part 3、Part 4），全书由吴红统稿。主审陈玉峰老师、王建华老师对教材的编写提出了许多建设性的意见。教材在编写过程中得到徐州工业职业技术学院金万祥副院长、化工系冷士良主任，南京化工职业技术学院丁志平副院长及其他高校老师的支持与指导，在此一并表示感谢。

由于编者水平所限，书中疏漏与不当之处难免，敬希指正，以便改进。

编者

2008 年 5 月

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Part 1 Introduction

Lesson 1 The Characteristics of English for Science and Technology

为了学习和了解国外先进的科学技术，增强国际科技交流能力，人们需要学习和研究大量国外的科技文章，但目前仍有不少人无法直接阅读外文文章，这就使得科技翻译越来越受到人们的重视。科技翻译为各民族的科技交流活动起到桥梁和纽带的作用。“翻译是一间屋子的窗户，它可以放进新鲜空气，并可以让我们看到外面的一切。”因此了解并掌握科技英语的特点，对于阅读、翻译或撰写英文文献有着十分重要的作用。

科技英语是描述科技内容的英语，在词汇方面同基础英语没有绝对的界限，但科技英语作为一种特殊的文体，在用词方面有其自身特有的形成和构成特点。除了一些专门术语外，科技英语中使用的词语，大多属于正式书面语体的范畴。正式书面语的采用，有利于提高科技文章的正规性。另外，科技英语词汇在其形成过程中也充分运用英语构词法，利用现有的语言材料，采用借用、组合、转换等构词方法来表达新的含义，因此，科技翻译工作者需要了解科技英语的特点，从而正确表达。

一、大量使用名词化结构

《当代英语语法》（A Grammar of Contemporary）在论述科技英语时提出，大量使用名词化结构（nominalization）是科技英语的特点之一。因为科技文体要求行文简洁、表达客观、内容确切、信息量大，强调存在的事实而非某一行为。

e. g. 1 Archimedes first discovered the principle of displacement of water by solid bodies.

阿基米德最先发现固体排水的原理。

句中 of displacement of water by solid bodies 系名词化结构，一方面简化了同位语从句，另一方面强调 displacement 这一事实。

e. g. 2 If you use firebricks round the walls of the boiler, the heat loss can be considerably reduced.

炉壁采用耐火砖可大大降低热耗。

More examples:

一般文体：Eliot refused the offer and it made us angry.

艾略特拒绝了这个邀请，这令我们生气。

科技英语文体：Eliot's refusal of the offer made us angry. (*refuse → refusal*)

艾略特对这个邀请的拒绝令我们生气。

一般文体：When we had completed the experiment, we immediately recorded the result.

当我们完成这项实验时，我们立即把结果记录下来。

科技英语文体：On completion of the experiment, we immediately recorded the result. (*complete → completion*)

我们一完成这项实验，就立刻把结果记录下来。

二、广泛使用被动语句

根据英国利兹大学 John Swales 的统计，科技英语中的谓语至少有三分之一是被动态。这是因为科技文章侧重叙事推理，强调客观准确。第一、二人称使用过多，会造成主观臆断的印象。因此尽量使用第三人称叙述，采用被动语态，例如：

Attention must be paid to the working temperature of the machine.

应当注意机器的工作温度。

而很少说：

You must pay attention to the working temperature of the machine.

你们必须注意机器的工作温度。

此外，如前所述，科技文章将主要信息前置，放在主语部分，这也是广泛使用被动态的主要原因。试观察并比较下列两段短文的主语。

一般文体：We can store electrical energy in two metal plates separated by an insulating medium. We call such a device a capacitor, or a condenser, and its ability to store electrical energy capacitance. It is measured in Farads.

科技英语文体：Electrical energy can be stored in two metal plates separated by an insulating medium. Such a device is called a capacitor, or a condenser and its ability to store electrical energy capacitance. It is measured in Farads.

电能可储存在由一绝缘介质隔开的两块金属极板内。这样的装置称为电容器，其储存电能的能力称为电容。电容的测量单位是法拉。

这一段短文中各句的主语分别为：

Electrical energy; Such a device; Its ability to store electrical energy; It (*Capacitance*)

它们都包含了较多的信息，并且处于句首的位置，非常醒目。四个主语完全不同，避免了单调重复，前后连贯，自然流畅。足见被动结构可收简洁客观之效。

More examples:

一般文体：We place some stems with flowers on in red ink. After some time we could see that the red ink had moved very slowly up the stems and changed the colour of the flowers.

我们把一些带花的茎放置于红墨水中，过了一段时间，我们能够看到红墨水缓慢地沿着茎移动，改变了花的颜色。

科技英语文体：Some flowering stems were placed in red ink. After some time, the red ink could be seen to have crept up the stems and changed the colour of the flower.

一些带花的茎被置于红墨水中，过了一段时间，能够看到红墨水缓慢地沿着茎移动，改变了花的颜色。

科技英语所表述的是客观规律，因之要尽量避免使用第一、二人称；此外，要使主要的信息置于句首。

三、非限定动词

如前所述，科技文章要求行文简练，结构紧凑，为此，往往使用分词短语代替定语从句或状语从句；使用分词独立结构代替状语从句或并列分句；使用不定式短语代替各种从句；介词＋动名词短语代替定语从句或状语从句。这样可缩短句子，又比较醒目。试比较下列各组句子。

一般文体：A direct current is a current which flows always in the same direction.

科技英语文体：A direct current is a current flowing always in the same direction.

直流电是一种总是沿同一方向流动的电流。

一般文体：When heat radiates from the earth, it causes air currents to rise.

科技英语文体：Radiating from the earth, heat causes air currents to rise.

热量由地球辐射出来时，使得气流上升。

一般文体：A body can move uniformly and in a straight line, if there is no cause to change that motion.

科技英语文体：A body can move uniformly and in a straight line, there being no cause to change that motion.

如果没有改变物体运动的原因，那么物体将做匀速直线运动。

More sentences in formal style:

Materials to be used for structural purposes are chosen so as to behave elastically in the environmental conditions.

结构材料的选择应使其在外界条件中保持其弹性。

There are different ways of changing energy from one form into another.

将能量从一种形式转变成另一种形式有各种不同的方法。

四、后置定语

大量使用后置定语也是科技文章的特点之一。常见的结构有以下五种：

1. 介词短语

The forces due to friction are called frictional forces.

由于摩擦而产生的力称为摩擦力。

2. 形容词及形容词短语

In this factory the only fuel available is coal.

该厂唯一可用的燃料是煤。

3. 副词

The air outside pressed the side in.

外面的空气将桶壁压得凹进去了。

4. 单个分词，但仍保持较强的动词意义

The heat produced is equal to the electrical energy wasted.

产生的热量等于浪费了的电能。

5. 定语从句

During construction, problems often arise which require design changes.

在施工过程中，常会出现需要改变设计的问题。

The molecules exert forces upon each other, which depend upon the distance between them.

分子相互间都存在着力的作用，该力的大小取决于它们之间的距离。

Very wonderful changes in matter take place before our eyes every day to which we pay little attention.

（定语从句 to which we pay little attention 修饰的是 changes，这是一种分隔定语从句。）

我们几乎没有注意到的、很奇异的物质变化每天都在眼前发生。

五、常用句型

科技文章中经常使用若干特定的句型，从而形成科技文体区别于其他文体的标志。例如“It…that…”结构句型、被动态结构句型、比较结构句型、分词短语结构句型、省略句结构句

型等。举例如下：

It seems that these two branches of science are mutually dependent and interacting.

看来这两个科学分支是相互依存、相互作用的。

It has been proved that induced voltage causes a current to flow in opposition to the force producing it.

已经证明，感应电压使电流的方向与产生电流的磁场力方向相反。

It was not until the 19th century that heat was considered as a form of energy.

直到19世纪人们才认识到热是能量的一种形式。

This steel alloy is believed to be the best available here.

人们认为这种合金钢是这里能提供的最好的合金钢。

Compared with hydrogen, oxygen is nearly 16 times as heavy.

氧与氢比较，质量大约是它的16倍。

The resistance being very high , the current in the circuit was low.

由于电阻很大，电路中通过的电流就小。

Ice keeps the same temperature while melting.

冰在融化时，其温度保持不变。

All substances, whether gas, liquid or solid, are made of atoms.

一切物质，不论是气态、液态，还是固态，都由原子组成。

六、长句

为了表述一个复杂概念，使之逻辑严密，结构紧凑，科技文章中往往出现许多长句。有的长句多达七八十个词，以下即是一例。

The efforts that have been made to explain optical phenomena by means of the hypothesis of a medium having the same physical character as an elastic solid body led, in the first instance, to the understanding of a concrete example of a medium which can transmit transverse vibrations, and at a later stage to the definite conclusion that there is no luminiferous medium having the physical character assumed in the hypothesis.

七、复合词与缩略词

大量使用复合词与缩略词是科技文章的特点之一，复合词从过去的双词组合发展到多词组合；缩略词趋向于任意构词，例如某一篇论文的作者可以就仅在该文中使用的术语组成缩略词，例如：

full-enclosed 全封闭的（双词合成形容词）

feed-back 反馈（双词合成名词）

work-harden 加工硬化（双词合成词）

criss-cross 交叉着（双词合成副词）

on-and-off-the-road 路面越野两用的（多词合成形容词）

anti-armoured-fighting-vehicle-missile 反装甲车导弹（多词合成名词）

colorimeter 色度计（无连字符复合词）

maths (mathematics) 数学（裁减式缩略词）

lab (laboratory) 实验室

ft (foot/feet) 英尺

cpd (compound) 化合物

P. S. I. (pounds per square inch) 磅/平方英寸

八、常使用源自拉丁语等的外来词汇

在正式写作中通常使用拉丁语动词，而在非正式写作中通常使用口语中的或文学上的短语动词。

科技英语中常用源于拉丁语的动词（举例）	普通英语常用动词短语（举例）
ignite	set fire/light to 点燃
insert	push in 插入
depress	push down 压低
consume	use up 消耗
equalize	make up 补偿
occupy	fill up 占用
extinguish	put out (a fire) 熄灭
add	put in 放进
remove	take off/away 移开
invert	turn…upside down 使颠倒

科技英语中常用外来语的词汇（举例）	普通英语常用的词汇（举例）
employ	use
contact	touch
rapid	quick
possess	have
absorb	take in
transform	change
erode	wear away
aggregate	put together
approximately	about
bear	carry
commence	begin
inquire	ask
endeavor	try
remark	say
obtain	get

Reading Material

How to Study Chemistry as a Course for Specialty

We have written this text to assist you as you study chemistry. Chemistry is a fundamental science—some call it the central science. As you and your classmates pursue diverse career goals you will find that the vocabulary and ideas presented in this text will be useful in more places and in more ways than you may image now.

We begin with the most basic vocabulary and ideas. We then carefully evolve increasingly sophisticated ideas that are necessary and useful in all the other physical sciences, the biological sciences, and the applied sciences such as medicine, density, engineering, agriculture, and home economics.

We have made the early chapters as nearly self-contained as possible. The material can be presented in the order considered most appropriate by your professor. Some professors will cover chapters in different orders or will omit some chapters completely—the text was designed to accommodate this.

Early in each section we have attempted to provide the experimental basis for the ideas we evolve. By experimental basis we mean the observations and experiments on the phenomena that have been most important in developing concepts. We then present an explanation of the experimental observations.

Chemistry is an experimental science. We know what we know because we (literally thousands of scientists) have observed it to be true. Theories have been evolved to explain experimental observations (facts). Successful theories explain observations fully and accurately. More importantly, they enable us to predict the results of experiments that have not yet been performed. Thus, we should always keep in mind the fact that experiment and theory go hand-in-hand. They are intimately related parts of our attempt to understand and explain natural phenomena.

"What is the best way to study chemistry?" is a question we are asked often by our students. While there is no single answer to this question, the following suggestions may be helpful. Your professor may provide additional suggestions. A number of supplementary materials accompany this text. All are designed to assist you as you study chemistry. Your professor may suggest that you use some of them.

Students often underestimate the importance of the act of writing as a tool for learning. Whenever you read, do not just highlight passages in the text, but also take notes. Whenever you work problems or answer questions write yourself explanations of why each step was done or how you reasoned out the answer. Keep a special section of your notebook for working out problems or answering questions. The very act of writing forces you to concentrate more on what you are doing, and you learn more. This is true even if you never go back to review what you wrote earlier. Of course, these notes will also help you to review for an examination.

You should always read over the assigned material before it is covered in class. This helps you to recognize the idea as your professor discusses them. Take careful class notes. At the first opportunity and certainly the same way, you should recopy your class notes. As you do this, fill in more detail where you can. Try to work the illustrative examples that your professor solved in class, without looking at the solution in your notes. If you must look at the solution, look at only one line (step), and then try to figure out the next step. Head the assigned material again and take notes, integrating these with your class notes. Read the assigned material again and take notes, integrating these with your class notes. Reading should be much more informative the second time.

Review the "key terms" at the end of the chapter to be sure that you know the exact meaning of each. Work the illustrative examples in the text while covering the solutions with a sheet of paper. If you find it necessary to look at the solutions, look at only one line at a time and try to figure out the next step. Answers to illustrative examples are displayed on blue backgrounds. At the end of most examples, we suggest related questions from the end-of-chapter exercises.

Lesson 2　Word-Building of English for Science and Technology

构词法是组成单词的一种方法，它有清晰严谨的结构形式，本身有规律可循。利用构词法记忆单词，可以记忆成串、举一反三。构词法即词的构成方法及词在结构上的规律。科技英语构词特点是外来语多（很多来自希腊语和拉丁语），构词方法多。除了非科技英语中的常用的三种构词法——转化、派生及合成法外，还普遍采用压缩法、混成法、符号法等。

一、派生法

派生法（derivation，也称词缀法），即由一个词根加上前缀或后缀，构成另一个单词的构词法。添加在词根前面的构成部分叫前缀，它一般不改变原词的词性，只改变其词义。添加在词根后面的构成部分叫后缀，它改变了原词的词性，有时也改变其词义。如：以形容词“happy（幸福的）”为词根，加前缀“un-”就是其反义词“unhappy（不幸的）”；加后缀“-ly”，就是其副词形式“happily（幸福地）”；加后缀“-ness”，就是其名词形式“happiness（幸福）”。同样还可以得到“unhappily”和“unhappiness”。前缀、后缀是构词的要素，具有一定的作用和意义。懂得了前、后缀的含义，就容易了解由前（后）缀和词根结合而成的单词的意义，举例见表1。

表1　派生构词法举例

数字	拉丁或希腊前缀	烷烃	烷基	烯烃	醇	醛
		alkane	alkyl	alkene	alcohol	aldehyde
one	mono-	methane	methyl		methanol	methyl aldehyde
two	di- bi-	ethane	ethyl	ethene ethylene	ethanol	ethyl aldehyde ethanal
three	tri-	propane	propyl	propene	propanol	propylaldehyde
four	tetra- quadri-	butane	butyl	butene	butanol	butyl aldehyde
five	pent(a)-	pentane	pentyl	pentene	pentanol	pentanal
six	hex(a)-	hexane	hexyl	hexene	hexanol	hexanal
seven	hept(a)-	heptane	heptyl	heptene	heptanol	heptanal heptyl aldehyde
eight	oct(a)-	octane	octyl	octene	octanol	octyl aldehyde
nine	non(a)-	nonane	nonyl	nonene	nonanol	nonyl aldehyde
ten	dec(a)-	decane	decyl	decene	decanol	decyl aldehyde decanal

例如“烯烃”就是用前缀（如拉丁或希腊前缀）表示分子中碳原子数再加上“-ene”作词尾构成的。若将词尾变成“-ane”、“-yne”、“-ol”、“-yl”，则分别表示“烷烃”、“炔烃”、“醇”和“基”等。依此类推，从而构成千万种化学物质名词。

据估计，知道一个前缀可帮助人们认识50个英语单词。一名科技工作者应至少知道50个前缀和30个后缀。这对扩大词汇量，增强自由阅读能力，提高翻译质量和加快翻译速度都非常有用。

二、合成法

把两个单词或两个以上的词合成一个新词，这种构词的方法叫做合成法（composition）。

1. 复合名词的主要构成方式

(1) 名词＋名词

classroom 教室，carbon black 炭黑

(2) 形容词＋名词

blackboard 黑板，green-house 温室，atomic weight 原子量

(3) 动词＋名词

break-water 防波堤

(4) 副词＋名词

overcoat 大衣，inland 内地

(5) 动词＋副词

breakdown 崩溃，毛病，breakup 瓦解

(6) 名词＋介词＋名词

editor-in-chief 总编辑

2. 复合形容词的主要构成方式

(1) 名词＋形容词

snow-white 雪白的，colour-blind 色盲的，world-wide 全世界规模的

(2) 形容词＋形容词

red-hot 灼热的

(3) 副词＋形容词

ever-green 常绿的，over-sensitive 过于敏感的

(4) 名词＋分词

hand-made 手工制作的

(5) 形容词＋名词

first-rate 第一流的，second-hand 旧的，用过的，第二手的

(6) 形容词＋名词＋ed

warm-hearted 热心肠的，open-minded 思想开明的，white-haired 白发的

(7) 数词＋名词＋ed

two-faced 两面派的，four-cornered 有四角的

(8) 数词＋名词＋形容词

five-year-old 五岁的，six-inch-tall 六英寸高的

(9) 名词＋名词＋ed

iron-willed 有钢铁意志的

3. 复合动词的主要构成方式

(1) 副词＋动词

overcome 克服，uphold 支持，主张，outgrow 因年龄增长而失去

(2) 名词＋动词

sun-bathe 进行日光浴

4. 复合副词的主要构成方式

(1) 名词＋名词

sideways 横着

(2) 名词＋副词

headfirst 头朝下

(3) 形容词＋名词

meanwhile 同时，其间

(4) 介词＋名词

beforehand 事先

三、压缩法

压缩法（shortening）指只取词头字母的构词方法，这种方法在科技英语中较常用。

OPEC：Organization of Petroleum Exporting Countries 石油输出国组织

CAD：computer aided design 计算机辅助设计

PVC：polyvinyl chloride 聚氯乙烯

FRP：fibre glass reinforced plastic 玻璃钢

DDT：dichloro-diphenyl-tricchloroethane 滴滴涕

DNA：deoxyribonucleic acid 脱氧核糖核酸

C/O：care of 烦……转交

P. S.：postscript（信末）附言

四、混成法

混合法（blending），即将两个词混合或各取一部分紧缩而成一个新词，后半部分表示主体，前半部分表示属性。

news broadcast→newscast 新闻广播　　television broadcast→telecast 电视播送

smoke and fog→smog 烟雾　　helicopter airport→heliport 直升飞机场

五、符号法（signs）

&：and　＃：number　$：dollar　©：copyright

Exercises

1. Write out the names of the alkanes which have one to ten carbon atoms in English.
2. Write out the local names of common organic acid in English and Chinese.

Reading Material

Chemistry and Chemist

Chemistry is at the forefront of scientific adventure, and you could make your own contribution to the rapidly expanding technology we are enjoying. Take some of the recent academic research: computer graphics allow us to predict whether small molecules will fit into or react with larger ones—this could lead to a whole new generation of drugs to control disease; chemists are also studying the use of chemicals to trap the sun's energy and to purify sea water; they are also investigating the possibility of using new ceramic materials to replace metals which can corrode.

Biotechnology is helping us to develop new sources of food and new ways of producing fuel, as well as producing new remedies for the sick. As the computer helps us to predict and interpret results from the test tube, the speed, accuracy and quality of results is rapidly increas-

ing—all to the benefit of product development.

It is the job of chemists to provide us with new materials to take us into the next century, and by pursuing the subject, you could make your positive contribution to society. Here are some good reasons for choosing chemistry as a career.

Firstly, if you have an interest in the chemical sciences, you can probably imagine taking some responsibility for the development of new technology. New ideas and materials are constantly being used in technology to improve the society in which we live. You could work in a field where research and innovation are of primary importance to standards of living, so you could see the practical results of your work in everyday use.

Secondly, chemistry offers many career opportunities, whether working in a public service such as a water treatment plant, or high level research and development in industry. Your chemistry-based skills and experience can be used, not only in many different areas within the chemical industry, but also as the basis for a more general career in business. As a qualification, chemistry is highly regarded as a sound basis for employment.

You should remember that, as the society we live in becomes more technically advanced, the need for suitably qualified chemists will also increase. Although chemistry stands as a subject in its own right, it acts as the bond between physics and biology. Thus, by entering the world of chemistry you will be equipping yourself to play a leading role in the complex world of tomorrow.

Chemistry gives you an excellent training for many jobs, both scientific and non-scientific. To be successful in the subject you need to be able to think logically, and be creative, numerate, and analytical. These skills are much sought after in many walks of life, and would enable you to pursue a career in, say, computing and finance, as well as careers which use your chemistry directly.

Here is a brief outline of some of the fields chemists work in:

Many are employed in the wealth-creating manufacturing industries - not just oil, chemical and mining companies, but also in ceramics, electronics and fibres. Many others are in consumer based industries such as food, paper and brewing; or in service industries such as transport, health and water treatment.

In manufacturing and service industries, chemists work in Research and Development to improve and develop new products, or in quality control, where they make sure that the public receives products of a consistently high standard.

Chemists in the public sector deal with matters of public concern such as food preservation, pollution control, defence, and nuclear energy. The National Health Service also needs chemists, as do the teaching profession and the Government's research and advisory establishments.

Nowadays, chemists are also found in such diverse areas as finance, law and politics, retailing, computing and purchasing. Chemists make good managers, and they can put their specialist knowledge to work as consultants or technical authors. Agricultural scientist, conservationist, doctor, geologist, meteorologist, pharmacist, vet... the list of jobs where a qualification in chemistry is considered essential is endless. So even if you are unsure about what career you want to follow eventually, you can still study chemistry and know that you're keeping your options open.

Lesson 3 A Brief Introduction of Fine Chemicals

Until the early 1970s in-house capabilities for production of raw materials and intermediates for products sold were considered a key competitive advantage by the chemical industry. As of this writing, this situation has changed completely. Particularly those chemical companies concentrating on portfolios having high added value specialties consider efficient research and development, dynamic marketing, and proper management of human, technical, and financial resources as key success factors rather than production. This change in strategic focus is especially evident in the agrochemical and pharmaceutical industries which together comprise the life science industry. In manufacturing activities, manufacturing has been regrouped into separate divisions, and in a few cases large life science companies have disinvested their chemical manufacturing activities. In addition to these strategic developments, the requirement for more and more sophisticated organic chemical has contributed substantially to the emergence of the fine chemicals industry as a distinct entity. Fine chemical manufacturers are backward integrated, production oriented, and service the mega enterprises within the chemical industry. The fine chemicals industry has its own characteristics with regard to research and development, production, marketing, and finance.

In the chemical business products may be described as commodities, fine chemicals, of specialists. Various commodities are also known as petrochemicals, basic chemicals, organic chemicals (large-volume), monomers, commodity fibers, and plastics. Advanced intermediates, building blocks, bulk drugs and bulk pesticides, active ingredients, bulk vitamins, and flavor and fragrance chemicals are all fine chemicals. Adhesives, disinfectants, electronic chemicals, food additives, mining chemicals, pesticides, pharmaceuticals, photographic chemicals, specialty polymers, and water treatment chemicals are all specialties. The added value is highest for specialties.

It is common to both commodities and fine chemicals that these materials are identified according to specifications, according to what they are. These substances are sold within the chemistry industry, and customers know better how to use them than suppliers. Specialties are identified according to performance, according to what they can do. Customers are the public, and suppliers have to provide for technical assistance. A particular substance may be both a fine chemical and a specialty. For example, as long as, 2-chloro-5-(1-hydroxy-3-oxo-1-isoindolinyl) benzene sulfonamide is sold according to specifications it is a fine chemical. But once it is tabletted and marked as the diuretic, chlorthalidone, it becomes a specialty. The limits between commodities and fine chemicals are not so clearly fixed.

In terms of volume the border line between commodities and fine chemicals comes somewhere between about 1000t/yr and 10000t/yr. In terms of unit prices the line typically varies between $2.50/kg and $10/kg. Establishing more precise demarcations is not practical even though a large number of well-known intermediates fall within these lines, e.g., acetoacetanilide, chloroformates, cyanuric chloride, hydroquinone, malonates, pyridine, picolines, and sorbic acid. Additionally, for amino acids and vitamins two typical groups of fine chemicals,