安全、健康与环保专业英语

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Professional English of Safety, Health & Environment

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本书包含四大模块，21 个单元。其中，前 13 个单元为专业性英语阅读文章，几乎每章都分为 Reading A 和 Reading B：Reading A 为专业性较强的英语阅读文章，旨在培养学生的专业阅读能力；Reading B 为辅助阅读文章，旨在拓宽学生有关 EHS 专业英语的知识，可以作为阅读理解的练习。另外，后 8 个单元的目的在于培养学生实际应用专业英语的能力。

本书可供高职高专环境、安全等专业的师生参考使用，也供环境科学与工程、安全工程等领域的工程技术人员、科研人员和管理人员参考。

图书在版编目（CIP）数据

安全、健康与环保专业英语/谢雯主编. —北京：化学工业出版社，2016.7

ISBN 978-7-122-27067-2

Ⅰ.①工…　Ⅱ.①谢…　Ⅲ.①工厂环境保护-英语-高等学校-教材　Ⅳ.①H31

中国版本图书馆 CIP 数据核字（2016）第 102450 号

责任编辑：刘兴春　刘　婧　　文字编辑：汲永臻
责任校对：王　静　　装帧设计：王晓宇

出版发行：化学工业出版社（北京市东城区青年湖南街 13 号　邮政编码 100011）
印　　装：三河市延风印装有限公司
787mm×1092mm　1/16　印张 12½　字数 233 千字　2017 年 1 月北京第 1 版第 1 次印刷

购书咨询：010-64518888（传真：010-64519686）　售后服务：010-64518899
网　　址：http://www.cip.com.cn
凡购买本书，如有缺损质量问题，本社销售中心负责调换。

定　　价：39.80 元

前言
Foreword

安全、健康与环保专业英语是高职高专环境类专业学生的必修课。在完成公共基础英语学习任务后，学生必须继续修读专业英语。本书为高职高专环境类工业环保与安全专业的学生提供未来工作岗位上所需的专业英语知识和技能，培养学生实际使用英语的能力。

安全、健康与环保专业英语在高职高专的教学计划中一般只安排一个学期，周课时两节。但是现有的高职高专安全、健康与环保类的专业英语书几乎没有，即使有，书中所选的文章篇幅较长，词汇量很大，课后相应的练习很少，给高职高专的专业英语教学带来了诸多不便。

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本书由谢雯任主编，刘晓毅、于献波任副主编，郭璐、张小广、官贵、王小晖等参与了图书的策划和编写工作。本书的主编、副主编和参编者都是奋斗在环境保护专业工作及教学第一线的高级工程师、博士以及专业教师等。在编写本书的过程中，他们对图书的结构和内容安排提出了很多宝贵的意见。本书课文和阅读材料的编写均参考了一些环保专业类的图书和国内外英文网站。在此谨向本书的编写人员，所引用文章的原作者、出版社和有关网站表示衷心的感谢！

由于编者水平有限，书中难免存在疏漏和不当之处，敬请读者批评指正。

谢　雯

2016 年 6 月

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PART I

Environmental Protection

Unit 1 Water Pollution and Disposal

1.1 Reading A: Introduction to Water Pollution Indicators: BOD, COD & Heavy Metals

BOD & COD

Biochemical Oxygen Demand, BOD, as it is commonly abbreviated, is one of the most important and useful parameters (measured characteristics) indicating the organic strength of a wastewater. BOD measurement permits an estimate of the waste strength in terms of the amount of dissolved oxygen required to break down the wastewater. The specifics of the analysis are discussed in detail in Standard Methods for the Examination of Water and Wastewater. The BOD test is one of the most basic tests used in the wastewater field. It is essentially a measure of the biological and the chemical component of the waste in terms of the dissolved oxygen needed by the natural aerobic biological systems in the wastewater to break down the waste under defined conditions. Generally the BOD test is carried out by determining the dissolved oxygen on the wastewater or a diluted mixture at the beginning of the test period, incubating the wastewater mixture at 20℃, and determining the dissolved oxygen at the end of 5 days. The difference in dissolved oxygen between the initial measurement and the fifth day measurement represents the biochemical oxygen demand.

While BOD describes the biological oxidation capacity of a wastewater, it is not a measure of the total potential oxidation of the organic compounds present in the wastewater. A number of chemical tests are used to measure this parameter, either in terms of the oxygen required for virtually complete oxidation, or in terms of the element carbon. Probably the most common test for estimating industrial wastewater strength is the Chemical Oxygen Demand (COD) Test. COD test is a measurement of the oxygen-depletion capacity of a water sample contaminated with organic waste matter. Specifically, it measures the equivalent amount of oxygen required to chemically oxidize organic compounds in water.COD is used as a general indicator of water quality and is an integral part of all water quality management programs. Additionally, COD is often used to estimate BOD (Biochemical Oxygen Demand) as a strong correlation exists between COD and BOD, however COD is a much faster, more accurate test.

A test which measures carbon and which is being used to a greater extent in measuring wastewater strength is the TOC (Total Organic Carbon) test where the carbon is oxidized by catalytic combustion to carbon dioxide and the carbon dioxide is measured.

Heavy Metals

The main threats to human health from heavy metals are associated with exposure to lead, cadmium, mercury and arsenic. These metals have been extensively studied and their effects on human health regularly reviewed by international bodies such as the WHO.

Cadmium compounds are currently mainly used in re-chargeable **nickel-cadmium** batteries. Cadmium emissions have increased dramatically during the 20th century, one reason being that cadmium-containing products are rarely recycled, but often dumped together with household waste. Cigarette smoking is a major source of cadmium exposure. In non-smokers, food is the most important source of cadmium exposure. Recent data indicate that adverse health effects of cadmium exposure may occur at lower exposure levels than previously anticipated, primarily in the form of kidney damage but possibly also bone effects and fractures. Many individuals in Europe already exceed these exposure levels. Therefore, measures should be taken to reduce cadmium exposure in the general population in order to minimize the risk of adverse health effects.

The general population is primarily exposed to mercury *via* food, fish being a major source of methyl mercury exposure, and dental amalgam. The general population does not face a significant health risk from methyl mercury, although certain groups with high fish consumption may attain blood levels associated with a low risk of neurological damage to adults. Since there is a risk to the fetus in particular, pregnant women should avoid a high intake of certain fish, such as shark, swordfish and tuna; fish (such as pike, walleye and bass) taken from polluted fresh waters should especially be avoided.

The general population is exposed to lead from air and food in roughly equal proportions. During the last century, lead emissions to ambient air have caused considerable pollution, mainly due to lead emissions from petrol. Children are particularly susceptible to lead exposure due to high gastrointestinal uptake and the permeable blood-brain barrier. Blood levels in children should be reduced below the levels so far considered acceptable, recent data indicating that there may be neurotoxic effects of lead at lower levels of exposure than previously anticipated. Although lead in petrol has dramatically decreased over the last decades, thereby reducing environmental exposure, phasing out any remaining uses of lead additives in motor fuels should be encouraged. The use of lead-based paints should be abandoned, and lead should not be used in food containers. In particular, the public should be aware of glazed food containers, which may leach lead into food.

Exposure to arsenic is mainly *via* intake of food and drinking water, food being the most important source in most populations. Long-term exposure to arsenic in drinking-water is mainly related to increased risks of skin cancer, but also some other cancers, as well as other skin lesions such as hyperkeratosis and pigmentation changes. Occupational exposure to arsenic, primarily by inhalation, is causally associated with lung cancer. Clear exposure-response relationships and high risks have been observed.

New Words

1. parameter [pə'ræmitə] n. 参数；系数；参量
2. aerobic [eə'rəubik] adj. 需氧的；增氧健身法的
3. dilute [dai'luːt] adj. 稀释的；淡的
4. incubate ['iŋkjubeit] vt. 孵化；培养；温育；逐渐发展 vi. 孵化；酝酿 n. 孵育物
5. oxidation [ɔksi'deiʃən] n. 氧化
6. virtually ['vɜːtʃuəli] adv. 事实上，几乎；实质上
7. correlation [ˌkɔrə'leiʃən] n. 相关，关联；相互关系
8. catalytic [ˌkætə'litik] adj. 接触反应的；起催化作用的
9. nickel ['nikəl] n. 镍；镍币；五分镍币 vt. 镀镍于
10. anticipate [æn'tisipeit] vt. 预期，期望；占先，抢先；提前使用
11. fracture ['fræktʃə] n. 破裂，断裂；骨折 vi. 破裂；折断 vt. 使破裂
12. amalgam [ə'mælgəm] n. 汞合金，汞齐；混合物
13. neurological [ˌnjuərə'lɔdʒikl] adj. 神经病学的，神经学上的
14. swordfish ['sɔːdfiʃ] n. 旗鱼
15. tuna ['tjuːnə] n. 金枪鱼，鲔鱼
16. pike [paik] n. 通行费；矛；梭子鱼；尖头；收费道路 vt. 用矛刺穿
17. walleye ['wɔːlai] n.角膜白斑，斜视
18. bass [beis] n. 鲈鱼；男低音；低音部；椴树 adj. 低音的
19. ambient ['æmbiənt] adj. 周围的；外界的；环绕的 n. 周围环境
20. susceptible [sə'septəbl] adj. 易受影响的；易感动的；容许…的

21. gastrointestinal [ˌgæstrəuin'testinl] adj. 胃与肠的

22. permeable ['pɜːmiəbl] adj. 能透过的；有渗透性的

23. neurotoxic [ˌnjuərəu'tɔksik] adj. 毒害神经的

24. glazed [gleizd] adj. 光滑的；像玻璃的；上过釉的；呆滞无神的 v. 上釉（glaze 的过去分词）；装以玻璃

25. hyperkeratosis [ˌhaipəkerə'təusis] n. 角化过度；眼角膜细胞增多

26. pigmentation [pigmən'teiʃən] n. 染色；色素淀积；天然颜色

Exercises

Task 1 Reading Comprehension. Please read the text carefully and answer the following 5 questions.

1. What does the parameter BOD indicate?

2. How does BOD measurement estimate the waste strength?

3. What is the most common test for estimating industrial wastewater strength?

4. What does COD test measure?

5. What are the four kinds of heavy metals which pose the main threats to human health?

Task 2 Translation. Please translate the following English words or phrases into Chinese.

1. BOD	6. dissolved oxygen
2. COD	7. contaminate
3. TOC	8. oxidation
4. heavy metal	9. diluted
5. household waste	10. neurological

Task 3 Translation. Please translate the following English sentences into Chinese.

1. BOD measurement permits an estimate of the waste strength in terms of the amount of dissolved oxygen required to break down the wastewater.

2. It is essentially a measure of the biological and the chemical component of

the waste in terms of the dissolved oxygen needed by the natural aerobic biological systems in the wastewater to break down the waste under defined conditions.

3. Additionally, COD is often used to estimate BOD (Biochemical Oxygen Demand) as a strong correlation exists between COD and BOD, however COD is a much faster, more accurate test.

4. Cadmium emissions have increased dramatically during the 20th century, one reason being that cadmium-containing products are rarely re-cycled, but often dumped together with household waste.

5. In particular, the public should be aware of glazed food containers, which may leach lead into food.

1.2 Reading B: Sewage Treatment Technology

Treatment of sewage is essential to ensure that the receiving water into which the effluent is ultimately discharged is not significantly polluted. However, the degree of treatment required will vary according to the type of receiving water. Thus, a very high degree of treatment will be required if the effluent discharges to a fishery or upstream of an abstraction point for water supply. A lower level of treatment may be acceptable for discharges to coastal waters where there is rapid dilution and dispersion.

Sewage treatment involves:

- The removal of solids by physical screening or sedimentation.
- The removal of soluble and fine suspended organic pollutants by biological oxidation and adsorption processes.

Both forms of treatment produce sludge as by-products and these have to be treated and used or disposed of in an economical and environmentally acceptable way.

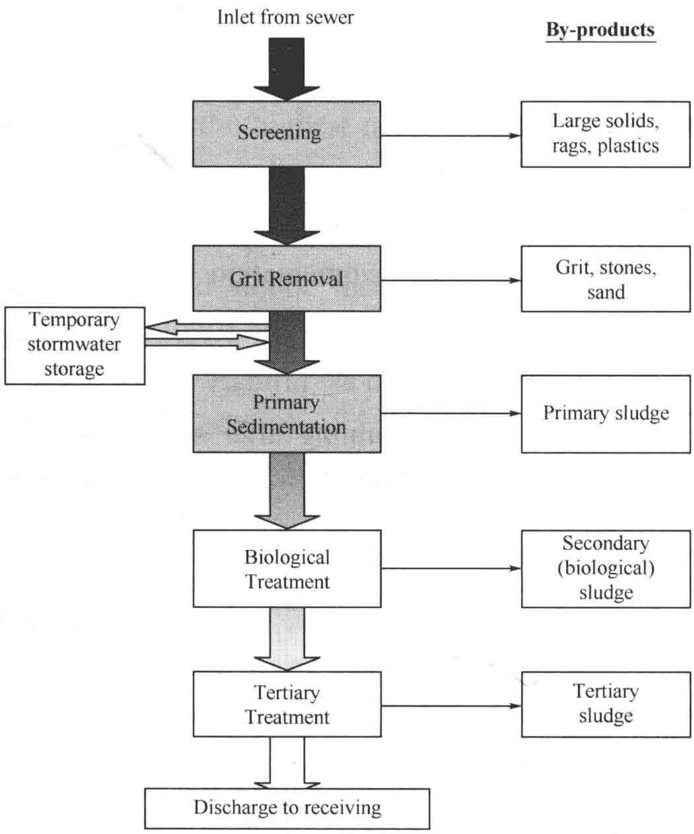
The following describes a typical sewage treatment sequence which is illustrated in Figure 1. In practice, there are many process variations employed according to locality and the standard of effluent required.

1.2.1 Preliminary Treatment

Screening

Large solids (plastics, rag, toilet paper residues) are removed first by mechanical screens. Traditionally, screening was used to remove only large solid material (> 25~30mm) in order to protect downstream operations. Nowadays, much finer screens (6mm mesh) are commonly employed to remove smaller inert solids. The material retained ('screenings') is usually washed to remove faecal matter and then compressed for disposal to landfill or to an incinerator.

This diagram shows a typical sewage treatment process.



Grit removal

At the next preliminary stage, fine mineral matter (grit and sand), originating mainly from road runoff, is allowed to deposit in long channels or circular traps. The retained solids are removed and usually sent to landfill for disposal.

Storm water diversion channel

At times of rainstorms, the flow of sewage into the works may be too high to be accommodated by the downstream treatment stages. In these circumstances, some of the flow may be diverted at this point to storm tanks where it is stored temporarily before returning it for treatment when the flow subsides.

At times of rainstorms, the flow of sewage into the works may be too high to be accommodated by the downstream treatment stages. In these circumstances, some of the flow may be diverted at this point to storm tanks where it is stored temporarily before returning it for treatment when the flow subsides. In extreme rainfall events an overflow of effluent from the storm tanks may pass directly to a watercourse.

1.2.2 Primary Treatment

Primary sedimentation

The sewage passes into large sedimentation tanks to provide a quiescent settlement period of about 8 hours. Most of the solids settle to the bottom of the tanks and form a watery sludge, known as 'primary sludge', which is removed for separate treatment. The sewage remaining after settlement has taken place is known as 'settled sewage'.

Secondary (biological) treatment

Settled sewage then flows to an aerobic biological treatment stage where it comes into contact with micro-organisms which remove and oxidise most of the remaining organic pollutants.

At smaller works, the biological stage often takes the form of a packed bed of graded mineral media through which the sewage trickles and on the surfaces of which the micro-organisms grow. At most larger works, the sewage is mixed for several hours with an aerated suspension of flocs of micro-organisms (known as the activated sludge process). As well as removing most of the polluting organic matter, modern biological treatment can, where necessary, remove much of the nitrogen and phosphorus in the sewage, thus reducing the nutrient load on the receiving waters.

Final settlement

Following secondary (biological) treatment, the flow passes to final settlement tanks where most of the biological solids are deposited as sludge (secondary sludge) while the clarified effluent passes to the outfall pipe for discharge to a watercourse. In the case of the activated sludge process, some of the secondary sludge is returned to the aeration tanks for further contact with the sewage. The secondary sludge from biological treatment also requires separate treatment and disposal and may be combined with the primary sludge for this purpose.

Tertiary treatment

In circumstances where the highest quality of effluent is required, a third (tertiary) stage of treatment can be used to remove most the remaining suspended organic matter from the effluent before it is discharged to a watercourse. Tertiary treatment is effected by sand filters, mechanical filtration or by passing the effluent through a constructed wetland such as a reed bed or grass plot.

1.2.3 Sludge Treatment

The following outlines the more common types of sludge treatment employed, of which various combinations are used according to the end product required.

Primary consolidation

As a first stage of treatment, sludge is passed through stirred tanks or subjected to centrifugation to reduce its water content and volume by up to 50 per cent. The separated liquor is returned to the sewage flow for treatment and the consolidated sludge passes forward for further processing.

Anaerobic digestion

Anaerobic digestion (AD) has been practised for more than 150 years. It is not new but still has huge unrealised potential if regulations did not inhibit co-digestion of wastes. In this process, consolidated liquid sludge is retained in an airtight tank (digester) and maintained at 35 deg. C for 12~20 days. Under the anaerobic conditions in the tank, various pathogens break down about half of the sludge organic matter and convert it into a gas containing about 65 per cent methane.

The gas is used to heat the digester and, in some cases, also to fuel gas engines to generate electricity. The sludge resulting from anaerobic digestion is much less offensive in odour than the untreated raw sludge and, with certain restrictions (Reference 2), is generally suitable for use in agriculture in liquid or solid form. Further consolidation of sludge after digestion, to reduce its volume, is a common practice.

Mechanical dewatering

Either untreated or digested sludge may be converted from a liquid to a sludge 'cake' by treating it first with a conditioning chemical which releases much of the water initially bound to the organic matter. Much of the free water is then removed from the sludge in a filter press, a belt filter or a centrifuge. The resultant sludge cake will have only 20 per cent of the volume and weight of the original sludge, thereby reducing subsequent handling and transport costs. The conversion of sludge to a solid form is essential prior to its disposal to landfill.

Incineration

This involves the burning of sludge at 850~900 deg. C to destroy its organic content and to leave a smaller residue of mineral ash for final disposal, usually to landfill. Incineration is only suitable for large sewage works and is used when the option of agricultural use of the sludge is not practicable. The process is carried out under closely controlled conditions and is subject to strict environmental regulation (the EU Waste Incineration Directive) to ensure that ambient air quality is not compromised by the combustion gases.

Thermal drying

Some sewage works in the UK employ thermal drying systems to convert the