

外教社——麦克米伦中学双语教材系列

化学

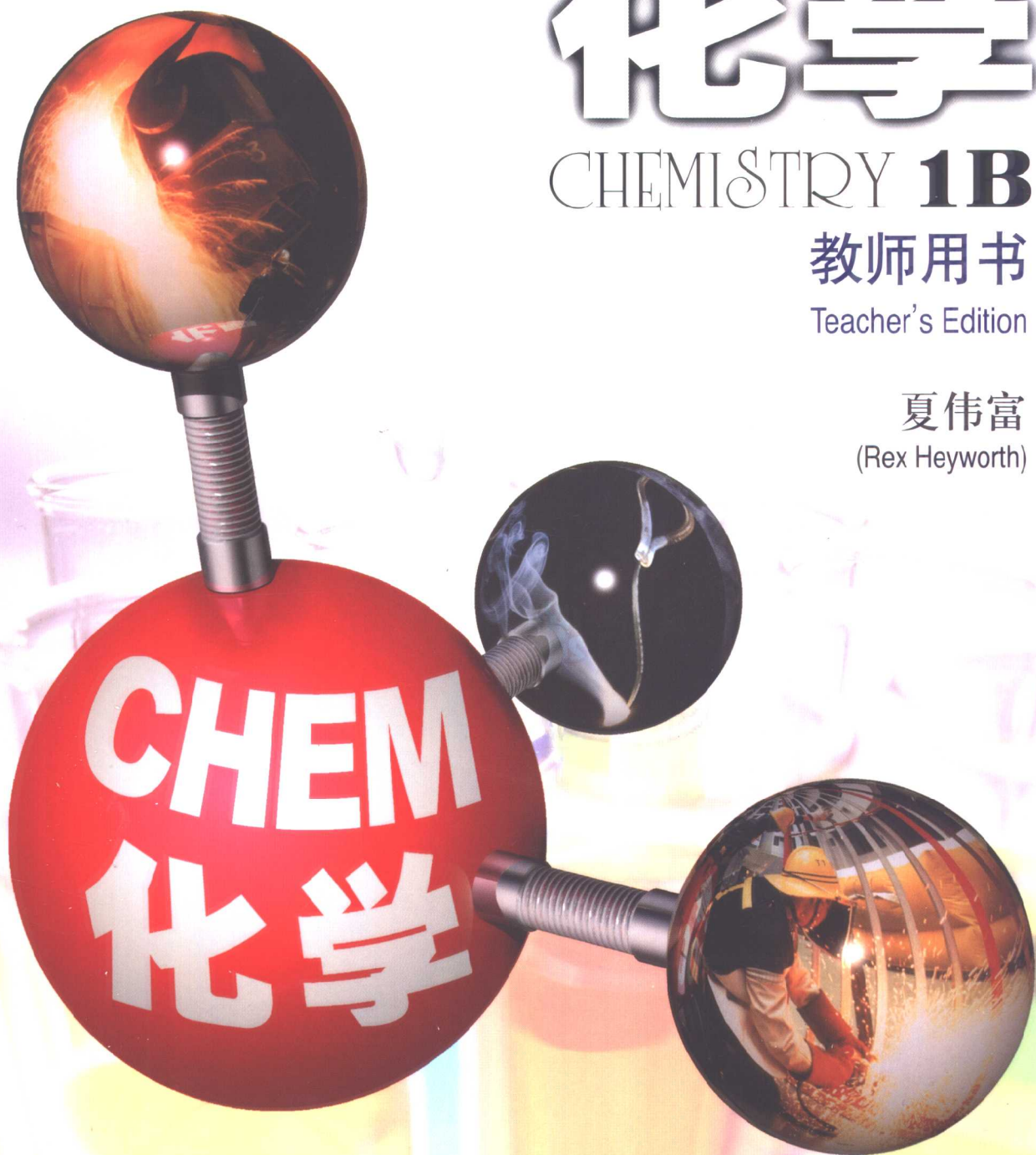
CHEMISTRY **1B**

教师用书

Teacher's Edition

夏伟富

(Rex Heyworth)



上海外语教育出版社



SHANGHAI FOREIGN LANGUAGE EDUCATION PRESS



CHINESE LITERATURE

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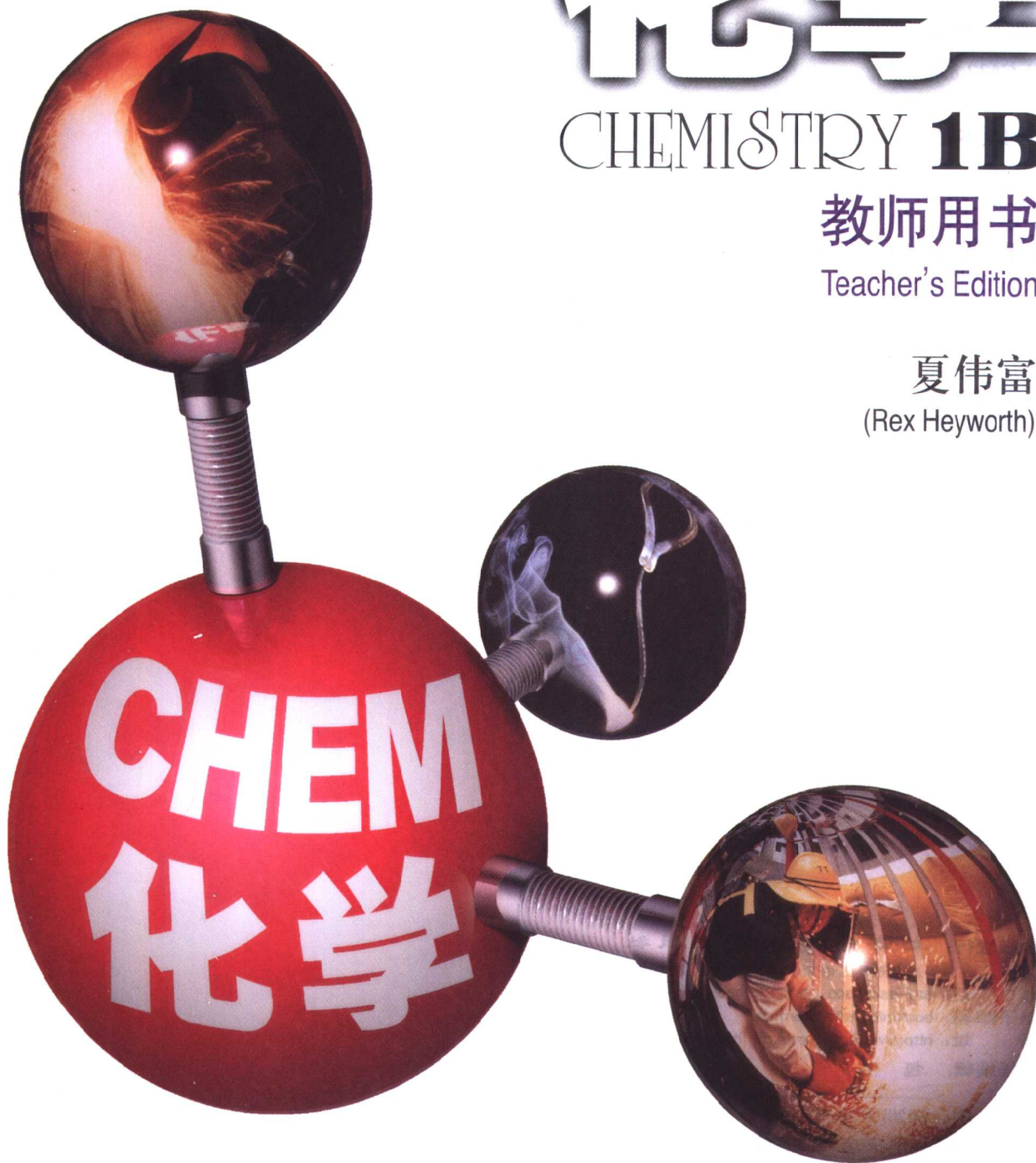
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出版前言

双语教育以外语作为学科的教学语言,直接进行学科知识的教学。这种新的教学尝试引起了教育主管部门、教育工作者、外语专家以及成千上万学子和家长的关注。随着对外开放的不断深入以及成功加入WTO,我国在经济、科技、教育等领域全面步入国际舞台,在更大范围内和更深层次上参与国际竞争,这对我们人才培养的规模和规格提出了崭新的要求。为了培养能够熟练运用外语吸收先进科技知识、参与国际交流的人才,基础教育的改革势在必行。双语教育对教师、学生、教育研究人员以及教育服务机构都是一种新的挑战。这种新的教学方法要取得成功,需要大胆而又科学的摸索与实践,也需要教师、学生、教育研究人员和教育服务机构各方的协同努力。

作为外语教育出版领域的专业出版社,外教社秉承一贯“全心致力中国外语教育事业的发展”的宗旨,为更好地推动双语教育,抓住时机,经过精心策划,从众多的双语教材中选择了原由麦克米伦出版社出版、在我国香港地区广泛使用的教材,供大陆地区进行双语教育试验的学校使用。本套《外教社—麦克米伦中学双语教材系列》主要有以下特点:

1. 英语语言纯正流畅,适合中学生水平,学生可以比较轻松地掌握学科知识,并在学习的过程中不知不觉地提高英语应用能力。
2. 教学内容丰富,编写体系完整,例证贴近生活,注重跨学科教育。
3. 版式活泼,插图精美,表格详细,各种知识的表现更加直观易懂,从而提高学生兴趣,增强教学效果。
4. 注意现代化教学手段的运用。页边空白处列出与授课内容相关的网址,为学生了解更多相关知识提供了有益的参考。
5. 教师用书英汉对照,采用和合页形式,便于教师授课。教师授课提示单独用红色标出。

尽管可能在编写体系、知识结构、学科内容等方面与大陆地区传统学科教学稍有不同之处,我们相信本套教材纯正地道的英语、丰富的课程资源以及全新的教学理念会对大陆地区的双语教育产生良好的推动作用。

本套教材可供有较好英语基础的双语学校、国际学校、外国语学校以及重点中学进行双语教学使用。

本教材承蒙上海外国语大学双语学校的李秀萍、朱卫、周丽华、余杲然老师仔细审读,在此表示衷心的感谢。同时也欢迎使用本套教材的师生向我们提出宝贵意见。

上海外语教育出版社
2003年5月

引进说明

《外教社—麦克米伦中学双语教材系列 化学》由我社从麦克米伦出版社引进出版。为适应我国双语教学实际情况，特对原系列图书做了一些改进。现将一些需要说明的地方列举如下，以方便使用：

1. 教师用书除少数内容外，为中英对照形式，左右页码相同，但是页码后加 a、b 区分，其中 a 页英文页对应学生用书，b 页则为 a 页中文译文，方便教师授课。
2. 习题中题号带“*”的为香港历年中学会考题，仅供参考，不作正式要求，不另提供答案。
3. 在学生用书和教师用书的英文部分特别增加了某些单词的构词法解析，以利于学生了解英文词源，帮助学生记忆和扩展词汇。
4. 学生用书篇末综合复习题中设计有英文词汇练习、填词游戏等，而教师用书中文对应部分则提供中文专业词汇训练和配对练习。
5. 本教材中一些内容的表述角度、描述方式、少数概念的定义与大陆化学通用教材略有出入，但本质相通，不造成理解障碍，且因为教材编写体系严谨，契合严密，故引进后未作较大改动。此外，本教材中的金属活动性顺序表将钠排在钙的前面，大陆化学教材中则是钙在钠的前面。由于钠和钙的性质极其相似，各家解释不一。教师在授课过程中可以参照大陆化学教材相应内容和最新科研学术成果，进行比较介绍。

Periodic table of elements

Period	Group I	Group II	TRANSITION METALS																Group III	Group IV	Group V	Group VI	Group VII	Group 0												
1			1 1.0 H Hydrogen (g)																5 10.8 6 B Boron	12 7 C Carbon	14 28.1 Si Silicon	15 31.0 P Phosphorus	16 32.1 S Sulphur	17 35.5 Cl Chlorine (g)	18 39.9 Ar Argon (g)											
2	3 6.9 4 Li Lithium	9.0 Be Beryllium																	13 27.0 Al Aluminium	31 69.7 Ga Gallium	32 72.6 Ge Germanium	33 74.9 As Arsenic	34 79.3 Se Selenium	35 80.0 Br Bromine (l)	36 83.8 Kr Krypton (g)											
3	11 23.0 Na Sodium	24.3 Mg Magnesium																	21 45.0 Sc Scandium	22 47.9 Ti Titanium	23 50.9 V Vanadium	24 52.0 Cr Chromium	25 54.7 Mn Manganese	26 55.8 Fe Iron	27 58.9 Co Cobalt	28 58.7 Ni Nickel	29 63.5 Cu Copper	30 65.4 Zn Zinc	31 69.7 Ga Gallium	32 72.6 Ge Germanium	33 74.9 As Arsenic	34 79.3 Se Selenium	35 80.0 Br Bromine (l)	36 83.8 Kr Krypton (g)		
4	19 39.1 K Potassium	40.1 Ca Calcium																	39 88.9 Y Yttrium	40 91.2 Zr Zirconium	41 92.9 Nb Niobium	42 95.5 Mo Molybdenum	43 (98) Tc Technetium	44 101.1 Ru Ruthenium	45 102.9 Rh Rhodium	46 106.4 Pd Palladium	47 107.9 Ag Silver	48 112.4 Cd Cadmium	49 114.8 In Indium	50 118.7 Sn Tin	51 121.8 Sb Antimony	52 127.6 Te Tellurium	53 127.0 I Iodine	54 131.3 Xe Xenon (g)		
5	37 85.5 Rb Rubidium	87.6 Sr Strontium																	[57 – 71] Lanthanides	72 178.5 Hf Hafnium	73 180.9 Ta Tantalum	74 183.0 W Tungsten	75 186.2 Re Rhenium	76 190.2 Os Osmium	77 192.2 Ir Iridium	78 195.1 Pt Platinum	79 197.0 Au Gold	80 200.6 Hg Mercury (l)	81 204.4 Tl Thallium	82 207.2 Pb Lead	83 209.0 Bi Bismuth	84 (209) Po Polonium	85* (210) At Astatine	86 (222) Rn Radon (g)		
6	55 132.9 Cs Caesium	137.3 Ba Barium																	[89 – 103] Actinides	104*(261) Rf Rutherfordium	105*(262) Db Dubnium	106*(263) Sg Seaborgium	107*(264) Bh Bohrium	108*(265) Hs Hassium	109*(266) Mt Meitnerium	110* Uun	111* Uuu	112* Uub	113* Uut							
7	87 (223) Fr Francium	226.0 Ra Radium																	117 (293) Ts Tennessine	118 (294) Og Oganesson																

state of element at room temperature and pressure
(g) gas
(l) liquid
no entry – solid

atomic mass

symbol

name

atomic number

8 16.0 O Oxygen (g)

metal

metalloid

non-metal

* – element does not occur naturally (man-made element)

Note: element 110 and above are given a temporary IUPAC nomenclature; element 113 has not yet been discovered but is included in the table at its expected position.

57 138.9 La Lanthanum	58 140.1 Ce Cerium	59 140.9 Pr Praseodymium	60 144.2 Nd Neodymium	61* (145) Pm Promethium	62 150.4 Sm Samarium	63 152.0 Eu Europium	64 157.3 Gd Gadolinium	65 158.9 Tb Terbium	66 162.5 Dy Dysprosium	67 164.9 Ho Holmium	68 167.3 Er Erbium	69 168.9 Tm Thulium	70 173.0 Yb Ytterbium	71 175.0 Lu Lutetium
89 227.0 Ac Actinium	90 232.0 Th Thorium	91 231.0 Pa Protactinium	92 238.0 U Uranium	93* 237.0 Np Neptunium	94* (244) Pu Plutonium	95* 243.0 Am Americium	96* 247 Cm Curium	97* (247) Bk Berkelium	98* (251) Cf Californium	99* (252) Es Einsteinium	100* (257) Fm Fermium	101* (258) Md Mendelevium	102* (259) No Nobelium	103* (260) Lr Lawrencium

元素周期表

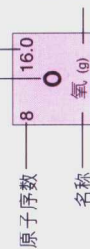
周期	第Ⅰ族	第Ⅱ族	第Ⅲ族
1			
2	3 Li 锂	6, 9, 4 Be 铍	9, 0
3	11 Na 钠	23, 0, 12 Mg 镁	24, 3
4	19 K 钾	39, 1, 20 Ca 钙	40, 1
5	37 Rb 铷	85, 5, 38 Sr 锶	87, 6
6	55 Cs 铯	132, 9, 56 Ba 钡	137, 3
7	87 Fr 钫	(223) Ra 镭	226, 0

11.0H氢(g)										510.86C碳										12714.08N氮(g)										1619.01020.2F氟(g)										24.0He氦(g)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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89	Ac 锕	227.0	90	Th 钍	232.0	91	Pa 镤	231.0	92	U 铀	238.0	93*	Np 镎	237.0	94*	Pu 钚	(244)	95*	Am 镅	243	96*	Cm 镬	(247)	97*	Bk 锫	(247)	98*	Cf 锎	(251)	99*	Es 锿	(252)	100*	Fm 镄	(258)	101*	Md 镻	(258)	102*	No 镎	(259)	103*	Lr 镗	(260)

原子质量

符号



元素在室温时和常压下

的状态

(g) 气体

(1) 液体——(没有注明——固体)

順金



金半



風金井



* 不是天然的元素 (人造元素)

注意：编号110及以上的元素是根据国际纯化学及应用化学学会的命名法暂时命名；编号113的元素尚未被发现。

Preface

The course

The course consists of the following:

- two textbooks for students. They are both divided into two sections, book A and book B.
- two activity books (book 1 and 2) for students
- teacher's editions of the textbooks and activity books

The textbooks

Great attention has been paid to the presentation of the textbooks. Special features include:

- Careful choice of vocabulary, with use of Chinese terms to facilitate student comprehension.
- Full-colour diagrams and illustrations to maximize students' attention and interest.
- Study tips for students to aid learning.
- Cross reference to material in other parts of the book and to related material in other subjects, e.g. Biology and Physics.
- Carefully constructed examination-type questions to reflect the new emphasis of the syllabus.
- Full solutions to end-of-chapter questions.
- Material of social relevance.
- Techniques from educational psychology shown to be effective in facilitating learning and understanding. These techniques are found in a special students' introduction, in innovative chapter summaries, in section reviews and in margin references.
- 'Chemistry and Us' sections which stimulate interest and develop an appreciation of chemistry and its application in daily life.
- I.T. on the net sections provide web-sites for further information on selected topics.

The teacher's editions of the textbooks have been designed to maximize the usefulness of the textbooks. They include **(a)** margin notes for use in lessons, and **(b)** answers to the in-text questions.

前言

课程

本套教材包括：

- 学生课本 1A、1B 及 2A、2B
- 化学实验手册第一册及第二册
- 课本及实验手册的教师用书

课本

本书的编写经过细心安排，其特点包括：

- 叙述简洁、资料充实。
- 内容包含与社会实际环境有关材料。
- 加插彩色照片和图表，以吸引学生的注意力，并提高其学习兴趣。
- 附有“学习提示”一栏，有助学生学习。
- 附有“多了解一点”一栏，列出其他学科的相关资料，例如生物学和物理学，供学生相互参照。
- 附有“化学与我们”一栏，让学生看到化学知识如何应用在日常生活中，增加学生的学习兴趣。
- 精心编写的课后练习。
- 章末的练习题（除带“*”的香港中学会考试题及详答题外）全部附有答案。
- “网上资讯”一栏提供有关课题的网址。

《教师用书》为教师提供辅助资料，包括在页边空白处加有上课时用的注释及课堂练习题的答案。

The activity books

The basis of the course is the work in the activity books. They are designed mainly for small-group work and to help students think for themselves as much as possible. Special features include the following:

- The use of hazard warning symbols and safety warnings for experimental work.
- A variety of innovative activities to develop process skills including: decision-making exercises, problem-solving investigations, experimental design tasks, discussions or debates, data/information collection and communication tasks such as short talks.

The teacher's editions of the activity books provide (a) overlays of model answers for each activity, and (b) lists of apparatus and materials needed for preparing the activities. These books will therefore be of great use to both teachers and laboratory technicians.

实验手册

本手册包含化学的基本概念。主要为小组活动而编写，也希望能启发学生多思考问题，其特点如下：

- 实验过程中危险警告标签的辨认和安全告示。
- 各项新颖活动能提高学生处理问题的能力，包括：训练学生作出判断、解决问题、设计实验、讨论或辩论、收集和交换数据／信息等。

实验手册的《教师用书》提供(a)活动的标准答案和(b)活动所需的装置和材料，所以对教师和实验室技术员的用处很大。

Acknowledgements

The author and publishers wish to thank the following for permission to use photographs:

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Paul Brierly

Sammy Ho

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致谢

本书蒙下列机构及人士提供图片，谨此致谢。

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我们非常感谢香港考试局同意翻印历届香港中学会考化学科的试题。

Student's notes – learning with the textbook

When we read a textbook, we want to understand and remember ideas. What is the best way to do this? Many students use repetition. This is not a good way. Repeating sentences sometimes helps us to remember. But it does not help us to understand.

The best way to remember is to understand. And the best way to understand is to think deeply about what we read. Some ways of doing this are described below.

How can we learn terms and their meanings?

Here are some ways to understand and remember terms. They work because they make us think deeply.

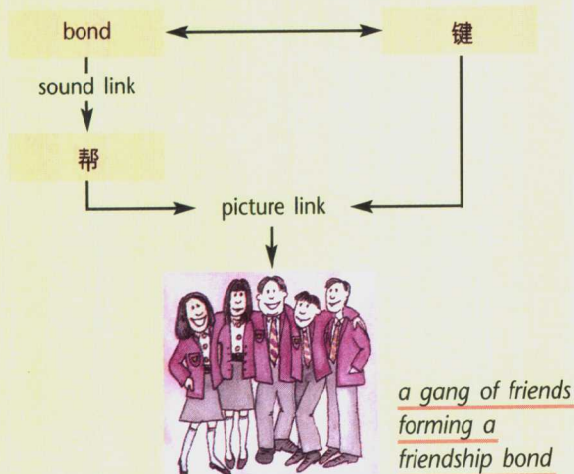
To remember chemical terms

Here is a useful method if you also know the Chinese word for a term. Do this:

- 1 Think of a Chinese word with a similar sound to the English chemical term.
- 2 Think of a picture to link this sound word with the Chinese word. Use any picture. Silly or weird pictures are often the best because these tend to stick in the mind.

EXAMPLE 1

To remember the chemical term 'bond'.



To remember the picture is easy. From the picture, you can recall the chemical term.

To remember meanings of chemical terms

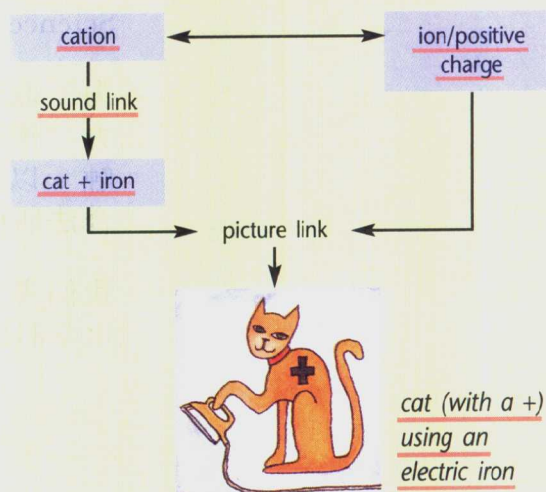
This is similar to the previous method. First, understand the meaning. Then do this:

- 1 Think of a familiar Chinese or English word with a similar sound.
- 2 Make a picture link using some or all of the meaning.

EXAMPLE 2

To remember the meaning of the term 'cation'.

A cation is an ion with a positive charge.



Word analysis

Many terms in chemistry are made of smaller parts joined together. Each part has a meaning. The parts can help us to work out the meaning of the term. 'Word analysis' gives a list of many common word parts. Also, 'STUDY TIPS' throughout the book gives you help.

EXAMPLE 3

What is the meaning of the term 'dehydrate'?

Dehydrate consists of the parts 'de-' and '-hydrate'.

From Word analysis, 'de-' = reverse, opposite to

'-hydr' = water

So,

hydrate = adding water

dehydrate = removing water

Sets of related words

Many words are related to other words. When possible, learn sets of related words. The study tips will help you. For example in Chapter 11:

electrolysis (noun)
electrolyte (noun)
electrode (noun)
electrolytic (adjective)
to electrolyse (verb)

To remember lists of words

Sometimes we need to remember a list of words. One way is to make a sentence with the words, or with the first letters of the words.

EXAMPLE 4

To remember the names and symbols of the first nine elements. Consider this sentence:

Harry Heung Likes Beef But Candy Ng Orders Fish.

As this sentence is easy to remember, we can recall the symbols and the names for the elements. For example, Harry gives H (hydrogen), Fish gives F (fluorine).

EXAMPLE 5

Suppose you read the words in the box below. The ideas around the box are examples of elaboration.

Related words –
e.g. electrolysis

Meaning of this word

Example –
lead(II) bromide → lead + bromine

Electrolytes Substances that **conduct** electricity when **molten** or in aqueous solution (i.e. dissolved in water). During conduction, they **decompose**. **Compounds** made of metals and non-metals are **electrolytes**.

Examples –
sodium chloride,
lead(II) bromide,
copper(II) sulphate

Previous work – metals
conduct electricity but
they are not electrolytes

Elements cannot be
electrolytes

How can we understand ideas?

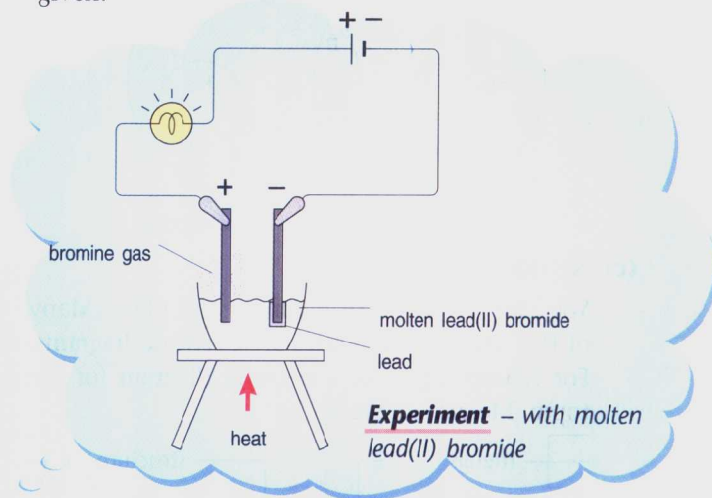
Understanding involves joining ideas together. Here are three ways to do this joining.

Elaboration

When you read something, think of other ideas related to the ideas in the text. You can:

- think of *examples*
- think of *diagrams* or *pictures*; you can even make your own mental pictures
- recall *experiments*
- join the ideas to work in *other subjects*, e.g. Biology, EPA
- recall *previous work*

The book helps you to elaborate by reminding you to 'THINK ABOUT' information from other subjects. References to 'MORE ABOUT' the subject are also given.



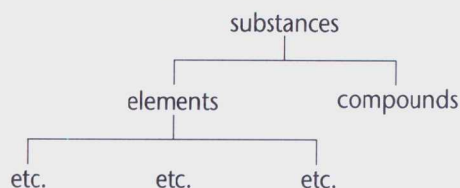
Experiment – with molten lead(II) bromide

Organization

Organizing ideas also helps understanding. Some ways used in this book are shown below. Use these examples to help when you make your own organization.

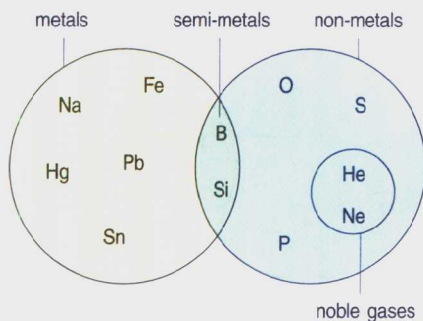
(a) Tree diagrams

For example, for a classification of substances (see the summary for Chapter 1).



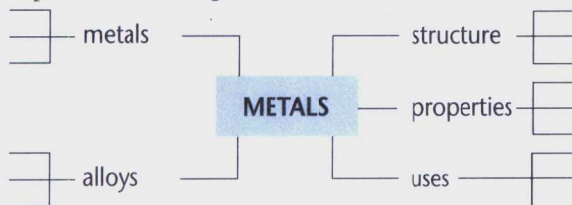
(b) Set diagrams

For example, for groups of elements (see Book 1A, page 6).



(c) Network diagrams

You can use these to organize any ideas. Many of the chapter summaries are network diagrams. For example, part of a network diagram for the topic 'Metals' might be:

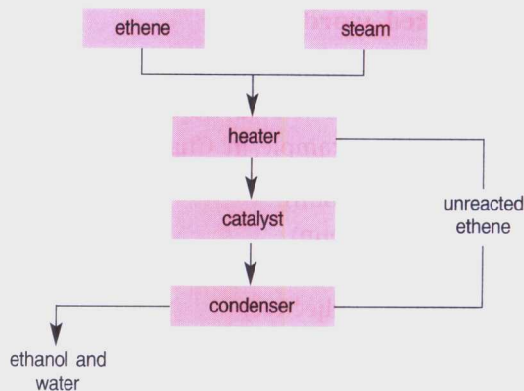


(d) Tables

A lot of information in Science is organized into tables. This book contains many tables. For example, look at the table in Chapter 5 for the structures of substances (see Book 1A, page 114).

(e) Flow charts

Flow charts are useful when one idea follows another. For example, in Chapter 18 we use a flow chart to explain the manufacture of ethanol (see Book 2A, page 139).



Reorganization

When something is organized one way, try to organize it another way. This will make your understanding even better. For example:

- If you have a table, reorganize it as a network diagram.
- Use the ideas in a network diagram to write sentences.

How can we study a chapter?

Here are three steps to follow when you study a chapter in the book.

Preview

To get an idea of what you will learn:

- Look at the headings in the chapter.
- Look at the summary.

Study each section

- Look at each heading. Many are in the form of questions. Think of other questions.
- Read the section. Underline important parts.
- Think deeply about the section. For example, use word analysis, elaboration.
- Answer the questions given. Also try to answer your own questions. This is important. If you cannot answer a question, study the section again.

Review

After you finish the chapter:

- Study the summary. Try to recall the ideas without looking at the summary.
- Try some of the examination-type problems at the end of the chapter.