

高级化学专业英语

金钦汉 主编



Advanced English
of Chemistry

吉林大学出版社

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写在前言

专业外语是大学非外语专业的一门必修课，它的任务在于巩固基础外语中已学过的知识，扩大词汇量，提高应用能力，为用外语从事专业活动打基础。它对于扩大学生的知识面，提高其独立工作（特别是研究工作）能力具有十分重要的意义。我们从1978年开始在化学系各专业开设这门课程。经过多年实践，深切感到有一本符合上述要求的教材的重要性。这里奉献给读者的，就是我们在这方面所作的一个尝试。

本书为《高级化学专业英语》，它有别于一般的化学专业英语教材，其着眼点在于化学学科的高级专业活动：查阅文献、从事研究和教学、撰写论文、参加学术会议、开展国际学术交流等等，因为这些活动才是真正离不开英语，甚至非用英语不可的。而我们的学生们又正是在这方面懂得甚少，求知欲望最为强烈，因此，本书选材既考虑到了语言教学方面的需要（扩大词汇、巩固语法），又考虑到了专业教学方面的需要（内容广泛、实用性强），每篇都有相对独立而完整的内容：有的可作范文（如学术通信、专利说明书等），有的可作参考资料（如命名法、诺贝尔奖条例、如何准备学术报告等），都有长期保存的价值。

考虑到本书读者已有较好的英语基础，为节省篇幅，注释都力求简明，词汇也仅列出比较专门的术语和难以查到的生词，并汇总放在书末，以利查找。

本书分上、下册。上册为通用篇，适用于化学学科各专业；下册为专业篇，分两个分册：第一分册适用于无机、分析、物化、环境化学及其各相近专业；第二分册适用于有机、高分子、生化、食品化学及其各相近专业。

本书可作为大学高年级化学专业英语教材，也可供有关专业师生和科技人员自学和应用专业英语时参考。

本书由吉林大学化学系金钦汉、刘永新、岳贵春、陈忠才、马荣堂、李荣生、李青山、李明阳等合编，由金钦汉主编。虽然编者们都一直从事着有关的教学工作，但毕竟不是专门的英语工作者，书中错误和不当之处在所难免，还望读者多加指正。

编 者

1987年4月

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1. One of the Winners of the Nobel Prize for Chemistry in 1986 — Dr. Yuan Tseh Lee

Dr. Yuan Tseh Lee was born on November 19, 1936 in Hsinchu, Taiwan. His father is an accomplished artist and his mother a school teacher.

He started his early education while Taiwan was under Japanese occupation—a result of a war between China and Japan in 1894. His elementary education was disrupted soon after it started during World War II while the city populace was relocated to the mountains to avoid the daily bombing by the Allies². It was not until after the war when Taiwan was returned to China that he was able to attend school normally as a third year student in grade school³.

His elementary and secondary education in Hsinchu was rather colorful and full of fun. In elementary school, he was the second baseman on the school's baseball team as well as a member of the ping-pong team which won the little league championship in Taiwan. In high school he played on the tennis team besides playing trombone in the marching band.

Besides his interest in sports during this time, he was also an avid and serious reader of a wide variety of books covering science, literature, and social science. The biography of Madam Curie made a strong impact on him at a young age. It was Madam Curie's beautiful life as a wonderful human being, her dedication toward

science, her selflessness, idealism that made him decide to be a scientist.

In 1955, with his excellent academic performance in high school, Lee was admitted to the National Taiwan University without having to take the entrance examination, a practice the Universities took to admit the best students⁴. By the end of his freshman year he had decided chemistry was to be his chosen field. Although the facilities in the Taiwan University were less than ideal, the free and exciting academic atmosphere, the dedication of some professors, and the camaraderie among fellow students in a way made up for it⁵. He worked under Professor Hua-sheng Cheng on his B. S. thesis which was on the separation of Sr and Ba using the paper electrophoresis method.

After graduation in 1959, he went on to the National Tsinghua University to do his graduate work. He received his Master's degree on the studies of the natural radioisotopes contained in Hukutolite, a mineral of hot spring sediment. After receiving his M. S. he stayed on at Tsinghua University as a research assistant of Professor C. H. Wong and carried out the X-ray structure determination of tricyclopentadienyl samarium.

He entered the University of California at Berkeley as a graduate student in 1962. He worked under the late Professor Bruce Mahan for his thesis research on chemi-ionization processes of electronically excited alkali atoms. During his graduate student years, he

developed an interest in ion-molecule reactions and the dynamics of molecular scattering, especially the crossed molecular beam studies of reaction dynamics.

Upon receiving his Ph. D. degree in 1965, he stayed on in Mahan's group and started to work on ion molecule reactive scattering experiments with Ron Gentry using ion beam techniques measuring energy and angular distributions. In a period of about a year he learned the art of designing and constructing a very powerful scattering apparatus and carried out successful scattering apparatus and carried out successful experiments on $N_2^+ + H_2 \rightarrow N_2H^+ + H$ and obtained a complete product distribution contour map, a remarkable accomplishment at that time.

In February 1967, he joined Professor Dudley Herschbach at Harvard University as a post-doctoral fellow. He spent half his time working with Robert Gordon on the reactions of hydrogen atoms and diatomic alkali molecules and the other half of his time on the construction of a universal crossed molecular beams apparatus with Doug McDonald and Pierre LeBreton. Time was certainly ripe to move the crossed molecular beams method beyond the alkali age. With tremendous effort and valuable assistance from the machine shop foreman, George Pisiello, the machine was completed in ten months and the first successful non alkali neutral beam experiment on $Cl + Br_2 \rightarrow BrCl + Br$ was carried out in late 1967.

He accepted the position as an assistant professor

in the Department of Chemistry and the James Franck Institute of the University of Chicago in October 1968. There he started an illustrious academic career. His further development as a creative scientist and his construction of a new generation state-of-the-art crossed molecular beams apparatus enabled him to carry out numerous exciting and pioneering experiments with his students. He was promoted to associate professor in October 1971 and professor in January 1973.

In 1974, he returned to Berkeley as professor of chemistry and principal investigator at the Lawrence Berkeley Laboratory of the University of California. He became an American citizen the same year.

In the ensuing years, his scientific efforts blossomed and the scope expanded. His world leading laboratory now contains seven very sophisticated molecular beams apparatus which were specially designed to pursue problems associated with reaction dynamics, photochemical processes, and molecular spectroscopy. His laboratory has always attracted bright scientists from all over the world and they always seem to enjoy working together. He takes great pride in the fact that more than fifteen of his former associates are serving as professors in major universities, and many others are making great contributions at the national laboratories and in the private sector.

Lee and his wife, Bernice Wu, whom he first met in elementary school have two sons, Ted (born in 1963), Sidney (born in 1966) and a daughter, Char-

lotte (born in 1969) .

Among some of the awards and recognitions he has received over the years include:

Alfred P. Sloan Fellow, 1969-1971.

Camille and Henry Dreyfus Foundation Teacher Scholar Grant, Recipient 1971-1974.

Fellow, American Academy of Arts and Science, 1975.

Fellow, American physical Society, 1976,

John Simon Guggenheim Fellow, 1976-1977.

Member, National Academy of Sciences, 1979.

Member, Academia Sinica, Taiwan, China, 1980.

Honorary Professor, Institute of Chemistry, Chinese Academy of Science, Beijing, China, 1980.

Honorary Professor, Fudan University, Shanghai China, 1980.

Miller professorship, University of California, Berkeley, California, 1981-1982.

Ernest O. Lawrence Award, U. S. Department of Energy, 1981.

Sherman Fairchild Distinguished Scholar, California Institute of Technology, 1983.

Harrison Howe Award, Rochester Section, American Chemical Society, 1983.

Peter Debye Award of Physical Chemistry, American Chemical Society, 1986.

National Medal of Science, 1986.

Honorary Professor, Chinese University of Science and Technology, Hefei, Anhuei, China, 1986.

Honorary Doctor of Science Degree, University of
Waterloo, 1986.

术 语 和 词 组

it is not until……that…… 直到……时才……
freshman year 大学一年级
tricyclopentadienyl samarium 三环戊二烯钐
B. S. thesis 学士论文
a crossed molecular beams apparatus 一套交叉分
子束装置
a complete product distribution contour map
一个完整的产物分布等高线圈

注 释

1. 本句为并列句，但第二分句的谓语is被省略了。全句可译为：他的父亲是一位有才华的艺术家，而他的母亲是一位教师。

2. 这是一个复合句。while 引导的是一个时间状语从句。主句中 soon after it started 也是一个时间状语从句。全句可译为：二次大战期间，当城市居民为避免盟军的轰炸而迁居山区时，他在入小学后不久就被迫辍学了。

3. 这是一个强调句型，强调 after 引导的时间状语从句。全句可译为：直到战争结束台湾回归到中国之后，他才得以作为正规学校三年级生正常地上学。

4. 本句为复合句。a practice……best students 是同位语，其中 the Universities took to……是一个定语从句，修饰 practice。全句可译为：由于高中时学习成绩优异，李远

哲在1955年未经入学考试（这是大学为录取优秀学生而采取的一项措施）就被国立台湾大学录取了。

5. 这是一个复合句。although 引导的是一个让步状语从句。全句可译为：虽然台湾大学的设备条件不够理想，但其自由和令人兴奋的学术空气、一些教授的献身精神及学生间的团结友爱以某种方式弥补了这一点。

2. Molecular Beam Studies of Elementary Chemical Processes

—From Nobel Lecture Given by Dr. Yuan Tesh Lee

Chemistry is the study of material transformations. Yet a knowledge of the rate, or time dependence, of chemical change is of critical importance for the successful synthesis of new materials and for the utilization of the energy generated by a reaction. During the past century it has become clear that all macroscopic chemical processes consist of many elementary chemical reactions that are themselves simply a series of encounters between atomic or molecular species¹. In order to understand the time dependence of chemical reactions, chemical kineticists have traditionally focused on sorting out all of the elementary chemical reactions involved in a macroscopic chemical process and determining their respective rates.

Our basic understanding of the relation between reactive molecular encounters and rates of reactions (formulated in terms of activation energies, E_a , and pre-exponential factors, A , as elucidated by Arrhenius in his rate constant expression, $K = A \exp(-E_a/RT)$), was deepened some fifty years ago following the discovery of quantum mechanics. Since a chemical reaction is fundamentally a mechanical event, involving the rearrangement of atoms and molecules during a collision, detailed information on the dynamics of simple