外教社——麦克米伦中学双语教材系列

化学

CHEMISTRY 2B

学生用书

Student's Edition

夏伟富

(Rex Heyworth)

上海外语教育出版社 外教社 SHANGHAI FOREIGN LANGUAGE EDUCATION PRESS

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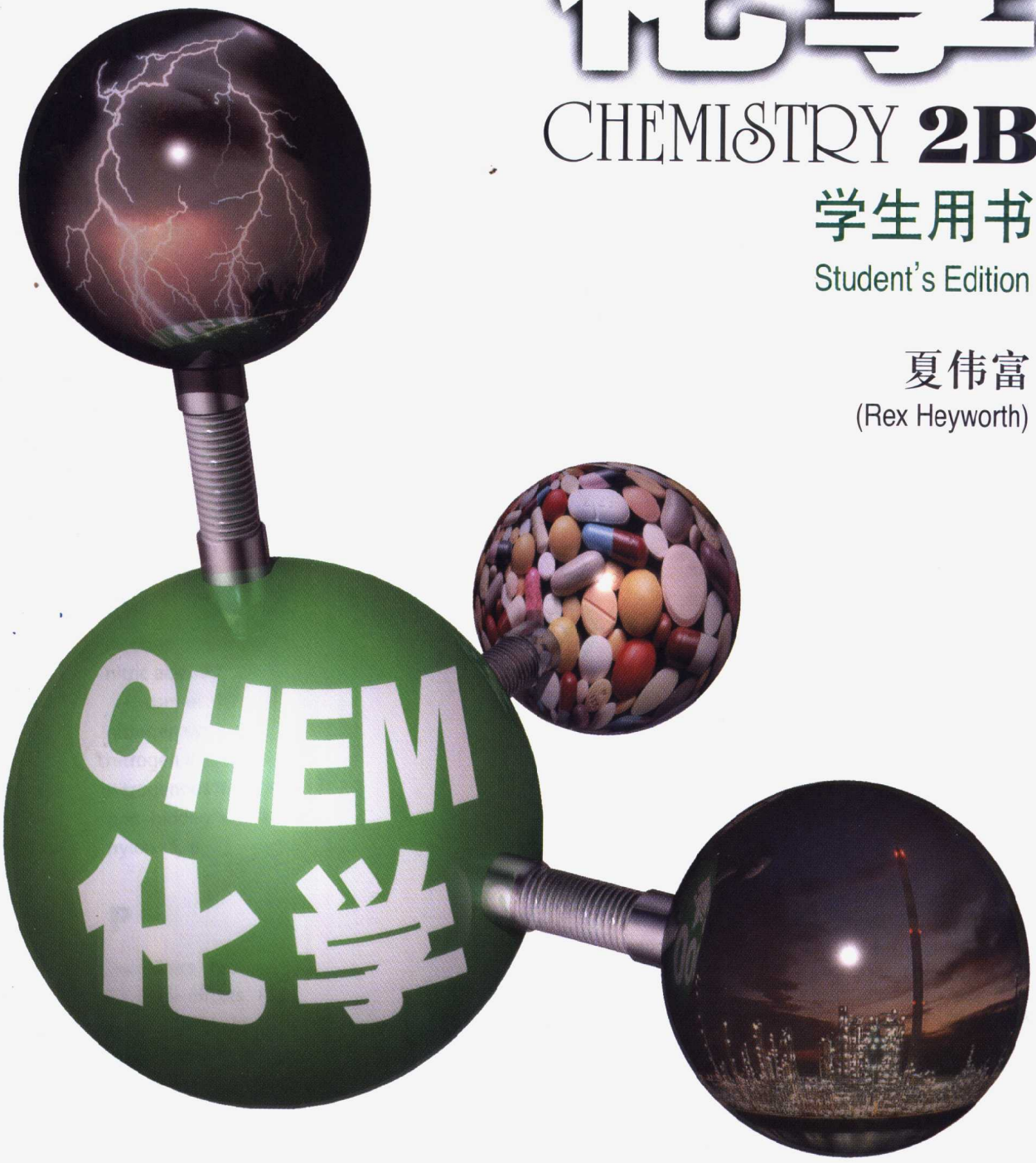

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出版前言

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。

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、余枭然老师仔细审读，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

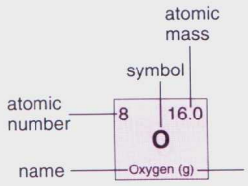
Periodic table of elements

Period	Group I	Group II	Group III	Group IV	Group V	Group VI	Group VII	Group 0
1								2 4.0 **He** Helium (g)
2	3 6.9 **Li** Lithium	4 9.0 **Be** Beryllium	5 10.8 **B** Boron	6 12 **C** Carbon	7 14.0 **N** Nitrogen (g)	8 16 **O** Oxygen (g)	9 19.0 **F** Fluorine (g)	10 20.2 **Ne** Neon (g)
3	11 23.0 **Na** Sodium	12 24.3 **Mg** Magnesium	13 27.0 **Al** Aluminium	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)
4	19 39.1 **K** Potassium	20 40.1 **Ca** Calcium	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 **Se** Selenium	35 80.0 **Br** Bromine (l)	36 83.8 **Kr** Krypton (g)
5	37 85.5 **Rb** Rubidium	38 87.6 **Sr** Strontium	39 88.9 **Y** Yttrium	40 91.2 **Zr** Zirconium	41 92.9 **Nb** Niobium	42 95.5 **Mo** Molybdenum	43 (98)$_a$ **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)
6	55 132.9 **Cs** Caesium	56 137.3 **Ba** Barium	[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)
7	87 (223) **Fr** Francium	88 226.0 **Ra** Radium	[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**					

1 1.0 **H** Hydrogen (g)

TRANSITION METALS

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 **Am** Americium	96* (247) **Cm** Curium	97* (247) **Bk** Berkelium	98* (251) **Cf** Californium	99* (252) **Es** Einsteinium	100* (258) **Fm** Fermium	101* (258) **Md** Mendelevium	102* (259) **No** Nobelium	103* (260) **Lr** Lawrencium



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

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.

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

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 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.

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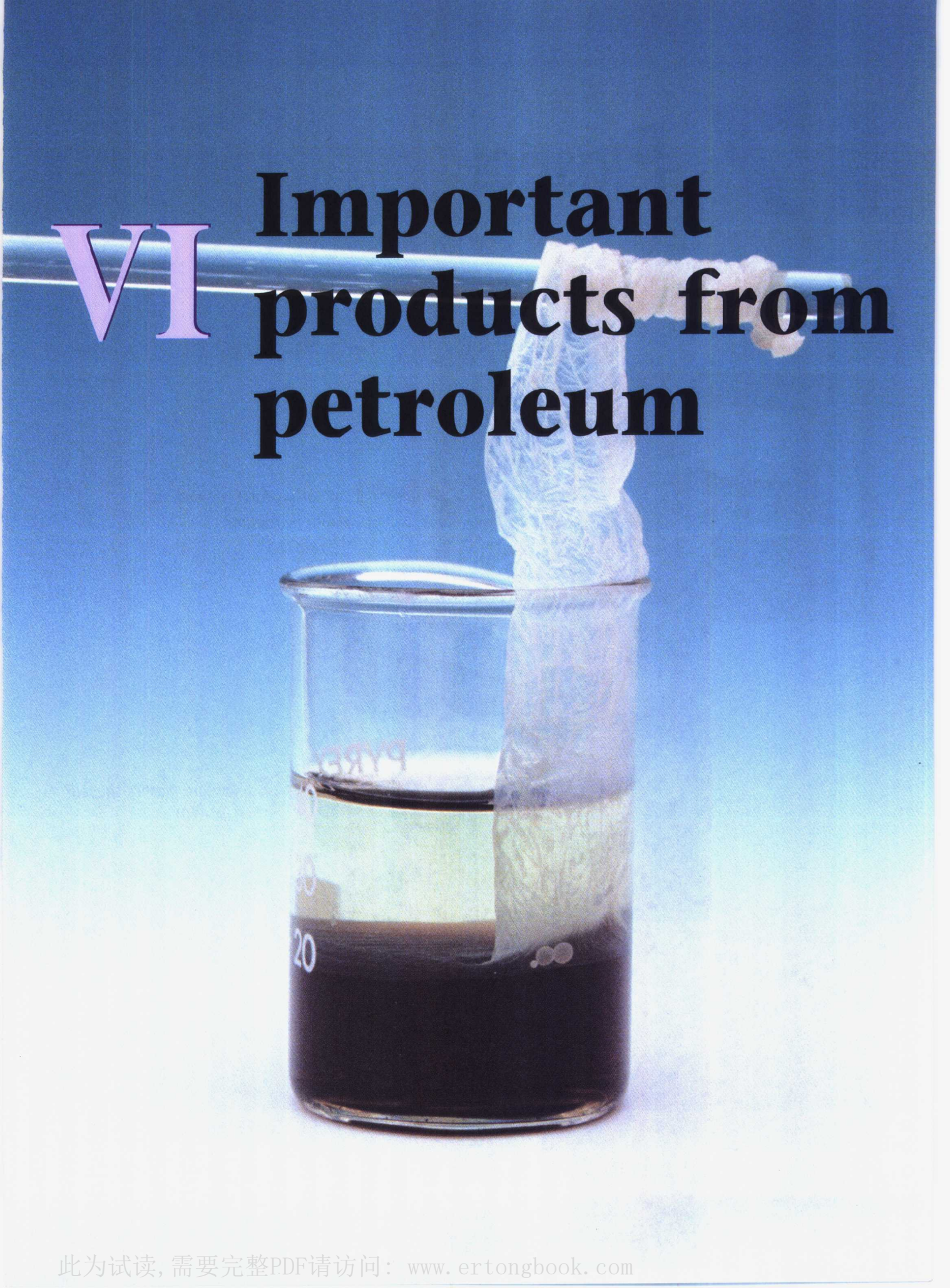
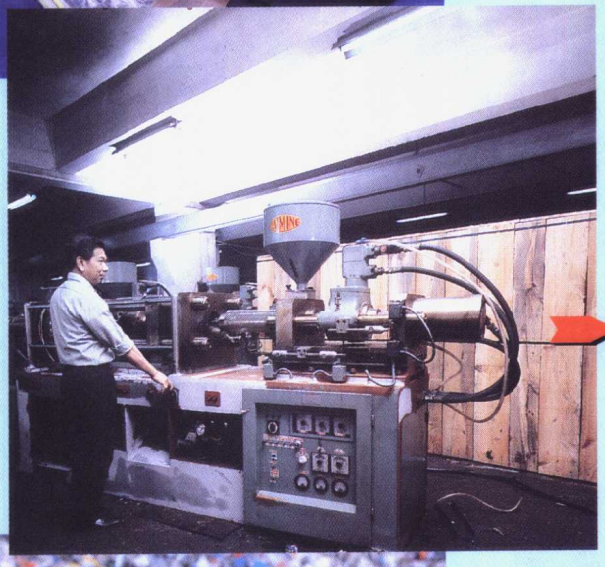
VI Important products from petroleum



17 Plastics

1 *What products are derived from petroleum?*
(See p3)



2 *How are plastics shaped?*
(See p10)

3 *Can we recycle plastics?*
(See p24)

In this chapter you will find out

- that plastics are made from chemicals obtained from petroleum
- some of the many uses of plastics
- how properties of plastics are related to their structure
- that plastics are either addition polymers or condensation polymers
- about environmental problems caused by the use of plastics

17.1 Plastics — a new material

For thousands of years, people have used natural materials to make things. For example:

- wood for houses
- metals for tools
- wool and cotton for clothes
- glass and clay for containers

ACTIVITY 17.1 A
Plastics are all around us.

However, such natural materials have disadvantages. Iron rusts, wood rots and burns, wool and cotton soon get holes. Today, we have materials without these disadvantages. These materials are **plastics**. Plastics are not natural materials. They are made with chemicals from petroleum.

The first plastics were made only about 50 years ago. Figure 17.1 shows objects before and after plastics were discovered.

before plastics

after plastics

Fig. 17.1 *Household articles before and after plastics were discovered.*

rots
腐败

CLASS PRACTICE

1 Look around you now.

(a) Name some objects made of natural materials.

(b) Name some objects made of plastics.

2 Look at the objects in the lefthand side of Figure 17.1. For each object:

(a) Give a disadvantage of the old material.

(b) Give an advantage of using plastic.

IT ON THE NET

Uses of various polymers.

http://www.psrc.usm.edu/macrog/floor1.html

Different kinds of plastics

There are many different kinds of plastics. Figure 17.2 shows uses of six types of plastics in modern homes.

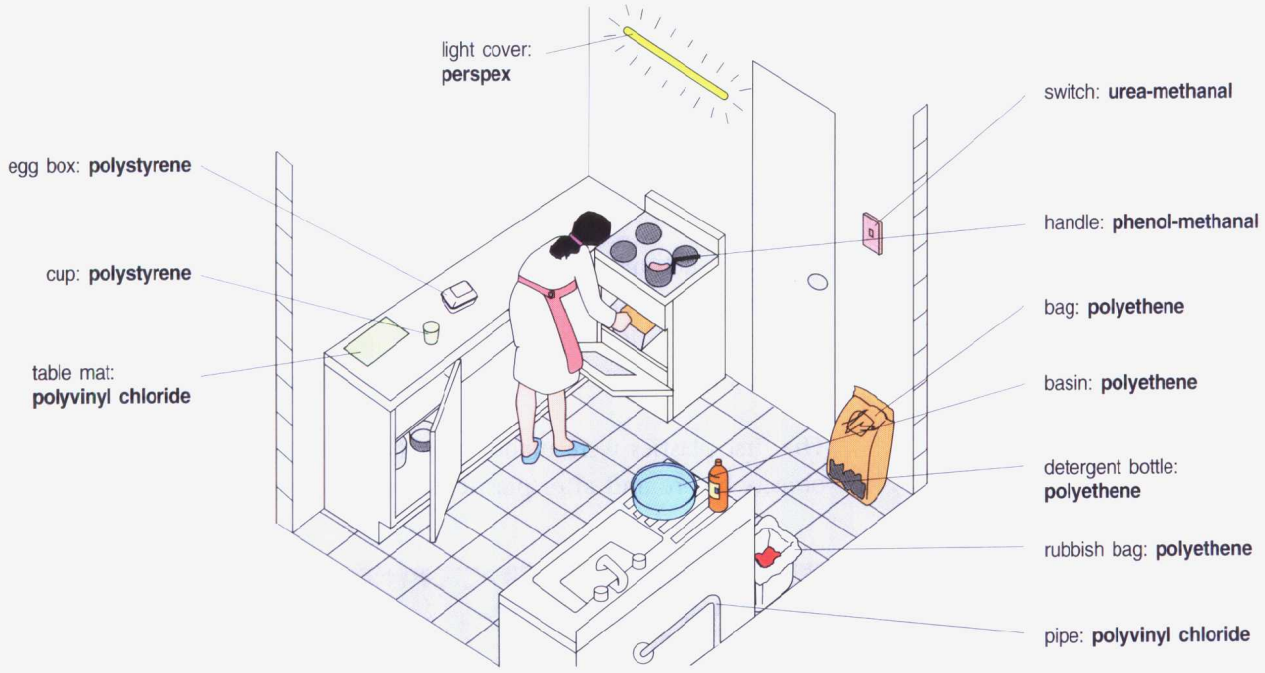


Fig. 17.2 *Uses of plastics in the kitchen.*

CLASS PRACTICE

3 Look at Figure 17.2. Prepare a table and list:

(a) The names of the six plastics used.

(b) The uses of each type of plastic.

17.2 Properties and uses of plastics

ACTIVITY 17.1 B, C
Properties of plastics: Data collection.
A key to identify plastics.

Different plastics have different properties. Plastics are chosen for different uses because they have useful combinations of properties. Plastics can be:

- cheap
- flexible
- strong but light
- resistant to chemicals
- not eaten by living things
- good insulators of heat and electricity
- easily moulded

STUDY TIP
Polyethene is also called polythene.

Figure 17.3 shows how the uses of some plastics are related to their properties.

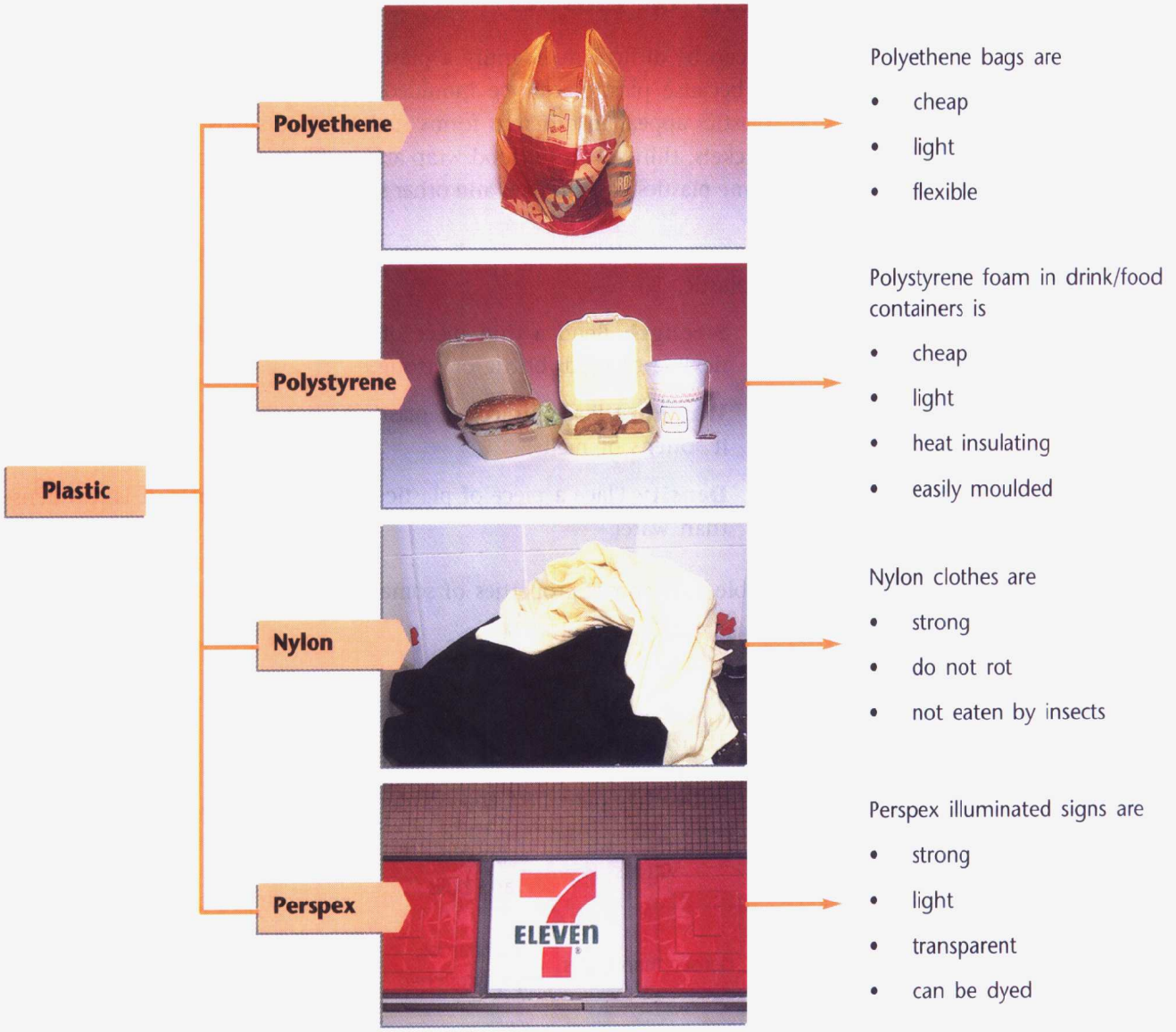


Fig. 17.3 *The way plastics are used relates to their properties.*

flexible 易弯曲的 illuminated signs 照明宣传牌 moulded 可造型的 polystyrene foam 聚苯乙烯泡胶

CLASS PRACTICE

4 Suggest properties of plastics for the following uses:

(a) plastic food wraping

(b) detergent bottle

(c) handle of a cooking pan

(d) case of a vacuum cleaner

5 Perspex can be used as a substitute for glass. Uses also include street lights and aircraft windows.

(a) What properties of perspex are similar to glass?

(b) Give:

(i) advantages; and

(ii) disadvantages of perspex.

6 State some advantages and disadvantages of using:

(a) a plastic bag instead of a paper bag.

(b) a plastic pipe instead of an iron pipe for carrying water.

(c) a plastic food container instead of a glass container.

ACTIVITY 17.1 D

Decision exercise: Choosing a plastic.

Tests on plastics

It can be difficult to identify a plastic just by looking at it. One reason is because plastics can be moulded into different shapes. Also, many plastics appear in different forms such as rigid solids used in bowls and buckets, thin sheets for food wrap and as fibres for clothes. Furthermore, some plastics contain dyes and other substances to modify their properties.

However, the following simple tests can help to determine the nature of a plastic.

1 **Strength** Bend a thin piece of plastic. This tells us whether it is flexible or rigid, brittle or strong.

2 **Warming** Place a piece of plastic in hot water or oil to find out if it softens or melts.

3 **Density** Place a piece of plastic in water. If it floats, it is less dense than water.

Table 17.1 shows properties of some plastics.

Plastic	Polyethene	Polystyrene	Polyvinyl chloride (PVC)	Perspex	Nylon	Urea-methanol
Strength	flexible	brittle	brittle when pure	hard and strong	flexible but strong	hard but brittle
Effect of warming	melts	melts	softens	bubbles and boils	melts	does not melt
Other properties	less dense than water	transparent	denser than water	transparent, easily scratched	large force needed to break nylon thread by stretching	white (when pure), insoluble in any solvent

Table 17.1 *Properties of some plastics.*

substitute
代用品

17.3 Classifying plastics

IT ON THE NET

Some more on polymers and properties.

http://library.advanced.org/3659/orgchem/polymers.html

We classify plastics based on their properties. According to their behaviour on heating, plastics can be classified into two groups:

1 thermoplastics and

2 thermosetting plastics

In Table 17.1, urea-methanal is a thermosetting plastic. The others are all thermoplastics.

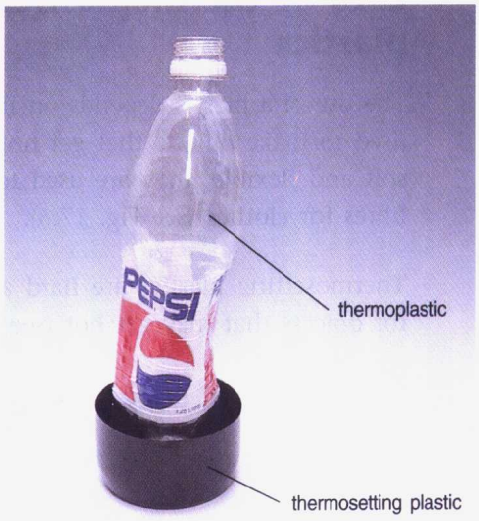


Fig. 17.4 *Heat softens a thermoplastic but not a thermosetting plastic.*

IT ON THE NET

Thermoplastics.

http://www.endura.com/thermo.htm

Thermoplastics

These plastics are like chocolate! When you heat them, they get soft or melt. On cooling, they become hard again (see Fig. 17.4). This can be repeated many times. Thus, thermoplastics can be moulded easily (see Fig. 17.5). Thermoplastics are usually soft and flexible.

A thermoplastic is one that softens on heating and hardens again on cooling.

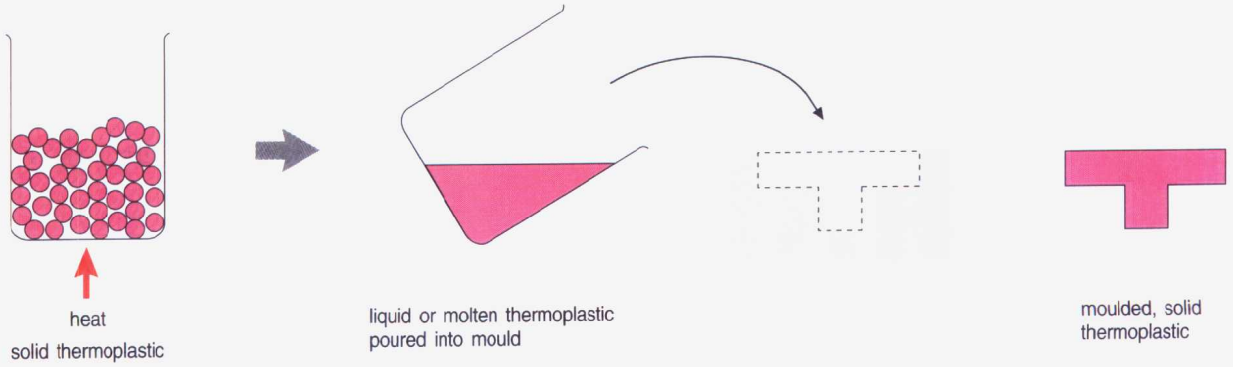


Fig. 17.5 *Thermoplastics are easily moulded.*