

环境科学与工程

专业英语

● 主编 董德明

吉林大学出版社

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主编 董德明
副主编 沈万斌 包国章 田绿绿 岳贵春

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前 言

环境科学与工程专业英语是许多环境科学与工程专业本科院校学生的必修课之一。当前,人口、资源、发展与环境污染已成为全球关注的焦点。自1992年联合国环境与发展大会以来,世界各国纷纷制定对策和措施,实施可持续发展战略。《中国环境保护21世纪议程》也于1995年应运而生。近年,我国政府十分重视国际环境合作项目与交流工作。随着国际环境组织对跨国边界环境问题的日益关注,将会需要更多的国际型环境科学与工程专业英语人才,环境科学与工程专业英语已成为国际环境问题交往中必不可少的必备工具。因此,加强环境科学与工程专业英语的教学与教材更新是适应当前环境科学与工程专业教学和社会发展的需要。鉴于此,我们编写了这本环境科学与工程专业英语教材。

本教材取材广泛,内容丰富,全部内容精选于英美原文。主要包括环境污染与控制、环境化学、环境生态学及环境影响评价等诸多内容。全书共分四部分,第一部分为精读篇章,要求学生认真学习,教师全面讲解,为必学内容;第二部分为泛读篇章,训练学生的阅读速度扩大知识面;第三部分为英汉对照篇章,提高学生的翻译水平和理解能力;第四部分为附录。为便于学生和读者对课文内容的更好理解,本教材增加了生词表和课后训练内容,并对文中的一些难句进行了注释。

本教材是在吉林大学环境科学与工程系使用多年的自编讲义的基础上编写的,它凝聚了环境科学与工程系许多教师的心血。多年来,环境科学与工程系的岳贵春、董德明等同志都曾为环境科学与工程专业英语教材的编选付出了辛勤的劳动。

本教材第一部分的1~7课、32课由董德明教授完成;第一部分的16~25课、29课由沈万斌完成;第一部分的8~15课、26~28课、30、31、33~38课由包国章完成;第二部分、第三部分和第四部分由田绿绿完成。最后由董德明教授对全书进行了统一的修改和审定。

书中如有不当之处,敬请读者批评指正。

编 者

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SECTION 1 LESSONS

Lesson 1

WHAT IS POLLUTION?

Pollution can be defined as an undesirable change in the physical, chemical, or biological characteristics of the air, water, or land that can harmfully affect health, survival, or activities of humans or other living organisms. Note that under this definition pollution does not necessarily have to cause physical harm. It may merely interfere with human activities. For example, a lake may be considered polluted if it can not be used for boating activities.

The problem with defining pollution is specifying what constitutes "undesirable change", which requires value judgement. Any alternation of the environment probably has some desirable effect on humans or other living organisms. The same alternation, however, may be judged favorably by some; or, the undesirable effect may be considered acceptable when compared with the favorable effect.

For example, chemicals spewed into the air or water from an industrial plant may be harmful to humans and other organisms living near the plant. However, if expensive pollution controls are required, the plant may be forced to shut down. Thus workers who would lose their jobs may feel that the risks to them from contaminated air and water are not as serious as the benefits of having jobs.

Similarly, an affluent country may ban the use of DDT as a pesticide because of a judgement that the risks (especially to non human organisms) outweigh the benefits. At the same time, a country with insufficient food production or a country where malaria affects much of the population may decide that the advantages of using DDT to kill crop pests or malaria-carrying mosquitoes outweigh risks of its undesirable effects.

Value judgements about short-term versus long-term risks can also cause controversy. Building a worldwide network of nuclear power plants may provide electricity for the present human generation, but it compels future generation to handle and store the radioactive wastes product for hundreds of thousands of years.

Thus, we see that the determination of desirable versus undesirable effects of an environmentally altering activity is a very difficult and highly controversial process. The nature of tragedy, as the philosopher Hegel pointed out long time ago, is the conflict

not between right and wrong but between right and right. Although defining pollution is a difficult, controversial process, it must be done in order to control pollution.

New Words

1	desirable	<i>adj.</i>	理想的, 令人满意的, 良好的
2	survival	<i>n.</i>	生存, 幸存者
3	alteration	<i>n.</i>	变更, 改变, 蚀变
4	spew	<i>v.</i>	呕出, 喷, 涌出, 渗出
5	affluent	<i>adj.</i>	丰富的, 富裕的
6	ban	<i>v.</i>	禁止, 取缔
7	pesticide	<i>n.</i>	杀虫剂, 农药
8	malaria	<i>n.</i>	疟疾
9	mosquito	<i>n.</i>	蚊子
10	versus	<i>prep.</i>	对, 与
11	controversy	<i>n.</i>	论争, 论战, 辩论
12	compel	<i>v.</i>	迫使, 强迫
13	radioactive	<i>adj.</i>	放射性的
14	tragedy	<i>n.</i>	悲剧, 不幸
15	conflict	<i>n.</i>	冲突, 斗争, 矛盾, 分歧

Phrases and Expressions

- 1 interfere with 妨碍, 干扰
- 2 interfere in 干涉, 干预
- 3 compare with 与……相比
- 4 compare to 比作, 比拟
- 5 hundreds of thousands of years 几十万年

Exercises

1. Give an example of environment pollution leading to long-term risk to humans.
2. Do you agree with "a lake may be considered polluted if it can not be used for boating activities"?
3. Put the following into English.

人类行为 化学污染 当代人类 农作物害虫 可接受的 价值 风险 核电站
污染控制 环境效益

Lesson 2

TYPES OF POLLUTION

From a biological viewpoint we can recognize two major types of pollutants: degradable and non-degradable. A degradable pollutant can be decomposed, removed, or consumed and thus reduced to acceptable levels either by natural process or by human-engineered systems (such as sewage treatment plants), as long as the system is not overloaded. There are two classes of degradable pollutants: rapidly degradable and slowly degradable. Rapidly degradable pollutants, such as human sewage and animal and crop wastes, can normally be decomposed rather quickly. The decomposing processes can be overloaded, however, so that the rate of breakdown is slowed. For example, a rapidly flowing river can normally cleanse itself of some human sewage fairly quickly. The decomposing processes can be overwhelmed by too much raw, untreated sewage from a large city or a number of small cities or farms.

Slowly degradable pollutants, such as DDT and some radioactive materials, decompose slowly but eventually are either broken down completely or reduced to harmless levels. For example, it typically takes about 4 years for DDT in soil to be decomposed to 25 percent of the original level applied. Some radioactive materials that give off harmful radiation, such as iodine-131, decay to harmless levels in a few minutes or hours and are rapidly degradable pollutants. Others, such as strontium-90 produced by nuclear bomb blasts, can persist at harmful levels for decades, and plutonium-239 produced by nuclear power plants, remains at harmful levels for thousands to hundreds of thousands of years. Slowly degradable pollutants are often synthetic compounds, such as DDT and plastics. Because they are artificial substances, nature usually has not evolved processes for breaking them down. Potentially harmful persistent pollutants must either be completely prevented from reaching the environment or controlled so that they do not accumulate to harmful levels.

Non-degradable pollutants are not broken down by natural process. Examples of non-degradable pollutants are mercury, lead and some of their compounds and some plastics. Like slowly degradable pollutants, non-degradable pollutants must be either prevented from entering the air, water, and soil or kept below harmful levels by removal from the environment.

New Words

1	degradable	adj.	可降低的, 可降解的
2	non-degradable	adj.	不可降低的, 不可降解的
3	decompose	v.	分解, (使) 腐烂, (使) 腐败
4	consume	v.	消费, 消耗
5	sewage	n.	污水
6	fairly	adv.	完全地
7	overwhelm	v.	淹没, 压倒
8	raw	adj.	原(状的), 生(的)
9	eventually	adv.	最后, 终于
10	iodine	n.	碘
11	strontium	n.	锶
12	plutonium	n.	钚
13	artificial	adj.	人工的, 人为的
14	evolve	v.	开展, 发展, 进化
15	persistent	adj.	固执的, 持久的

Phrases and Expressions

- 1 give off 发出
- 2 prevent from 阻止
- 3 auto-pollution 汽车污染
- 4 automobile exhaust gas 汽车废气

Exercises

1. Give some examples of degradable pollutants and non-degradable pollutants from a biological viewpoint.

2. DDT takes about 4 years in soil to be decomposed to 25 percent of original level applied. Do you agree with that "DDT is a degradable pollutant"? Why?

3. Put the following into English.

可降低的 分解 污水 持久性污染物 生物富集 有害水平

Lesson 3

NATURAL WATER AND WATER POLLUTION

Natural waters cannot be easily defined, but they can be described in terms of the physical, chemical and biological conditions present. The physical condition should consist of clean water with an ambient temperature, and freedom from most suspended solids, coloration, surface scum or foam, obnoxious odor, and taste. The chemical condition should ensure that there is adequate oxygen, a correct balance of dissolved chemical nutrients to support life, and an absence of excessive organic matter and toxic substances. Biologically, most natural waters contain a range of microorganism, plants, and animals that exist in a balanced ecological state. All ponds, lakes, streams, and rivers are ecosystems, where the biological population exists within the physicochemical environment. Each ecosystem has its own organization, comprising biological nutritional cycles for the continued survival of the species constituting the food web within the system.

A. S. Wisdom gave a legal definition of pollution in 1956, as "the addition of something to water which change its natural qualities, so that the riparian owner does not get the natural water of the stream transmitted to him" .

Any change that takes place within the ecosystem caused by the introduction of external may be regarded as pollution. Natural pollution can occur, perhaps caused by leaf fall or dead animals, whereby toxins are introduced into the water and these change the ecological balance and the physicochemical conditions. Other forms of pollution are introduced by human activities, and the effects may range from slight to heavy. Slight or natural pollution produces no visible and abnormal effect upon the water, which is to be absorbed. This means that the ecosystem quickly readjusts, and returns to its natural state with little or no effect upon the water or the life forms. Slight pollution occurs in many natural waters and is not an environmental problem.

Water is a basic natural resource required by all human beings, and by the modern technological society in which they live. Man requires a minimum body intake of water that varies from 2.8 to 13 liters per head per day depending upon the climate and the temperature. Water is normally taken into the body in food and drink, and the intake must balance the body loss resulting from breathing, sweating, and excretion of urine and feces. If there is no intake of water into the body, death can ensue within 10 days.

Water is also essential to man for maintaining personal body hygiene and freedom from disease.

In addition to personal use, water is required for many other purposes and these can be classified into five main user categories.

Public water supplies provided by ten Regional Water Authorities (WAS) in England. Two thirds of these supplies is used by domestic households for drinking, cooking, dishwashing, general cleaning, laundering, personal washing and bathing, lavatory flushing, car washing, and garden watering. Another one third is used by industry, commerce and trade premises.

Industrial water supplies provided by the WAS or obtained by direct abstraction. Various industrial processes require large quantities of water for cooling purposes, steam raising, material processing, and the disposal of waste. Water is also used as a fluid carrier for processing materials such as paper fibers, or crushed ore.

Cooling water is used in large quantities for the generation of electricity by power stations. This water is usually abstracted from rivers, lakes, and estuaries.

The agricultural industry uses comparatively small quantities of water for dairy processing, animal hygiene, stock watering, and land irrigation. The horticultural industry uses water for land irrigation, glasshouse watering, and washing marketable vegetable crops.

Water is also required for amenity and recreational purposes. This category differs from the pervious four because water is not abstracted from the hydrological cycle. The so-called water space includes streams, rivers, reservoirs, estuaries, canals, and coastal waters. It is used for all types of water sports, such as swimming, fishing, boating, sailing, skiing, and as a means of transportation for pleasure or commercial purposes.

The amount of water used is usually described as water consumption. All water abstracted or drawn from the hydrological cycle is eventually returned to it after use.

New Words

1	ambient	<i>adj.</i>	环境的; 周围的
2	suspended	<i>adj.</i>	悬浮的
3	scum	<i>n.</i>	浮渣; 渣滓
4	foam	<i>n.</i>	泡沫
5	obnoxious	<i>adj.</i>	讨厌的
6	odor	<i>n.</i>	气味

7	ensure	<i>v.</i>	确保; 保证
8	adequate	<i>adj.</i>	妥当的; 适当的; 充分的; 足够的
9	absence	<i>n.</i>	缺乏; 缺席
10	excessive	<i>adj.</i>	过度的; 过分的
11	pond	<i>n.</i>	池塘
12	comprise	<i>v.</i>	包括; 包含
13	legal	<i>adj.</i>	法律上的; 法定的; 合法的
14	riparian	<i>adj.</i>	河边的
15	external	<i>n.</i>	外部
16	whereby	<i>adv.</i>	靠那个
17	toxin	<i>n.</i>	毒素; 毒质
18	induce	<i>v.</i>	引起; 导致
19	abnormal	<i>adj.</i>	反常的; 不规则的
20	readjust	<i>v.</i>	再整理; 再调整
21	excretion	<i>n.</i>	排泄; 排泄物
22	urine	<i>n.</i>	尿
23	feces	<i>n.</i>	粪便; 排泄物
24	hygiene	<i>n.</i>	卫生学
25	domestic	<i>adj.</i>	家的; 家庭的; 国内的
26	household	<i>n.</i>	家; 户; 族
27	laundrying	<i>n.</i>	洗(衣服)
28	lavatory	<i>n.</i>	盥洗室
29	commercial	<i>adj.</i>	商业的
30	premise	<i>n.</i>	房屋
31	irrigation	<i>n.</i>	灌溉
32	horticultural	<i>adj.</i>	园艺的
33	marketable	<i>adj.</i>	适合市场销售的
34	amenity	<i>n.</i>	舒适
35	recreational	<i>adj.</i>	休养的; 娱乐的
36	category	<i>n.</i>	种类; 范畴
37	reservoir	<i>n.</i>	水库
38	estuary	<i>n.</i>	河口
39	canal	<i>n.</i>	运河
40	coastal	<i>adj.</i>	沿海的; 海岸的

Notes to the Text

1. Any change that takes place within the ecosystem caused by the introduction of

external may be regarded as pollution. 参考译文：任何由外部因素引起的生态系统内部的变化都可以认为是污染。

2. Public water supplies provided by ten Regional Water Authorities (WAS) in England. 参考译文：在英格兰，公共供水是由 10 个地区水管理局负责。

Exercises

1. *Give some examples of water utilization.*
2. *Try to give a definition of water pollution.*
3. *Put the following into English.*

水体 小溪 河流 运河 湖泊 水库 池塘 海洋 地表水 地下水 海水 淡水
水 饮用水 冷水 热水 开水 废水 污水 纯净水 矿泉水

Lesson 4

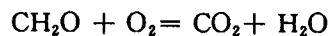
OXYGEN IN WATER

Without dissolved oxygen at an appreciable level, many kinds of aquatic organisms can not exist in water. Dissolved oxygen is consumed by the degradation of organic matter in water. Many fish kills result not from the direct toxicity of pollutants, but from oxygen deficiency as a result of its consumption in the biodegradation of the pollutants. For example, heavy rains after a prolonged dry period may wash a large amount of manure and other wastes from cattle feedlots into a stream and ultimately into a reservoir. As the wastes are degraded, the dissolved oxygen level in the water may go to such low values that fish in the reservoir die. Thus the fish die from suffocation, rather than from a direct toxic effect of the pollutant.

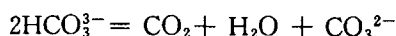
Oxygen comprises 20.95% by volume of clean, dry air and most elemental oxygen in water comes from the atmosphere. Therefore, the ability of a body of water to re-oxygenate itself by contact with the atmosphere is an important characteristic. Oxygen is produced by the photosynthetic action of algae. Oxygen production by algae is really not an efficient means of oxygenating a water however, because some of the oxygen formed by photosynthesis during the daylight hours must be paid back at night when the algae consume oxygen in their metabolic processes. When the algae die, the degradation of their biomass consumes oxygen.

The solubility of oxygen in water depends upon water temperature, the partial pressure of the oxygen in the atmosphere, and the salt content of the water. The calculation of oxygen solubility as a function of partial pressure is discussed in next section where it is shown that the solubility of oxygen in water at 25°C in equilibrium with air at atmospheric pressure is only 8.32 mg/L. Thus water in equilibrium with air cannot contain a high level of dissolved oxygen compared to many other solute species. If oxygen-consuming process are occurring in the water the dissolved oxygen level may rapidly approach zero unless some efficient mechanism for the re-aeration of water is operative, such as turbulent flow in a shallow stream or air pumped into the aeration tank of an activated sludge secondary waste treatment facility.

If organic matter of biological origin is represented by the formula CH_2O , the consumption of oxygen in water by the degradation of organic matter may be expressed by the following reaction:



The weight of organic material required to consume the 8.3 mg of O₂ in a liter of water in equilibrium with the atmosphere at 25°C is given by substituting into equation, which yields a value of 7.8 mg of CH₂O. Thus the microorganism-mediated degradation of only 7 or 8 mg of organic material can completely consume the oxygen dissolved in one liter of water initially saturated with air at 25°C. The depletion of oxygen to levels below those which will sustain aerobic organisms requires the degradation of even less organic matter at higher temperatures, where the solubility of oxygen is less, or in a water not initially saturated with atmospheric oxygen. Furthermore, there is no "chemical sink" for oxygen in water, unlike the case of CO₂ which, when utilized by algae, can be obtained from the reaction:



There are no chemical reactions that replenish dissolved oxygen and, except for oxygen provided by photosynthesis, it must come from the atmosphere.

The temperature effect on the solubility of gases in water is especially important in the case of oxygen. The solubility of oxygen in water decreases from 14.74 mg/L at 0°C to 7.03 mg/L at 35°C.

New Words

1	appreciable	<i>adj.</i>	值得重视的
2	organism	<i>n.</i>	生物体, 有机体
3	deficiency	<i>n.</i>	缺乏, 亏空
4	degradation	<i>n.</i>	分解, 降解
5	biodegradation	<i>n.</i>	生物降解
6	prolong	<i>v.</i>	延长, 拉长
7	manure	<i>n.</i>	粪, 肥料
8	cattle	<i>n.</i>	牛, 牲口, 家禽
9	feedlot	<i>n.</i>	牧场, 育肥地
10	ultimately	<i>adv.</i>	最后地
11	suffocation	<i>n.</i>	窒息, 闷死
12	re-oxygenate	<i>v.</i>	复氧
13	algae	<i>n.</i>	海藻
14	metabolic	<i>adj.</i>	变化的, 变形的
15	biomass	<i>n.</i>	生物质
16	mechanism	<i>n.</i>	机械装置
17	re-aeration	<i>n.</i>	再充气
18	turbulent	<i>adj.</i>	汹涌的, 狂暴的