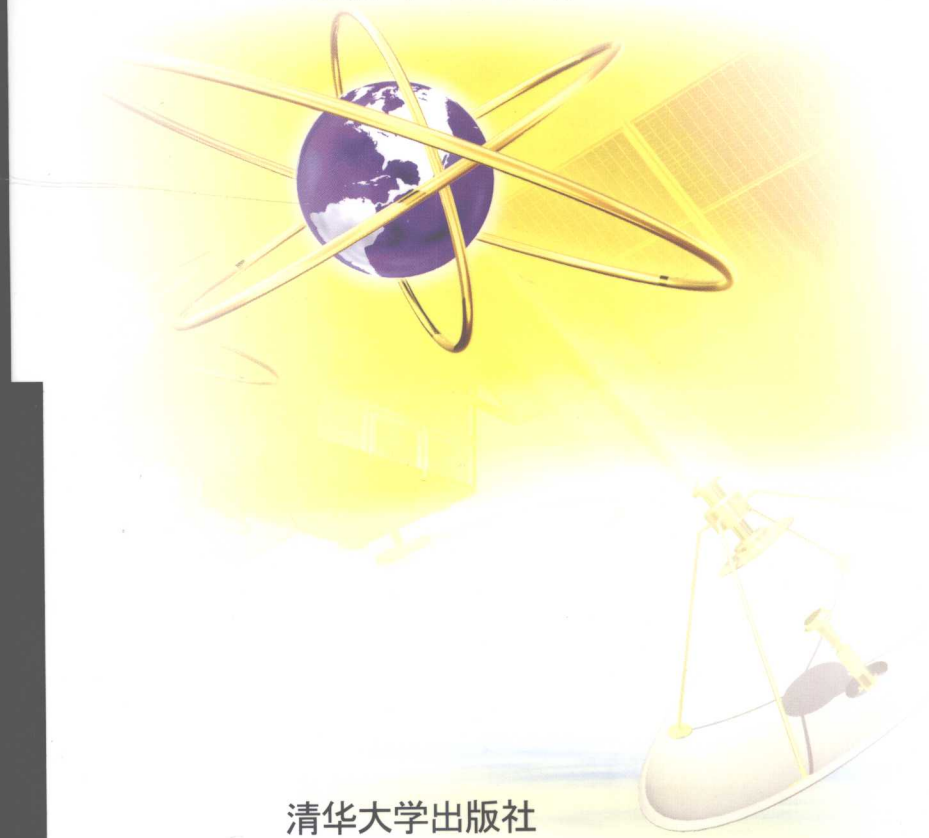
高校英语选修课系列教材

科技英语教程

English for Science and Technology

王亚光 李三喜 主编



清华大学出版社

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清华大学出版社
北京

内容简介

本教材是专门为科技英语课程编写的，共16单元，每单元由主课文A、科技英语专题讲座、练习、副课文B和延伸阅读构成。主课文附有生词表(Usages & Expressions)和重点、难点解析(Key Points)。重点、难点由编者认真挑选，做到解析精确、理解无障碍。科技英语专题讲座(Access to Scientific English)以科技英语的词汇特征、语法特征、特殊表达为主要内容，加上科技英语翻译、科技英语写作的实践指导，组成16个专题讲座。延伸阅读不限于科技论文，也包括介绍科技的报道性、描述性文章。Text A、Text B和延伸阅读尽量保持一定关联性。

本教材适用于科技英语专业学生，也适用于各普通高校、特别是某些理工类院校所有专业的学生作为必修课或选修课教材。

图书在版编目(CIP)数据

科技英语教程/王亚光，李三喜主编．—北京：清华大学出版社，2008.9
(高校英语选修课系列教材)
ISBN 978-7-302-18483-6

Ⅰ.科…　Ⅱ.①王…②李…　Ⅲ.科学技术—英语—高等学校—教材
Ⅳ.H31

中国版本图书馆CIP数据核字(2008)第134036号

责任编辑：刘细珍
装帧设计：常雪影
责任校对：王荣静
责任印制：王秀菊

出版发行：清华大学出版社　　**地　　址**：北京清华大学学研大厦A座
http://www.tup.com.cn　　**邮　　编**：100084
社　总　机：010-62770175　　**邮　　购**：010-62786544
投稿与读者服务：010-62776969，c-service@tup.tsinghua.edu.cn
质　量　反　馈：010-62772015，zhiliang@tup.tsinghua.edu.cn

印 装 者：北京鑫海金澳胶印有限公司
经　　销：全国新华书店
开　　本：140×203　**印　张**：9.5　**字　数**：235千字
版　　次：2008年9月第1版　　**印　　次**：2008年9月第1次印刷
印　　数：1～5000
定　　价：22.00元

FOREWORD 前言

科·技·英·语·教·程

在完成基础阶段的大学英语课程之后，学生们积累了一定量的词汇和语法知识，但是在高年级或者毕业后阅读专业英语文献还有一定的障碍，特别是在学术交流活动和工作实践当中，用英语进行沟通的交际能力还不尽如人意。为了拉近专业英语和基础英语的距离，也为了实现外语教学四年不断线的目标，全国很多理工类高校多开设了科技英语课程，目的是在基础英语和专业英语之间架起一座桥梁，帮助学生更容易地通过英文科技文献获得知识和信息，提高英语交际能力。然而，由于在大多数院校，科技英语还只是一门选修课，也少有专门的科技英语教师队伍，因此，科技英语的教材建设一直没有引起足够的重视。正是在这样的背景下，我们组织一批长期承担科技英语教学任务的教师编写了这本《科技英语教程》。

本教材是专门为科技英语课程编写的，共16单元，每单元由主课文A、科技英语专题讲座、练习、副课文B和延伸阅读构成。主课文A长度在900～1200词之间，副课文B长度在1500词左右，文章的专业程度一般不超过非专业人士的理解能力，内容相对完整，能独立成篇。主课文附有生词表(Usages & Expressions)和重点、难点解析(Key Points)。重点、难点由编者认真挑选，做到解析精确、理解无障碍。科技英语专题讲座(Access to Scientific English)以科技英语的词汇特征、语法特

征、特殊表达为主要内容，加上科技英语翻译、科技英语写作的实践指导，组成16个专题讲座。延伸阅读不限于科技论文，也包括介绍科技的报道性、描述性文章。Text A、Text B和延伸阅读尽量保持一定关联性。

本教材具有以下几个特点：一是内容覆盖面广，本教材选文内容涉及机械、材料、电气、信息、管理、法律等主干学科门类，突破了仅限于单一专业或者仅限于理工类专业的传统做法，更适用于在理工类院校的各个专业使用；二是注重实践能力的培养，传统科技英语教材单纯强调阅读能力，本教材在突出阅读能力的同时，对相关的基础知识有了一定介绍，同时增加了有利于提高表达能力的讨论练习，教师在使用中应该尽可能培养学生自主学习的能力；三是一线教师参与多，所有参与编写的老师都曾担任科技英语的教学任务，编写理念体现了他们的教学心得；四是体例适合教学，我们选文的长短、难易尽量考虑课堂教学的时间容量，其他安排也优先考虑了教学方便。

本书选取了近年来大量国内外书刊的内容，我们要对原文作者表示最诚挚的谢意，他们的文笔和智慧使更多的人有机会实现提高自我的理想。沈阳工业大学外语学院高霞、曹向辉和尚菲菲等同事为本书付出了大量的劳动，本书从策划到出版得到了沈阳工业大学教务处袁峰老师的大力支持，一并致以谢意。

作为一项有益的尝试，全体编者付出很多辛苦，但本书编写时间较短，漏误难免，恳请同行和适用本书的师生不吝赐教，以便将来再版时修正。

编　者

2008年7月

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科·技·英·语·教·程

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UNIT One

Text A

The Elementary Knowledge of Electrical Science

Human beings have explored the electrical phenomena they have experienced in everyday life from the beginning of record time. As scientists developed the knowledge of electrical charge, they formulated the laws of the electricity as we know them today. With the knowledge of electricity available, scientists and engineers analyzed and built electric circuits. And electric element may be described and analyzed in terms of the variables such as charge, current, voltage, power, and energy.

Electricity is a natural phenomenon controlled for the purposes of humankind. Through this phenomenon we have developed communication, lighting, and computing devices. Electricity is the physical phenomenon arising from the existence and interaction of electric charge.

People have always watched but few have analyzed that great display of power present in the electrical discharge in the sky called lighting. In the late 1740s, Benjamin Franklin[1]

developed the theory that there are two kinds of charges, positive and negative. With this concept of charge, Franklin developed this famous kite experiment in June 1752 and this innovation, the lighting rod, for draining the electrical charge from the clouds. Franklin was the first great American electrical scientist.

Alessandro Volta[2] of Padua, Italy, with the invention of his pile or electric battery, in 1800, was able to show a steady current in a closed circuit. Volta was remembered 54 years after his death when the unit of electromotive force was officially named the Volt.

The foundation of electrodynamics was laid by AndréMarie Ampère[3]. During the 1820s he defined the electric current and developed the means of measuring it. Ampère's most important publication on electricity and magnetism was also published in 1826. Ampère was honored by having the unit of electric current, the ampere, named after him in 1881.

A paper published by James Prescott Joule[4] in 1841 claimed the discovery of the relationship between a current and the heat or energy produced, which today we call Joule's law. And the unit of energy is called the Joule in his honor. The theories of electrodynamics were stated in mathematical terms by James Clerk Maxwell, a Scottish mathematical physicist, in paper published between 1855 and 1864. His famous book *Treatise on Electricity and Magnetism*[5] was published in 1873.

The outstanding characteristics of electricity when compared with other power sources are its mobility and flexibility. Electrical energy can be moved to any point along a couple of wires and, depending on the user's requirement, converter to light, heat, or motion. An electric circuit or

electric network is an interconnection of electrical elements linked together in a closed path so that an electric current may flow continuously. The flow of current is conventionally represented as a flow of positive charges. This convention was initiated by Benjamin Franklin. Of course, we now know that charge flow in metal conductors results from electrons with a negative charge. Nevertheless, we will conceive of current as the flow of positive charge, according to accepted convention.

The basic variables in an electrical circuit are current and voltage. These variables describe the flow of charge through the elements of circuit and the energy required to cause charge to flow. The value of a voltage may be positive or negative. The direction of a voltage is given by its polarities. The voltage across an element is the work required to move a unit positive charge from the "−"terminal to the "+" terminal. The unit of voltage is volt (V). The power and energy delivered to an element are of great importance. For example, the useful output of an electric light bulb can be expressed in terms of power. We know that a 300watt bulb delivers more light than a 100watt bulb.

The users of electric power are diverse and very important to modern societies. However, electrical science developed slowly over the centuries, with many studies focusing on the nature of charge. As scientists became aware of the ability to store and control charge, they formulated the idea of a circuit.

A circuit consists of electrical element linked together in a closed path so that charge may flow.

Charge is the intrinsic property of matter responsible for electrical phenomena. The quantity of charge can be expressed in

terms of the charge on one electron, which is coulomb. Current is the time rate of change of charge past a given point. We can express current: the unit of current is the ampere (A); an ampere is 1 coulomb per second.

The SI units are used by the engineers and scientists using decimal prefixes. We may simply express electrical quantities with a wide range of magnitudes.

The voltage across an element is the work required to move a unit of charge through the element. When the passive convention is used to assign the reference direction, the product of the element current and the element voltage gives the power absorbed by the element. (821 words)

Usages & Expressions

1. elementary *adj.* 基本的,主要的, 基础的,初级的
2. electrodynamics *n.* 电动力学
3. treatise *n.* 专题论文
4. element *n.* 元件,(化)元素,单元
5. variable *n.* 变量
   adj. 变化的, 可变的, 易变的
6. polarity *n.* 极性
7. intrinsic *adj.* (指价值、性质)固有的, 内在的, 本质的
8. SI *abbr.* 国际单位制(International System of Units)
9. coulomb *n.* 库仑(电量单位)
10. decimal *adj.* 十进的, 小数的, 以十为基础的, 十进制的
    n. 小数

Key Points

[1] Benjamin Franklin (1706-1790), 18世纪美国的实业家、科学家、社会活动家、思想家和外交家。曾做过著名的"风筝实验",在电学上成就显著。最先提出了避雷针的设想。他也是一位优秀的政治家,是美国独立战争的老战士。他参加起草了《独立宣言》和美国宪法。他是美国第一位驻外大使,在世界上也享有较高声誉。

[2] Alessandro Volta (1745-1827), Italian physicist, after whom the "volt" (unit of electromotive force) is named.

[3] André-Marie Ampère (1775-1836) was born on 20 Jan 1775 in Lyon, France.

[4] James Prescott Joule (1818-1889), was an English physicist. Joule studied the nature of heat, and discovered its relationship to energy. The SI derived unit of energy, the joule, named after him.

[5] *Treatise on Electricity and Magnetism*《电磁通论》。

Exercises

1. Find a word from column B with similar meaning to one of the words in column A.

A	B
1) innovate	a) name
2) elementary	b) lead
3) conceive	c) various
4) initiate	d) release
5) deliver	e) fundamental

6) assign
7) discharge
8) diverse
9) highlight
10) terminal

f) emphasize
g) assume
h) change
i) transfer
j) end

2. Reading Comprehension: Choose the best answer to each of the questions.

1) Which word is the most suitable for the style of the article?

A. Descriptive.
B. Narrative.
C. Expositive.
D. Argumentative.

2) Which of the following is Not True?

A. The physical phenomenon arising from the behavior of electrons and protons is caused by the attraction of particles with opposite charges and the repulsion of particles with the same charge.
B. Charge is the extrinsic property of matter responsible for electrical phenomena.
C. The flow of current is the direction of the flow of positive charges.
D. Electrodynamics is the physics of the relationship between electric current and magnetic or mechanical phenomena.

3) In the sentence "The theories of electrodynamics were stated in mathematical terms by James Clerk Maxwell." The word "stated" can be paraphrased as _____.

A. expressed
B. presented
C. proposed
D. introduced

4) How many famous people in the history of electricity are

mentioned in the passage?

A. 2　　B. 3

C. 4　　D. 5

5) The passage mainly talks about _____.

A. the application of the electricity in modern life

B. the fundamental concepts and the historical events in the development of electrical science

C. the important people who made great contribution to the development of electrical science

D. the importance of the electrical science to modern societies

3. Discussion

How can we save electricity in our daily life?

Access to Scientific English

科技英语的词汇特点

科技英语(English for Science and Technology 简称 EST)是一种专门用途英语(English for Specific Purposes 简称 ESP),是指科学工作者彼此进行学术交流或向广大读者介绍科学知识时习惯运用的一种语言体裁,用以描述各种自然现象、客观事实的发生过程和特性。科技英语是指科技文体,包括英语科技论文、科技报告、科普文章、科技新闻和科技产品说明书等。作为一种重要的英语文体,与非科技英语文体相比,它在词汇、语法和文体等方面都有自己的特点。而了解其词汇特征,将有助于我们更好地阅读、翻译,并最终能有效地引进新的科学技术,掌握科技的发展动态以及进行广泛的国际技术交流合作。

1. 科技英语词汇的三种主要来源

科技英语在表达上的这种客观性、严肃性在词的来源方面体现为采用外来词、赋予日常英语词汇新义、新造词汇。

在科技英语当中，有一半的科技词汇和半科技词汇直接来源于拉丁语和希腊语。尽管目前拉丁语作为古代一种交际语言不再使用，但它的词素还普遍用于科技词汇中，特别是在化学、生物学、药物学以及医学等领域。如化学元素 polonium 是以发现这一元素的居里夫人的祖国 Poloina（拉丁语）命名的。television 中的 tele 也是源于拉丁语。科技词汇中的外来词也有来自其他国家的语言，如 sputnik（人造卫星）来源于前苏联。

科技英语应用的一些词汇是已存在的，但被应用到科技英语当中的是被赋予了新义的，这样的词汇往往一词多义，且可出现在不同的科技领域，不同的领域还具有不同的意思。如 program 的词义是“大纲，节目”，而在计算机英语当中的词义是“程序”；chip 本意是“碎片，薄片”，而在计算机英语当中的词义却是“芯片”；“power”日常英语当中的词义是“能力、权利”，而在数学上它指的是“幂”，在物理上指的是“功率，能”。

科技发展带来了新事物的出现、新概念的生成，新事物、新概念又带来词汇的创造和增加，于是便有了新造词汇。随着网络的出现，有了 cyber love，email 等；后来有了克隆技术，又有了 clone。随着科技发展，新东西不断地被发现、发明和创造出来，新词也应运而生。

2. 科技英语词汇的三种主要构成手段

科技英语词汇的数量的增加与科技进步的速度是相辅相成的，了解英语构词法对我们准确理解科技术语词义极有帮助。常见的科技英语构词法主要有派生、缩略和合成三大手段。

科技英语词汇主要是通过缀合法派生的。派生法（affixation）是形成科技英语词汇的一种主要手段，根据词根所

加词缀的位置，派生法有加前缀(prefix)和后缀(suffix)两种途径。如：派生词(前缀＋词根＋后缀)：semiconductor，nonlinearity 等。英语词汇有一个特点，几乎每一基本意义单位都有两种或两种以上符号来表示独立使用的单词和不能独立使用的词根。如：土—earth(单词)，terra(词根)；水—water(单词)，hydro(词根)；日—sun(单词)，sol(词根)等等。在科技英语学习当中，除了要掌握单词之外，还要掌握词根，否则就无法掌握科技英语词汇。

缩略词(abbreviation)可分为三种：字母缩略词(acronyms)，截短词(clippings)和混合词(blends)。科技英语词汇中字母缩略词有两种构成方式。一种是首字母缩略，取用单词的第一个字母组成新的科技词汇或者机构名称。如，UFO(unidentified flying object)不明飞行物，FM(frequency modulation)调频，SCR(silicon controlled rectifier)可控硅整流器。另一种是取单词的第一个字母和单词中的另外一个字母或者部分字母形成新的科技英语。如，TB(tuberculosis)肺结核，TV(television)电视，TELESAT(telecommunications satellite)通信卫星。科技英语词汇中截断词的形成也和普通英语中一样，用单词的部分来代替整个单词代替单词的可以是整个单词的第一个音节(auto—automobile；memo—memorandum；diam—diameter)，也可以是最后一个音节(copter—helicopter；plane—aeroplane)，还可以是单词中间的部分(fridge—refrigerator；morph—metamorphosis)。科技英语中混成词的构成是把两个单词结合在一起形成一个单词。如，digicam＝digit(al)＋cam(era)；camcorder ＝ cam(era)＋(video-cassette re)corder；bit ＝ bi(nary)＋(dig)it 等等。

合成法(compounding)是把两个或两个以上的词按照一定次序排列成新词的方法。用这种方法构成的新词叫做复合词(compound)。合成法在科技英语词汇的发展过程中做出了积

极的贡献，它增补了大量的科技词汇。科技英语词汇中名词、动词、形容词、副词、介词都存在着合成词的形式，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），crisscross 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-armored-fighting-vehicle-missile 反装甲车导弹（多词合成名词），radiophotography 无线电传真（无连字符复合词），colorimeter 色度计（无连字符复合词）等。

Text B

The Method of Science

It is the business of the scientist to account for the facts that he knows. He chooses, when he can, the method of the "controlled experiment". If he wants to find the effect of light on growing plants, he will take many plants, as alike as possible. Sometimes he stands in the sun, sometimes in the shade, sometimes in the dark; all the time keeping all other conditions (temperature, nourishment) the same. In this way, by keeping other conditions constant, and by varying the light only, the effect of light on the plants can be clearly seen. This method of using "controls" can be as different as "Most moisture is present if iron is to rust?" and "Which variety of beans gives the greatest yield in one season?" In the course of inquiries the scientist may find what he thinks is common explanation for an increasing

number of facts. The explanation, if it seems to consistently fit the various facts, is called a hypothesis. If a hypothesis continues to stand the test of numerous experiments and remains unshaken, it becomes a law.

The "laws" of science differ from the "laws" of a country in two ways. First, a scientific law is liable at any time to need modifying. This happens when a fact is discovered which seems to contradict what the "law" would lead one to expect. The "law" may, in fact, have to be abandoned altogether. Second, a scientific "law" says "This is likely to be the explanation", or "This accounts for the facts as far as we know them". But the "law" of a country says "You must..." or "You must not...". The scientific "law" has no moral force; it is not bonding on human behavior nor approved or opposed by human conscience.

The scientist is always most gratified to find that an underlying "explanation" of many phenomena suggests in its turn the possibility of proving, without more ado, its own accuracy of falsity by a suitably arranged critical experiment. He is also gratified when his "explanation", if true, points to new series of experiments designed to answer a new set of question. For the curiosity of the scientist is never satisfied.

The evidence as to the vastness of the universe and the complexity of its arrangements continues to grow at an amazing rate. The gap between what has been known and all that can be known seems not to diminish, but rather to increase with every new discovery. Fresh unexplored regions are forever opening out. The rapidity of the increase of scientific knowledge, in the nineteenth and twentieth