化学专业英语

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兰州大学出版社

化 学 专 业 英 语

CHEMISTRY ENGLISH

马永祥 马志萍 谢继善 编

兰 州 大 学 出 版 社

内 容 简 介

本教材内容选自近年来国外高等院校化学和化工专业教学用书及IUPAC（国际纯粹化学和应用化学联合会）有机化合物命名法。

本书适于作高等院校化学、化工、药物化学及相关专业高年级学生的专业英语教材；也可作为该类专业的研究生以及从事化学和化工领域的教学、科研和工程技术人员的自学用书。通过对本书的学习可系统和迅速地通晓无机和有机化合物的一般命名规律，掌握三千个左右的化学化工专业英语词汇，并理解一些基本的语法概念。

高等学校教学参考书

化 学 专 业 英 语

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兰州大学出版社出版

（兰州大学校内）

甘肃省平凉地区印刷厂印刷　甘肃省新华书店发行

开本：787×1092　1/16　印张：18

1987年12月第1版　1987年12月第1次印刷

字数：48.4万　　印数：1—4500册

ISBN 7—311—00037—8/O·9

书号：13402·14　　定价：3.02元

前　言

在科技英语词汇中涉及化学和化工方面的数量最大，从事这一领域的工作人员在阅读专业英语资料时面对的词汇量数以万计，因而使该领域人员在学习专业英语时遇到的困难最大，周期最长。为使化学化工专业学生缩短掌握本专业英语的周期和学习中少走弯路，我们选编了此书，并从1983年起在大学作为高年级学生化学专业英语教材试用了多年，一些中青年教师也作为自学教材进行了学习，一般反映对掌握专业英语颇有裨益。

本书词汇丰富，选材面较广，涉及无机化学（化学元素及注音，无机化合物命名，配位化合物和各种酸碱概念），有机化学（各类有机化合物及其命名，金属有机及高分子化合物），分析化学（包括气相色谱、红外光谱和核磁共振波谱），物理化学(化学热力学、动力学和电化学)，化工基础（单元操作，物料及能量衡算），并有附录二篇（化学实验室常用仪器和杂环化合物的命名），材料新颖，内容广泛，文体各异。每课词汇有注音、常用词组及一些构词规律，对一些语法现象亦进行了解释和概括，最后附有总词汇表。

全书包括课文四十课，其中正式课文三十课，另十课（标有*号）供有时间和感兴趣的读者作课外阅读材料，读者也可根据所学专业方向的不同，有针对性地选读其中的部分内容。

认真地学习本书不仅可以较熟练地阅读各类化学化工资料，而且可以用英语撰写各种稿件。

本文在编写和修改过程中得到许多同志的指导和帮助，特此表示谢意。

由于我们英语水平的限制，难免有不足之处和错误，盼望读者提出宝贵意见。

编　者

1987年9月于兰州

TABLE OF CONTENTS

LESSON ONE

THE ELEMENTS

The number of protons in the nucleus of an atom is referred to as the atomic number, or proton number, Z. The number of electrons in an electrically neutral atom is also equal to the atomic number, Z. The total mass of an atom is determined very nearly by the total number of protons and neutrons in its nucleus. This total is called the mass number, A. The number of neutrons in an atom, the neutron number, is given by the quantity A-Z.

The term element refers to a pure substance with atoms all of a singlekind. To the chemist the "kind" of atom is specified by its atomic number, since this is the property that determines its chemical behavior. At present all the atoms from Z = 1 to Z = 107 are known; there are 107 chemical elements. Each chemical element has been given a name and a distinctive symbol. For most elements the symbol is simply the abbreviated form of the English name consisting of one or two letters, for example:

oxygen = O nitrogen = N neon = Ne magnesium = Mg

Some elements, which have been known for a long time, have symbols based on their Latin names, for example:

iron = Fe (ferrum) copper = Cu (cuprum) lead = Pb (plumbum)

A few elements have symbols based on the Latin name of one of their compounds, the elements themselves having been discovered only in relatively recent times,[1] for example:

sodium = Na (natrium = sodium carbonate)

potassium = K (kalium = potassium carbonate)

A complete listing of the elements may be found in table 1.

In addition to identifying an element by its symbol, information on the composition of its atomic nuclei may be included along with the symbol.

$^{A}_{Z}X$ means: $^{14}_{7}N$ $^{16}_{8}O$ $^{24}_{12}Mg$ $^{32}_{16}S$ $^{56}_{26}Fe$ $^{207}_{82}Pb$ $^{238}_{92}U$ and so on.

What is represented by the symbol $^{A}_{Z}X$ is an atomic species called a nuclide of the element X, having an atomic number Z and a mass number A. One of the nuclides shown above, that of the element oxygen, is an atom with eight protons and eight neutrons in its nucleus and eight electrons outside the nucleus.

All atoms of a given element must have the same atomic number, but they may have different mass numbers. The different nuclides of an element are referred to collectively as isotopes of the element. In Section 2-7, where the discovery and characterization of isotopes was discussed, it was pointed out that there is one type of neon atom with a mass 22/20 as great as the predominant atomic species. Actually three different nuclides exist; there are three isotopes of neon, By symbol, these are $^{20}_{10}Ne$, $^{21}_{10}Ne$, and $^{22}_{10}Ne$. The natural abundances of these nuclides are 90.9, 0.3 and 8.8%, respectively. Sometimes the mass numbers of isotopes are incorporated into the names of elements, such as neon-20, carbon-12 and oxygen-16. In a neutral atom the number of electrons must be equal to the number of protons, Z. But if an atom either loses or gains electrons, it acquires a net electric charge; it becomes an ion. The species $^{20}_{10}Ne^{+}$ and $^{20}_{10}Ne^{2+}$ are ions. The first one has ten protons, ten neutrons, and nine electrons; the second, ten protons, ten neutrons, and eight electrons.

Table 1. IUPAC* Names and Symbols of the Elements

Name		Symbol	At.No.	汉语名
Actinium	[æk'tiniəm]	Ac	89	锕
Aluminum	[ə'lju, minəm]	Al	13	铝
Americium	[æmə'risiəm]	Am	95	镅
Antimony	['æntiməni]	Sb	51	锑
Argon	[ɑ:gɔn]	Ar	18	氩
Arsenic	['ɑ:snik]	As	33	砷
Astatine	['æstətin]	At	85	砹
Barium	['bɛəriəm]	Ba	56	钡
Berkelium	['bə:kliəm]	Bk	97	锫
Beryllium	[be'riljəm]	Be	4	铍
Bismuth	[,bizməθ]	Bi	83	铋
Boron	['bɔ:rɔn]	B	5	硼
Bromine	['broumi:n]	Br	35	溴
Cadmium	['kædmiəm]	Cd	48	镉
Calcium	['kælsiəm]	Ca	20	钙
Californium	[,kæli'fɔ:niəm]	Cf	98	锎
Carbon	['kɑ:bən]	C	6	碳
Cerium	['siəriəm]	Ce	58	铈
Cesium	['si:zjəm]	Cs	55	铯
Chlorine	['klɔ:rin]	Cl	17	氯

Chromium	[ˈkroumjəm]	Cr	24	铬
Cobalt	[kəˈbɔːlt]	Co	27	钴
Copper	[ˈkɔpə]	Cu	29	铜
Curium	[ˈkjuəriəm]	Cm	96	锔
Dysprosium	[disˈprousiəm]	Dy	66	镝
Einsteinium	[ainˈstainiəm]	Es	99	锿
Erbium	[ˈəːbiəm]	Er	68	铒
Europium	[juəˈroupiəm]	Eu	63	铕
Fermium	[ˈfəːmiəm]	Fm	100	镄
Fluorine	[ˈflu(ː)əriːn]	F	9	氟
Francium	[ˈfrænsiəm]	Fr	87	钫
Gadolinium	[gædəˈliniəm]	Cd	64	钆
Gallium	[ˈgæliəm]	Ga	31	镓
Germanium	[dʒəːˈmeiniəm]	Ge	32	锗
Gold	[ˈgould]	Au	79	金
Hafnium	[ˈhæfniəm]	Hf	72	铪
Helium	[ˈhiːljəm]	He	2	氦
Holmium	[ˈhɔlmiəm]	Ho	67	钬
Hydrogen	[ˈhaidrədʒən]	H	1	氢
Indium	[ˈindiəm]	In	49	铟
Iodine	[ˈaiədiːn]	I	53	碘
Iridium	[aiˈridiəm]	Ir	77	铱
Iron	[ˈaiən]	Fe	26	铁
Krypton	[ˈkriptɔn]	Kr	36	氪
Lanthanum	[ˈlænθənəm]	La	57	镧
Lawrencium	[lɔːˈrensiəm]	Lr	103	铹
Lead	[led]	Pb	82	铅
Lithium	[ˈliθiəm]	Li	3	锂
Lutetium	[ljuːˈtiːʃiəm]	Lu	71	镥
Magnesium	[mægˈniːziəm]	Mg	12	镁
Manganese	[ˌmæŋgəˈniːz]	Mn	25	锰
Mendeleoium	[mendəˈliviəm]	Md	101	钔
Mercury	[ˈməːkjuri]	Hg	80	汞
Molybdenum	[mɔlibˈdiːnəm]	Mo	42	钼
Neodymium	[niː(ː)əˈdimiəm]	Nd	60	钕
Neon	[ˈniːən]	Ne	10	氖
Neptunium	[nepˈtjuniəm]	Np	93	镎
Nickel	[ˈnikəl]	Ni	28	镍
Niobium	[naiˈoubiəm]	Nb	41	铌
Nitrogen	[ˈnaitridʒən]	N	7	氮
Nobelium	[nouˈbeliəm]	No	102	锘
Osmium	[ˈɔzmiəm]	Os	76	锇
Oxygen	[ˈɔksidʒən]	O	8	氧
Palladium	[pəˈleidiəm]	Pd	46	钯

Phosphorus	[ˈfɔsfərəs]	P	15	磷
Platinum	[ˈplætinəm]	Pt	78	铂
Plutonium	[pluːˈtounjəm]	Pu	94	钚
Polonium	[pəˈlouniəm]	Po	84	钋
Potassium	[pəˈtæsjəm]	K	19	钾
Praseodymium	[ˌpreiziouˈdimiəm]	Pr	59	镨
Promethium	[prəˈmiːθiəm]	Pm	61	钷
Protactinium	[proutækˈtiniəm]	Pa	91	镤
Radium	[ˈreidiəm]	Ra	88	镭
Radon	[ˈreidɔn]	Rn	86	氡
Rhenium	[ˈriːniəm]	Re	75	铼
Rhodium	[ˈroudiəm]	Rh	45	铑
Rubidium	[ruːˈbidiəm]	Rb	37	铷
Ruthenium	[ruːθiːniəm]	Ru	44	钌
Samarium	[səˈmɛəriəm]	Sm	62	钐
Scandium	[ˈskændiəm]	Sc	21	钪
Selenium	[siˈliːnjəm]	Se	34	硒
Silicon	[ˈsilikən]	Si	14	硅
Silver	[ˈsilvə]	Ag	47	银
Sodium	[ˈsoudjəm]	Na	11	钠
Strontium	[ˈstrɔnʃiəm]	Sr	38	锶
Sulfur	[ˈsʌlfə]	S	16	硫
Tantalum	[ˈtæntələm]	Ta	73	钽
Technetium	[tekˈniːʃiəm]	Tc	43	锝
Tellurium	[teˈljuəriəm]	Te	52	碲
Terbium	[ˈtəːbiəm]	Tb	65	铽
Thallium	[ˈθæliəm]	Tl	81	铊
Thorium	[ˈθɔːriəm]	Th	90	钍
Thulium	[ˈθjuːliəm]	Tm	69	铥
Tin	[ˈtin]	Sn	50	锡
Titanium	[tiˈteiniəm]	Ti	22	钛
Tungsten	[ˈtʌŋsten]	W	74	钨
Uranium	[juəˈreinjəm]	U	92	铀
Vanadium	[vəˈneidiəm]	V	23	钒
Xenon	[ˈzenɔn]	Xe	54	氙
Ytterbium	[iˈtəːbjəm]	Yb	70	镱
Yttrium	[ˈitriəm]	Y	39	钇
Zinc	[ˈziŋk]	Zn	30	锌
Zirconium	[zəːˈkouniəm]	Zr	40	锆

*IUPAC = International Union of Pure and Applied Chemistry.

国际纯粹化学和应用化学联合会

词　汇

element ['eliment] n.　元素
proton ['proutɔn] n.　质子
nucleus ['nju:kləs] 复 nuclei ['nju:kliai] n.　核
atomic [ə'tɔmik] a.　原子的
atomic number　原子序数
neutral ['nju:trəl] a.　中性的
mass [mæs] n.　质量
mass number　质量数
atom ['ætəm] n.　原子
neutron ['nju:trɔn] n.　中子
quantity ['kwɔntiti] n.　量，数量
term [tə:m] n.　术语，名称
kind [kaind] n.　种，类；性质
single kind　同一类
specify ['spesifai] vt.　指定，规定，详细说明
chemical ['kemikəl] a.　化学的
n.　化学品
distinctive [dis'tiŋktiv] a.　有区别的，不同的
symbol ['simbəl] n.　符号
abbreviate [ə'bri:vieit] vt.　缩写
Latin ['lætin] a. n.　拉丁语
identify [ai'dentifai] vt.　鉴别，识别
nuclide ['nju:klaid] n.　核素
net [net] a.　净的，纯粹的
ion ['aiən] n.　离子
atomic species　原子种
carbonate ['kʌbənit] n.　碳酸盐(酯)
sodium carbonate　碳酸钠
potassium carbonate　碳酸钾
collectively [kə'lektivli] ad.　归类，集体，共同
predominant [pri'dɔminənt] a.　主要的
isotope ['aisətoup] n.　同位素
abundance [ə'bʌndəns] n.　丰度
incorporate [in'kɔ:pəreit] v.　合并，混合
acquire [ə'kwaiə] vt.　获得

词　组

referred to as…　称为……，被认为是……
equal to…　等于，与……相等
refer to…　涉及，指的是
(be) abbreviated from…是……的缩写，是……之略
consist of…　由……组成
(be) based (up) on…　根据……，以……为准
in addition to…　除……外
along with　与……一道

课 文 注 释

1. A few elements have symbols based on the Latin name of one of their compounds, the elements themselves having been discovered only in relatively recent times. 该句中，" A few elements…compounds，" 是主句，" the elements…recent times，" 系独立主格结构，用作附加说明，本句译文："一些元素的符号是由它们的

一种化合物的拉丁语名称命名的，而这些元素本身相对来说是近代才发现的。”

2. What is represented by the symbol ${}^{A}_{Z}X$ is an atomic species called anuclide of the element X, having an atomic number Z and a mass number A. 该复合句中，"what is … symbol ${}^{A}_{Z}X$ "是主语从句，what是连接代词，即the element which. "called a nuclide of the element X "为过去分词短语作atomic species的定语，"having … number A"是现在分词短语，作 the element X 的定语，本句译文："符号${}^{A}_{Z}X$所代表的是一个叫做元素X核素的原子种，该元素具有原子序数Z和质量数A。”

句中${}^{A}_{Z}$读法如下：

（1）此处读作 “X having an atomic number Z and a mass number A.”

（2）一般读法 “X with left subscript Z and (left) superscript A.”

LESSON TWO

THE PERIODIC TABLE

Beginning in the late seventeenth century with the work of Robert Boyle, who proposed the presently accepted concept of an element, numerous investigations produced a considerable knowledge of the properties of elements and their compounds[1]. In 1869, D. Mendeleev and L. Meyer, working independently, proposed the periodic law. In modern form, the law states that the properties of the elements are periodic functions of their atomic numbers. In other words, when the elements are listed in order of increasing atomic number, elements having closely similar properties will fall at definite intervals along the list. Thus it is possible to arrange the list of elements in tabular form with elements having similar properties placed in vertical columns[2]. Such an arrangement is called a periodic table.

Each horizontal row of elements constitutes a period. It should be noted that the lengths of the periods vary. There is a very short period containing only 2 elements, followed by two short periods of 8 elements each, and then two long periods of 18 elements each[3]. The next period includes 32 elements,

and the last period is apparently incomplete. With this arrangement, elements in the same vertical column have similar characteristics. These columns constitute the chemical families or groups. The groups headed by the members of the two 8-element periods are designated as main group elements, and the members of the other groups are called transition or inner transition elements.

In the periodic table, a heavy stepped line divides the elements into metals and nonmetals. Elements to the left of this line (with the exception of hydrogen) are metals, while those to the right are nonmetals. This division is for convenience only; elements bordering the line——the metalloids-have properties characteristic of both metals and nonmetals[4]. It may be seen that most of the elements, including all the transition and inner transition elements, are metals.

Except for hydrogen, a gas, the elements of group IA make up the alkali metal family. They are very reactive metals, and they are never found in the elemental state in nature. However, their compounds are widespread. All the members of the alkali metal family form ions having acharge of 1+only, In contrast, the elements of group IB—copper, silver, and gold—are comparatively inert. They are similar to the alkali metals in that they exist as 1+ ions in many of their compounds. However, as is characteristic of most transition elements, they form ions having other charges as well[5].

The elements of group IIA are known as the alkaline earth metals. Their characteristic ionic charge is 2+. These metals, particularly the last two members of the group, are almost as reactive as the alkali metals. The group IIB elements—zinc, cadmium, and mercury are less reactive than are those of group IIA[6], but are more reactive than the neighboring elements of group I B. The characteristic charge on their ions is also 2+.

With the exception of boron, group IIIA elements are also fairly reactive metals. Aluminum appears to be inert toward reaction with air, but this behavior stems from the fact that the metal forms a thin, invisible film of aluminum oxide on the surface, which protects the bulk of the metal from further oxidation[7]. The metals of group IIIA form ions of 3+ charge. Group IIIB consists of the metals scandium, yttrium, lanthanum, and actinium.

Group IVA consists of a nonmetal, carbon, two metalloids, silicon and germanium, and two metals, tin and lead. Each of these elements forms some compounds with formulas which indicate that four other atoms are present per group IVA atom, as, for example, carbon tertachloride, CCl_4. The group IV B metals—titanium, zirconium, and hafnium—also form compounds in which each group IVB atom is combined with four other atoms; these compounds are nonelectrolytes when pure.

The elements of group VA include three nonmetals—nitrogen, phosphorus,

and arsenic—and two metals—antimony and bismuth. Although compounds with the formulas N_2O_5, PCl_5, and $AsCl_5$ exist, none of them is ionic. These elements do form compounds—nitrides, phosphides, and arsenides—in which ions having charges of minus three occur. The elements of group VB are all metals. These elements form such a variety of different compounds that their characteristics are not easily generalized.

With the exception of polonium, the elements of group VIA are typical nonmetals. They are sometimes known as the chalcogens, from the Greek word meaning "ash formers"[8]. In their binary compounds with metals they exist as ions having a charge of 2-. The elements of group VII A are all nonmetals and are known as the halogens, from the Greek term meaning "salt formers." They are the most reactive nonmetals and are capable of reacting with practically all the metals and with most nonmetals, including each other.

The elements of groups VIB, VIIB, and VIIIB are all metals. They form such a wide variety of compounds that it is not practical at this point to present any examples as being typical of the behavior of the respective groups[9].

The periodicity of chemical behavior is illustrated by the fact that, excluding the first period, each period begins with a very reactive metal. Successive elements along the period show decreasing metallic character, eventually becoming nonmetals, and finally, in group VIIA, a very reactive nonmetal is found[10]. Each period ends with a member of the noble gas family.

词　汇

accept [ək'sept] vt.　接受，承认
concept ['kɔnsept] n. 概念
compound [kəm'paund] n. 化合物
property ['prɔpəti] n. 性质，特性
periodic [piəri'ɔdik] a. 周期的
periodic table　周期表
periodic law　周期律
state [steit] vt. 说明，认为
function ['fʌŋkʃən] n. 官能；函数
definite ['definit] a. 明确的，一定的
interval ['intəvəl] n. 间隔，空隙
arrange [ə'reindʒ] vt. -ment n. 安排，排列
tabular ['tæbjulə] a. 表的
vertical ['və:tikəl] a. 竖的，垂直的
column ['kɔləm] n. 柱，塔；纵列
horizontal [hɔri'zɔntl] a. 水平的；横式的
row [rou] n. 排，横列
period ['piəriəd] n. 周期
vary ['vɛəri] v. n. 改变，变化
incomplete [inkəm'pli:t] a. 不完全的，不完整的
apparently [ə'pærəntli] ad. 显然
family ['fæmili] n. （周期表的）族
group [gru:p] n. 族，基，团；vt. 把……分成组

designate ['dezigneit] vt. 指出，把…叫做
transition [træn'ziʃən] n. 过渡，转变
division [di'veiʒən] n. 区分，划分
border ['bɔ:də] v. 邻近，邻接
metaloid ['metəlɔid] n. 准金属
characteristic [kæriktə'ristik] n.a. 特性，特点
alkali ['ælkəlai] n. 碱
alkali metal 碱金属
reactive [ri'æktiv] a. 活泼的，反应的
widespread ['waidspred] a. 广泛的，广布的
elemental [ˌeli'mentl] a. 元素的；基本的
charge [tʃɑ:dʒ] n. 电荷；vt. 使…带电
comparatively [kəm'pærətivli] ad. 比较，稍稍
inert [i'nə:t] a. 惰性的，不活泼的
coinage ['kɔinidʒ] n. 造币，货币
ionic [ai'ɔnik] a. 离子的
alkaline ['ælkəlain] a. 碱的
alkaline earth metal 碱土金属
fairly ['fɛəli] ad. 十分，相当
stem [stem] vi 起源，产生（from, out of）
thin [θin] a. 薄的，稀薄的 n. 薄层
invisible [in'vizəbl] a. 肉眼看不见的
film [film] n. 膜，胶片
oxide ['ɔksaid] n. 氧化物
aluminum oxide 氧化铝
surface ['sə:fis] n. a. 表面
formula ['fɔ:mjulə] n. 分子式，公式
bulk [bʌlk] n. 躯体，主体；大部分，大量
oxidation [ɔksi'deiʃən] n. 氧化
carbon tetrachloride 四氯化碳
combine [kəm'bain] v. 化合，结合（with）
non-electrolyte ['nɔn-i'lektrəlait] n. 非电解质
nitride ['naitraid] n. 氮化物
phosphide ['fɔsfaid] n. 磷化物
arsenide ['ɑ:sinaid] n. 砷化物
minus ['mainəs] a. 负的 n. 负号，负量
generalize ['dʒənərəlaiz] v. 概括，归纳
typical ['tipikəl] a. 典型的
chalcogen ['kælkədʒən] n. 硫属，硫族
ash former [æʃ 'fɔ:mə] 灰源体，成灰（者）
binary ['bainəri] a. n. 二元（的），双（的）
halogen ['hælədʒən] n. 卤素
salt former [sɔ:lt 'fɔ:mə] 盐源体，成盐（者）
periodicity [piəriə'disiti] n. 周期性
illustrate ['iləstreit] vt. 说明，举例说明
exclude [iks'klu:d] vt. 排除，隔绝
eventually [i'ventjuəli] ad. 终于

前 缀

in- [in-] 不，非；incomplete, invisible
non- [nɔn-] 非，nonmetal, nonelectrolyte
di- [dai-] 二，双，dipositive
tetra- [tetre-] 四，tetrachloride

后 缀

-ment [-mənt] 过程，结果，状态（名词词尾）arrangement
-ly [-li] 程度，性质（副词词尾）apparently
-ic [-ik] …的（形容词词尾）periodic, ionic
-ide [-aid] …化物（名词词尾）

oxide, chloride, hydride

词 组

begin with… 从……开始
in modern form 按近代方式
a function of 随……而变，…的函数
in other words 换句话说
in order of… 按……（排列）
followed by… 接着，继之有，后面是
main group element 主族元素
for convenience 为方便起见
divide A into B and C 把A分成B和C
with the exception of… 除……之外
except for… 除……之外
make up… 形成，组成
in contrast 相反，与此对比
similar to… 类似于
exist as… 以［……形式］存在
…as well ［同样］也
known as 就是通常说的……，以……著称
protect A from B 保护A不受B…［影响］；使A免于B
composed of… 由……组成
to some extent 在某种程度上
a variety of…各种各样
capable of (+ing) 能够……，有……可能

课 文 注 释

1. beginning in the late seventeenth century with the work of Robert Boyle, who proposed the presently accepted concept of an element, numerous investigations produced a considerable knowledge of the properties of elements and their compounds. 其中"numerous investigations … compounds."为主句，Beginning 引导的分词短语是表示时间的状语，"who…an element"是修饰 Robert Boyle的定 语从句。本句译文："早在十七世纪末期，罗伯特·波义耳就开始了这项工作，他提出了现在公认的元素概念，大量的研究使我们对元素及其化合物的性质有了相当的了解。"
2. Thus it is possible to arrange the list of elements in tabular form with elements having similar properties placed in vertical columns. 该句中 it 是形式 主语，代替"to arrange…columns." 不定式短语，此短语中 with elements…columns 是独立主格结构作方式状语，修饰arrange。译文："于是，将具有类似性质的元素排成纵 列，从而把元素排成表格形式是可能的。"
3. each：在此处作副词，一般在句子末尾，意思是"每个"，"各（个地）"，也用作形容词和代词，如"each horizontal row" 和 "each of these elements"。
4. This division…and nonmetals:系并列句，第二个分句中"characteristic of both metals"是形容词后带有介词＋名词的补足语，作后置定语，修饰properties.
5. However, as is characteristic of most transition elements, they form ions having other charges as well. 这里"they form…as well" 是主句，"as is…elements" 是关系代词 as 引导的定语从句，修饰整个句子，as 本身在从句中作 主 语。本句译文："然而，象许多过渡元素所具有的特点一样，它们也形成具有其它电荷的离子。"
6. than are those of group IIA:Than 后的从句，有时主、谓语颠倒。

7. Aluminum appears to be inert toward reaction with air, but this behavior stems from the fact that the metal forms a thin, invisible film of aluminum oxide on the surface, which protects the bulk of the metal from further oxidation." Aluminum appears…air," 与"but this… further oxidation." 为并列复合句，在后一并列句中 that 引出的同位语从句是 fact 的同位语，which引导的定语从句修饰 invisible film. 本语译文："铝与空气的反应显出是惰性的，这种行为是由于在该金属表面形成薄的、肉眼看不见的氧化铝薄膜，这一薄膜保护金属本身不被进一步氧化。"

8. from the Greek word meaning "ash formers":是同位语短语，说明the chalcogens.

9. They form such a wide variety of compounds that it is not practical at this point to present any examples as being typical of the behavior of the respective groups. "They form…compounds"是主句，"that it is…句末"是 that引起的结果状语从句，从句中as+现在分词短语 "being…groups" 是 examples 的定语。译文："它们形成了各种不同的化合物，在这一点上我们甚至不能举出任何能表现各族元素典型变化的例子。"

10. successive elements along… nonmetal is found. 系并列复合句，第一分句"successive…nonmetals"其中"decreasing metallic character, "和"eventually becoming nonmetals"为并列的两个动名词短语，作该句及物动词 show 的宾语，第二分句是"and finally… is found. "

LESSON THREE

THE NONMETAL ELEMENTS

We noted earlier that nonmetals exhibit properties that are greatly different from those of the metals. As a rule, the nonmetals are poor conductors of electricity (graphitic carbon is an exception) and heat; they are brittle, are often intensely colored, and show an unusually wide range of melting and boiling points. Their molecular structures, usually involving ordinary covalent bonds, vary from the simple diatomic molecules of H_2, Cl_2, I_2, and N_2 to the giant molecules of diamond, silicon, and, boron.

The nonmetals that are gases at room temperature are the low-molecular-weight diatomic molecules and the noble gases that exert very small inter-