

中等专业学校教材

化学化工 专业英语

毕永宏 主编



化学工业出版社

中等专业学校教材

化学化工专业英语

毕永宏 主编

(京)新登字 039 号

图书在版编目 (CIP) 数据

化学化工专业英语/毕永宏主编. -北京: 化学工业出版社, 1996

中等专业学校教材

ISBN 7-5025-1689-1

I. 化… II. 毕… III. 化学工业-英语-专业学校-教材 IV. H31

中国版本图书馆 CIP 数据核字 (96) 第 14210 号

中等专业学校教材
化学化工专业英语

毕永宏 主编

责任编辑: 梁虹

封面设计: 郑小红

*

化学工业出版社出版发行

(北京市朝阳区惠新里 3 号 邮政编码 100029)

发行电话: (010) 64982530

<http://www.cip.com.cn>

*

新华书店北京发行所经销

北京市昌平振南印刷厂印刷

三河市宇新装订厂装订

开本 850 毫米×1168 毫米 1/32 印张 4 $\frac{3}{4}$ 字数 135 千字

1996 年 9 月第 1 版 2003 年 8 月北京第 5 次印刷

ISBN 7-5025-1689-1/G·432

定 价: 9.00 元

版权所有 违者必究

该书如有缺页、倒页、脱页者, 本社发行部负责退换

前 言

本书根据全国中等专业学校《英语教学大纲》的要求而编写，是化学化工类专业英语教材，适合于化学化工类的专业英语课程教学，亦可作为化工企事业单位技术人员的参考用书。

全书的编排由浅入深，特别注意了学习专业英语的过渡阶段。前 10 课的内容选择了与化学化工相关的较为通俗易懂的文章。为了提高学生学习的兴趣，前 5 课采用了日常英语文体与科技英语文体对照的形式。通过前 10 课的学习，可以使学生对科技英语文体的特点有一个初步的认识。后 16 课涉及到化学、化工工艺、高分子材料、化工分析以及企业管理等内容，很多课文摘编于英文原著，在考虑到专业英语教学需要的同时，尽量地保持原文的相对完整性，有利于提高学生阅读本专业外文资料的能力。

为了减少学生学习的困难，每篇课文的生词和词组都给予了解释，并对课文出现的难点给出注解。课文后的练习可以巩固学生学到的知识。此外，为了提高学生的阅读能力，增强教学的灵活性，后 16 课均附有相应的阅读材料，供教师选用。

本书的编写工作是由化工部北京化工学校组织完成的，毕永宏担任本书的主编并承担了 8~14 课以及 20~21 课的编写工作；刘红英承担 22~26 课的编写工作；河北化工学校葛正利承担了 1~5 课的编写工作；北京市化工学校录华承担了第 15、17、19 课的编写工作；天津化工学校梁凤凯承担了 16 和 18 课的编写工作；太原化工学校段炜承担了 6~7 课的编写工作。北京化工管理干部学院关昌峰担任本教材的主审。

本书在编写过程中得到了化工部北京化工学校的热情支持与帮助，在此表示诚挚的谢意。书中若有不妥之处，欢迎读者批评指正。

Contents

Lesson 1	Temperature	1
Lesson 2	Diffusion	5
Lesson 3	Carbon Dioxide and Respiration	9
Lesson 4	Natural and Synthetic Rubber	13
Lesson 5	Solutions, Suspensions and Colloids	17
Lesson 6	Solids, Liquids and Gases	22
Lesson 7	Elements and Compounds	27
Lesson 8	The Gases in the Air	32
Lesson 9	Pressure	36
Lesson 10	Application of Computers in Chemical Engineering	40
Lesson 11	Steady Flow	45
	<i>Reading Material:</i> Pumps	49
Lesson 12	Different Methods of Heat Transfer	52
	<i>Reading Material:</i> Heat Exchangers	55
Lesson 13	Distillation	57
	<i>Reading Material:</i> Distillation Column Design	63
Lesson 14	Plate Column	65
	<i>Reading Material:</i> Packed Column	71
Lesson 15	Chemical Technology	73
	<i>Reading Material:</i> Unit Operations	76
Lesson 16	Synthetic Ammonia Production	78
	<i>Reading Material:</i> The Preparation of Ammonia	81
Lesson 17	Plastics	84
	<i>Reading Material:</i> Polymer	87
Lesson 18	Pyrolysis Processes for Production of Ethylene and Propylene	89
	<i>Reading Material:</i> Efforts to Improve Pyrolysis Techniques	93
Lesson 19	Catalyst	96

<i>Reading Material</i> : Heterogeneous Catalysts	99
Lesson 20 Return on Investment	101
<i>Reading Material</i> : Economic Viewpoint	105
Lesson 21 The Complete Plant	107
<i>Reading Material</i> : The Design Calculation	110
Lesson 22 Chemical Analysis	112
<i>Reading Material</i> : The Function of Analytical Chemistry	116
Lesson 23 Steps in Analysis	118
<i>Reading Material</i> : Infrared Spectroscopy	122
Lesson 24 Iodometry-an Indirect Method	125
<i>Reading Material</i> : Determination of Copper in an Ore	128
Lesson 25 EDTA Titration Procedure	131
<i>Reading Material</i> : The Determination of Water Hardness	134
Lesson 26 The Assessment of the Heavy Metal Pollution in a River	
Estuary (I)	137
<i>Reading Material</i> : The Assessment of the Heavy Metal Pollution in a	
River Estuary (I)	141
Conferences	144

Lesson 1 Temperature

A

When anything is hot, we say that it has a high temperature, and when it is cold, we say that it has a low temperature. We measure temperature in degrees, with a fine tool called a thermometer. The figures are fixed by the temperature of melting ice and the temperature of boiling water. These are known as the melting point of ice and the boiling point of water.

There are two important systems; degrees Kelvin (K) and degrees Centigrade ($^{\circ}\text{C}$). We say that ice melts at 273 degrees Kelvin (273K) or at 0 degrees Centigrade (0°C). We say that water boils at 373 degrees Kelvin (373K) or at 100 degrees Centigrade (100°C). In science we use the Centigrade system of measuring temperature.

A mercury thermometer is made of a glass tube with a bulb at one end. The bulb and lower part of the tube have mercury inside. In order to fix the figures on a thermometer, we place the bulb in melting ice and mark at the level of the mercury, and call this point 0. Then we place the bulb in steam and the mercury goes up in the tube, because it expands when it gets warm. We make another mark at the new level of the mercury and call this point 100. we divide the space between the two marks into 100 divisions which are all the same size, for a Centigrade thermometer.

B

When anything is hot, it is said to have a high temperature, and when it

is cold, it is said to have a low temperature. Temperature is measured in degrees with an instrument known as a thermometer. The figures are determined by the temperature of melting ice and that of boiling water. These are known as the melting point of ice and the boiling point of water.

There are two important systems; degrees Kelvin (K) and degrees Centigrade (°C). Ice is said to melt at 273 degrees Kelvin (273K) or at 0 degrees Centigrade (0°C). Water is said to boil at 373 degrees Kelvin (373K) or at 100 degrees Centigrade (100°C). In science, the Centigrade system of measuring temperature is used.

A mercury thermometer consists of a glass tube having a bulb at one end. The bulb and lower part of the tube contain mercury. In order to determine the figures on a thermometer, the bulb is placed in melting ice and a mark is made at the level of the mercury, calling this point 0. Then the bulb is placed in steam and the mercury rises in the tube, because it expands on heating. Another mark is made at the new level of the mercury, calling this point 100. The space between the two marks is divided into 100 equal divisions for a Centigrade thermometer.

Words and Expressions

1. temperature [ˈtempərɪtʃə] n. 温度
2. measure [ˈmeɪʒə] vt. 测量, 测定
3. thermometer [θəˈmɒmɪtə] n. 温度计
4. to be known as... 叫做, 称为
5. melting point 熔点
boiling point 沸点
6. Kelvin [ˈkelvɪn] a. 开氏温度计的
degrees Kelvin 开氏温标; 开氏度数

7. centigrade [ˈsentigreɪd] a. 摄氏温度计的
degrees Centigrade 摄氏温标; 摄氏度数
8. mercury [ˈmɜ:kjʊəri] n. 水银(柱); 汞
9. bulb [bʌlb] n. 球状物; 玻璃泡(球管)
10. expand [ɪksˈpænd] v. 膨胀
11. division [dɪˈvɪʒən] n. 分开; 划分

Notes

1. The figures are determined by ...and that of boiling point. 此句中的 that 为代词, 代替前面的单数名词 the temperature.
2. ..., because it expands on heating. 句中 on heating 是介词+动名词结构, 作状语, 可译为“受热时”。

科技英语文体的主要特点 (一)

在科技英语文体中, 句子中的谓语动词常常以被动语态的形式出现。请对比下面几对句子:

- (1) The litmus paper is placed in the liquid. (被动)
He places the litmus paper in the liquid. (主动)
- (2) The gas is carefully heated. (被动)
The experimenter heats the gas carefully. (主动)
- (3) The results will be analyzed. (被动)
Scientists will analyze the results. (主动)
- (4) A barometer is used for measuring atmospheric pressure. (被动)
People use a barometer for measuring atmospheric pressure. (主动)
- (5) Filaments are made of tungsten wire. (被动)
People make filaments of tungsten wire. (主动)

在上面五对句子中, 虽然每一组的两句意义是相近的, 但被动结构使人有一目了然之感。首先被动句并不提及人, 对于一个科学家或科技工作者来说, 过多地提及人不但没必要, 而且会引起含混。其次主语是句子中非常重要的部分, 把不提及人的这一部分放在句首, 能

引起读者的注意。在科技英语文体中谓语动词用被动语态形式可使句子简洁。

注：科技英语中很多常用的被动态结构在汉语中已有习惯的译法。

A. 用于前面以 it 为形式主语而后面则以 that 引出主语从句的被动结构中：

It is considered that ... 人们认为…

It is supposed that ... 据推测，假定…

It is noticed that ... 人们注意到…

It has been shown that ... 已经证明…，已经表明…

It is reported that ... 据报道…

It is generally recognized that ... 通常认为…，一般公认…

B. 用于引出主语补足语的被动态结构：

be known as ... 通称为…，叫做…

be considered as ... 被说成是…

be described as ... 被描述成…

be accepted as ... 被承认为…

be defined as ... 定义是…，被下定义为…

be spoken of as ... 被说成是…

Exercises

用科技文体改写下面的短文：

Materials in which heat passes easily and quickly are said to be good conductors of heat, and all metals are good heat conductors. In materials such as wood, rubber and air, heat does not pass easily and quickly from one molecule to the next. When we say that we mean that these materials are bad conductors of heat——insulators. Air which is not moving is one of the worst conductors, and so it is one of the best insulators. Any material which holds inside itself plenty of air is a good insulator; e. g. wool, cork and fibre-glass.

Lesson 2 Diffusion

A

The molecules of a substance are moving about all the time without stopping. Imagine a crowd of people leaving a football match. They are all trying to get away as quickly as they can, and this is just what the molecules of a gas do. They try to spread out, or in other words, to *diffuse*.

The spreading out of molecules can be shown by opening a bottle of perfume in a room. The molecules of the perfume are pushed very close together inside the bottle. As soon as you open the bottle, they start to spread out into the air, and you can smell the perfume at the other end of the room. The smell becomes stronger as long as the bottle is left open.

In the end, when the molecules are spread out evenly inside and outside the bottle, the spreading out of molecules stops happening. When we say this we mean that both the room and the bottle hold an even mixture of perfume and air.

According to the laws of spreading out of molecules, the process goes on without stopping until the concentration of perfume molecules is the same all over the room, in other words, until the molecules have come to a condition where they are in balance, and do not change any more after this if conditions stay without changing.

B

The molecules of a substance are in continual motion. Imagine a crowd of people leaving a football match. They are all trying to get away as quickly as possible, and this is exactly how the molecules of a gas behave. They try to spread out, or in other words, to *diffuse*.

Diffusion can be demonstrated by opening a bottle of perfume in a room. The molecules of the perfume are concentrated inside the bottle. Immediately the bottle is opened, they start to diffuse into the air, and the perfume can be smelt at the other end of the room. The longer the bottle is left open, the stronger the smell becomes.

Finally, when there is an equal concentration of molecules inside and outside the bottle, diffusion ceases. By this is meant that both the room and the bottle contain a uniform mixture of perfume and air.

According to the principles of diffusion, the process continues unceasingly until the concentration of perfume molecules is equal in all parts of the room; in other words, until a state of equilibrium has been reached, and there is no further change, if conditions remain constant.

Words and Expressions

1. diffusion [di'fju:ʒən] n. 扩散, 散开
diffuse [di'fju:s] vi. 扩散, 散布
2. molecule ['mɒlikju:l] n. 分子.
3. spread out 扩散开; 传布
4. perfume ['pə:fju:m] n. 香水, 香味
5. mixture ['miksʃə] n. 混合物, 混合
6. concentrate ['kɒnsentreit] vt. 浓缩, 提浓

concentration [ˌkɒnsən'treɪʃən] n. 浓度, 浓缩

7. balance ['bæləns] n. 平衡; 天平 vt. 使平衡; 使均等
8. behave [bi'heɪv] vi. 表现, 运转
9. demonstrate ['demənstreɪt] vt. 证实, (用实例) 说明
10. cease [si:s] vt. 停止, 结束
11. contain [kən'teɪn] vt. 包含, 控制
12. uniform ['ju:nɪfɔ:m] a. 均匀的; 一致的; n. 制服
13. unceasing [ʌn'si:siŋ] a. 不停的, 不断的
14. state [steɪt] n. 状态; v. 陈述
15. equilibrium [ˌi:kwi'libriəm] n. 平衡; 平均
equilibrium constant 平衡常数

Notes

1. The spreading out of molecules 是名词化的动名词短语, 作主语。
2. as quickly as one can. 尽可能快。
as quickly as possible. 尽可能快地。
3. ..., if conditions remain constant. 句中 remain 是系动词, 可译为“假如条件保持不变”。

科技英语文体的主要特点 (二)

科技英语文体与日常英语文体的最大差别在于, 前者多使用技术性较强的, 较规范的单个动词作谓语, 而后者则多用短语动词或较为口语化的动词作谓语。试比较下列各组例句:

(1) The molecules of the perfume are concentrated inside the bottle. (科技)

The molecules of the perfume are pushed very close together inside the bottle. (日常)

(2) The body then eliminates this carbon dioxide by breathing out. (科技)

The body then gets rid of this carbon dioxide by breathing out. (日

常)

- (3) This is why it is important to ventilate any crowded place. (科技)
This is why it is important to bring fresh air into any crowded place. (日常)
- (4) Imagine a cube immersed in water. (科技)
Imagine a cube put into and covered with water. (日常)

Exercises

I. 用下面所给动词代替下列各句中的划线部分:

solidify, released, decreases, reflects, encloses

- The water in the kettle gets less and less.
- When a liquid changes to a solid, it is said to become a solid.
- The moon can be said to be like a large mirror which throws back the sun's light to the earth.
- When we burn coal, some of energy is set free.
- Any material which holds inside itself plenty of air is a good insulator.

II. 用所给词(组)改写短文中划线部分:

equal concentration, concentrated, dilute, reverse, ceases

If a Semi-permeable membrane has a weak solution of sugar on one side and a strong solution of sugar on the other, then more water molecules will diffuse through the membrane from the weak solution to the strong one than the opposite way. The result is that water diffuses from the weak solution, through the semi-permeable membrane, into the strong solution. This process is known as osmosis (渗透作用). When both solutions on either side of the membrane are of the same strength, osmosis stops happening.

Lesson 3 Carbon Dioxide and Respiration

A

When anything burns or breathes, it uses oxygen in the air and makes another gas which we call carbon dioxide. This gas turns lime-water cloudy. If you blow through a tube into lime-water, you can see it turning cloudy rapidly, because the air which we are breathing out contains more carbon dioxide than the air which we breathe in.

When animals breathe in, they take in air and the blood takes up oxygen from it. In the lungs the blood is made pure when oxygen takes the place of carbon dioxide. When the oxygen is carried to other parts of the body, the sugar in the blood is burned up, and carbon dioxide is made, just as it is made when a candle burns. The body then gets rid of this carbon dioxide by breathing out. Our bodies are kept warm by this burning up of sugar in the blood.

All animals and plants, except for a few unusual ones, need oxygen for breathing. When a number of people are in a closed room, the carbon dioxide slowly takes the place of oxygen. Because of this, they will in time feel sleepy and get headaches. This is why it is important to bring fresh air into any crowded place.

However, the amount of carbon dioxide does not increase in the atmosphere because it dissolves in water. Because of this, the rain and the seas take away a lot of it. Green plants also use it up for their growth.

B

When anything burns or breathes, oxygen in the air is used and another gas, known as carbon dioxide, is formed. This gas turns lime-water cloudy. If you blow through a tube into lime-water, it can be seen to turn cloudy rapidly, because the air which is being exhaled is richer in carbon dioxide than the air which is inhaled.

When animals inhale, air is taken in and from it oxygen is absorbed by the blood. In the lungs the blood is purified when oxygen replaces carbon dioxide. When the oxygen is transferred to other parts of the body, the sugar in the blood is consumed, forming carbon dioxide, similarly to the way in which it is formed when a candle burns. The body then eliminates this carbon dioxide by exhaling. Our bodies are heated by this consumption of sugar in the blood.

All living organisms, with the exception of a few unusual ones, require oxygen for respiration. When a number of people are in a closed room, the oxygen is gradually replaced by carbon dioxide. Consequently, they will eventually feel sleepy and get headaches. For this reason it is important to ventilate any crowded place.

However, carbon dioxide does not accumulate in the atmosphere because it dissolves in water. Consequently, much of it is removed by the rain and the seas. It is also consumed by green plants for their growth.

Words and Expressions

1. breathe [ˈbriːð] vi. 呼吸
2. carbon dioxide 二氧化碳
3. lime-water [ˈlaɪmˈwɔːtə] n. 石灰水

4. lung [lʌŋ] n. 肺
5. get rid of 排除, 去掉; 摆脱
6. dissolve [di'zɒlv] v. 溶解
7. use up 用尽, 消耗
8. exhale [eks'heil] vt. 呼出
9. inhale [in'heil] vt. 吸入
10. transfer [træns'fə:] vt. 转换; 输送; 传递
11. consume [kən'sju:m] vt. 消耗, 消费
12. eliminate [i'limineit] vt. 除去; 消灭
13. respiration [ˌrespə'reiʃən] n. 呼吸
14. ventilate ['ventileit] vt. 使...通风
15. accumulate [ə'kju:mjuleit] vt. 积累
accumulator n. 储蓄器, 蓄电池

Notes

This is why...place. 句中 why 引导的是表语从句, 从句中 it 作形式主语, 真正主语是不定式短语 to bring...place.

科技英语文体的主要特点 (三)

1. 在科技英语中常使用分词(短语)取代定语从句, 使句子简洁明了。试比较下面几对句子:
 - (1) Compressed air can be used for several purposes. (科技)
Air which is compressed can be used for several purposes. (日常)
 - (2) The unwanted liquid was thrown away. (科技)
The liquid which was not wanted was thrown away. (日常)
 - (3) This lens produces rays converging towards a point. (科技)
This lens produces rays which converge towards a point. (日常)
 - (4) Malaysia is a rubber-producing country. (科技)
Malaysia is a country which produces rubber. (日常)
2. 除定语从句外, 科技英语中状语从句的某些成分通常被省略, 从而