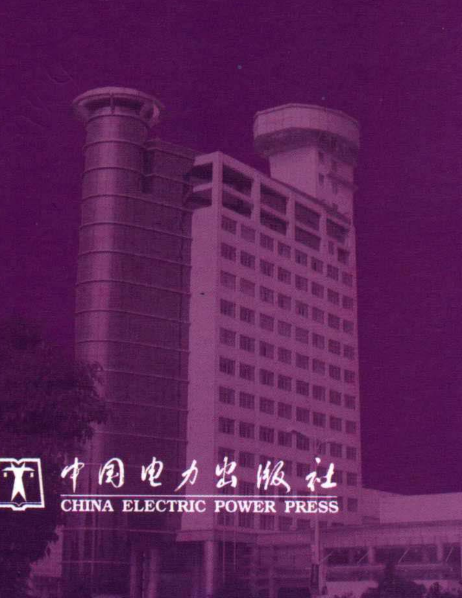
普通高等教育“十二五”规划教材

给水排水工程专业英语

徐金兰　黄廷林　编



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内 容 提 要

本书为普通高等教育“十二五”规划教材。全书分为教学阅读材料和补充阅读材料。教学阅读材料共有13个单元，即供水水源、水污染防治、水和废水处理方法、废水的组成、沉淀、过滤、混凝机理、活性炭吸附、水的软化、生物处理系统、活性污泥法、厌氧生物处理、废水的三级处理；补充阅读材料共有11个单元。本书结合编者多年的专业英语教学实践，充分吸收了近年来国内外给水排水工程新理论、新技术、新设备和新经验，体现给水废水处理技术的发展动态，符合给水排水工程方面的有关教学大纲，能达到给水排水工程专业的专业英语培养要求。

本书可作为普通高等院校给水排水工程专业教材，也可供给水排水设计、施工、管理和研究人员参考。

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前　言

本书结合编者多年的专业英语教学实践，充分吸收了近年来国内外给水排水工程新理论、新技术、新设备和新经验，体现给水废水处理技术的发展动态，符合给水排水工程方面的有关教学大纲，能达到给水排水工程专业的专业英语培养要求。

本书由13个单元教学阅读材料和11个单元补充阅读材料两部分组成。教学阅读材料涵盖给水排水工程的发展沿革以及给水和废水处理方法，重点介绍了给水处理中的混凝、沉淀、过滤等常规技术，以及活性炭吸附、软化等特殊处理技术；同时介绍了废水处理中常用的活性污泥处理、厌氧生物处理及三级处理技术。为了便于学生准确理解英文原文，每单元均配有必要的词汇表及其词组发音、参考译文。补充阅读材料重点介绍了废水处理中的好氧生物处理、厌氧消化及氧化、生物脱氮除磷、悬浮生长和生物膜反应器等生物处理技术，阐述了离子交换、膜滤及吸附等物化处理技术，对给水排水专业学生和相关技术人员查阅并获取英语专业文献中最新信息以及撰写英语文献的能力提高很有帮助和益处。

本书由西安建筑科技大学环境与市政工程学院徐金兰副教授和黄廷林教授编写，由西安建筑科技大学环境与市政工程学院副教授孙昕主审。

本书在编写过程中得到西安建筑科技大学环境与市政学院的大力支持，给排水教研室教师们提出了很多宝贵意见，在此表示衷心感谢！

限于编者水平，书中缺点错误难免，请读者不吝指教。

编　者

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Part 2　Supplementary Reading material

Part 1 Teaching Reading Material

Unit 1 Sources of Water Supply

All sources of water can be broadly classified under the following two categories: Surface water, and Ground water.

The surface water can further be sub-divided into the following categories: Streams, Lakes, Ponds, Rivers, and Impounded Reservoir.

The surface water sources are discussed with reference to the following impurities: Colour, Odour, Taste, Physical, Chemical, Bacterial.

(i) Streams. The impurities in the stream water are on account of clay, sand, colloidal and minerals by and large the water is colourless, odourless and tasteless.

Depending upon the strata through which water passes, it is likely to have mineral impurities, which may or may not be harmful. Water from streams and springs is the best source of supply.

(ii) Lakes. Lakes are formed in impervious bed. Since the water is not as free flowing as in the case of stream and springs, it is likely to be affected by bacterial impurities.

Lake water forms a good source of water supply, particularly if the lake is located at high altitude.

(iii) River. Because of the flowing nature of the water and continuous exposure to heat and light, it has self purification property. It is the major source of water supply for most of the water works.

The water carries sand, silt and clay with it. The intake point should be a good distance up-stream from the point at which sewage is discharged into the river.

(iv) Ponds. Comparatively small quantities of water may be collected from ponds, which are formed by depression in the plain. Because of the stagnant nature of water, it contains physical, chemical and bacterial impurities. It is invariably contaminated and unsuitable for water supply purposes.

(v) Impounded Reservoir. In most of the rivers there is considerable variation in the discharge between rainy season and dry season. Whereas water during the rains goes waste and occasionally causes flooding, there may be water scarcity or water famine during the summer months.

The difficulty has been partly overcome by storing water by constructing bund, weir or dam across the river.

The various sources of ground water are: Springs. Infiltration Galleries, Porous Pipe

Galleries, Wells.

The ground water is obtained by means of wells and tube wells. Wells may be classified into the following three categories:

(i) Open well or Dug well. These are normally 3 to 5 metres deep and are a normal source of supply for the villages.

(ii) Lined well. The wells are lined with bricks, stone or concrete. These wells are 10 to 20 metres deep.

(iii)Deep wells and Tube wells. These are the normal source of water supply in cities. They are used either alone or to augment the supply from rivers. In remote areas where irrigation facilities are not available, tube wells form the only source of irrigation wells.

New words and Expressions

source [sɔːs]	*n.*	源
supply [sə'plai]	*n.*	供给
broadly ['brɔːdli]	*ad.*	概略地，大致地
classify [/'klæsifai/]	*vt.*	分类
category ['kætigəri]	*n.*	种类，类别
surface ['səːfis]	*n.*	表面
ground [graund]	*n.*	地下
stream [striːm]	*n.*	小河，小溪
lake [leik]	*n.*	湖泊
pond [pɔnd]	*n.*	池塘
river ['rivə]	*n.*	江，河
impound [im'paund]	*vt.*	蓄水，储水
reservoir ['rezəvwɑː]	*n.*	水库
discuss [dis'kʌs]	*vt.*	论述，讨论
with reference to		关于，在……方面
impurity [im'pjuərəti]	*n.*	杂质，污染物
odour ['əudə]	*a.*	气味，臭味
taste [teist]	*n.*	味 tasteless *a.* 无味的
physical ['fizikəl]	*a.*	物理的
chemical ['kemikəl]	*a.*	化学
bacterial [bæk'tiəriəl]	*a.*	细菌的，细菌性的
on account of		由于
clay [klei]	*n.*	黏土，泥土
colloidal [kə'lɔidəl]	*n.*	胶体
by and large		一般而言

depending upon		根据，依……而定
stratum ['streitəm, 'stræ-, 'strɑ:-]	*n.*	地层，岩层（复数形式为 strata）；不透水层
be likely to		很可能
mineral ['minərəl]	*a.*	无机的，矿质的
harmful ['hɑ:mful]	*a.*	有害的
spring [spriŋ]	*n.*	泉
impervious [im'pə:viəs]	*a.*	不透水的 impervious bed 不透水层
free flowing		通畅地流动
affect [ə'fekt, 'æfekt]	*vt.*	改变，损害
locate [ləu'keit]	*vt.*	位于
altitude ['æltitju:d]	*n.*	高程，海拔
exposure [ik'spəuʒə]	*n.*	暴露 exposure to 暴露于
purification [ˌpjuərifi'keiʃən]	*n.*	净化
self purification		自净
property ['prɔpəti]	*n.*	性质，特点
water works		供水工程，给水工程
silt [silt]	*n.*	粉砂，淤泥
intake point		取水口位置（地点）
a good distance		相当的距离
upstream ['ʌp'stri:m]	*ad.*	向上游
sewage ['sju:idʒ]	*v.*	污水
discharge [dis'tʃɑ:dʒ, 'distʃɑ:dʒ]	*v.*	排出，排放
comparatively [kəm'pærətivli]	*ad.*	相对地，比较
quantity ['kwɔntəti]	*n.*	量
collect [kə'lekt]	*v.*	收集，集聚
depression [di'preʃən]	*n.*	凹陷
plain [plein]	*n.*	平原，平地
stagnant ['stægnənt]	*a.*	污浊的，滞留的
invariably [in'vεəriəbli]	*ad.*	总是
contaminate [kən'tæmineit]	*vt.*	污染
unsuitable [ˌʌn'sju:təbl]	*a.*	不适宜的
considerable [kən'sidərəbl]	*a.*	相当大的，可观的
variation [ˌvεəri'eiʃən]	*n.*	变化
rainy season		雨季
dry season		旱季
waste [weist]	*a.*	废弃的，剩余的，多余的
flooding ['flʌdiŋ]	*a.*	泛滥，淹没
scarcity ['skεəsəti]	*n.*	缺乏
famine ['fæmin]	*n.*	供不应求的

store [stɔː]	*vt.*	储备
construct [kən'strʌkt]	*vt.*	修建，建造
bund [bʌnd]	*n.*	堤
weir [wiə]	*n.*	堰，低坝
dam [dæm]	*n.*	坝
gallery ['gæləri]	*n.*	长廊，集水道
infiltration gallery		渗渠
porous ['pɔːrəs]	*a.*	多孔的，能透水的
by means of		借助于，通过
well [wel]	*n.*	井 tube well 管井
open well		敞口井，大口井
dug well		开挖的井
lined [laind]	*a.*	衬砌着的，加衬里的
concrete [kən'kriːt, 'kɔnkriːt]	*n.*	混凝土
augment [ɔːg'ment, 'ɔːgmənt]	*v.*	增加，补充
remote [ri'məut]	*a.*	偏远的
irrigation [ˌiri'geiʃən]	*n.*	灌溉
facility [fə'siliti]	*n.*	装置

【译文】

第一单元 供 水 水 源

一切水源可概略分为以下两类：地表水和地下水。

地表水可进一步细分为以下几种：溪流、湖泊、池塘、河流、蓄水库。

本文将按照下列所含杂质的情况，讨论地表水水源：色度、气味、口感、物理杂质、化学杂质、细菌。

（1）溪流。溪流中的杂质主要是黏土、砂、胶体和矿物质。一般而言，溪水无色、无臭、无味。根据水流通过的岩层不同，水中很可能含有矿物杂质。这些杂质可能无害，也可能有害。溪水和泉水是优良的供水水源。

（2）湖泊。湖泊形成于不透水的基层之上。由于湖水不能像溪流和泉水那样通畅地流动，因而很可能被含有细菌的杂质污染。

湖水是良好的供水水源，特别是位于海拔较高的湖泊。

（3）河流。由于河水的流动性，以及不断暴露于热和阳光中，河流具有自净作用。河流是绝大多数给水工程的主要供水水源。

河水带有砂砾、淤泥和黏土。河水取水点应位于污水排放口上游足够远的地方。

（4）池塘。池塘由平坦地区的凹地形成，从池塘中可汇聚的水量相对而言较少。因为水流停滞不畅，使其中含有物理的、化学的和细菌类的杂质。这种水总受到污染，因而不适于作为供水水源。

（5）蓄水库。大多数河流在雨季和旱季的水量变化相当大。降雨时期，水量过剩，有时还造成洪水泛滥；而在夏季，水量缺少，供不应求。

横跨河流修建堤、堰、坝以蓄水，已使上述困难得到了一定程度的解决。

各地下水源有泉、渗渠、多孔管渗渠和井。

地下水可通过井和管井取得，井可分为以下三种；

（1）敞口井或开挖井。一般深 3～5m，是乡村主要的供水水源。

（2）衬砌井。井内壁有砖、石或混凝土的衬砌。这种井深度为 10～20m。

（3）深水井和管道井。这是城市给水工程通常的水源。它们可以作为单独的供水水源，也可作为河流供水水源的补充水源。在没有灌溉设施的偏远地区，管井就成为唯一的灌溉水源了。

Unit 2 Combating Water Pollution

Effective pollution control systems depend on policies that combine technical, economic, social, and aesthetic considerations. The decisions involved require answers to many complex questions. How can we provide water of what quality, when, how much, to what people, and for what purposes? Who is to be restrained from putting how much of what kinds of wastes into what parts of the water system? Who is to be permitted to use waters for waste disposal and under what terms and conditions? Who will pay the high cost of protecting surface and ground waters?

The extreme view of demanding absolutely clean or pure water is as unacceptable as uncontrolled water pollution, since technical and financial feasibility must be included in all practical considerations of the problem.

There are several ways in which water pollution can be combated. First, through treatment of wastewater to make water reusable and of high quality. Second, by the enactment and enforcement of governmental regulations prohibiting and limiting pollution of water. Third, by development of practices and techniques that will prevent or limit the natural runoff of pollutants—for example, from agricultural areas—into water.

The traditional method of controlling water pollution in the United Stated has been to collect waste in a system of sewers and transport it to a waste treatment plant where the wastewater is treated for discharge into streams and for reuse.

There are two kinds of sewer systems—combined and separate. Combined sewers carry both water polluted by human use and storm water polluted as it drains off homes, streets, or land. In separate systems, sanitary sewers carry only sewage, while storm sewers carry the large volumes of storm runoff water. During dry weather when combined sewers are handling only the normal amount of wastewater, all of it is carried to the waste treatment plant. But during wet weather, only the normal amounts of wastewater, all of it is carried to the waste treatment plant, part of the water, including varying amounts of raw sewage, often bypass the treatment plant and flow directly into receiving streams. In theses cases, the process of dilution is depended on how to minimize the pollution, but this is a highly undesirable situation.

Wastewater is usually treated by two processes, called primary and secondary treatments. In primary treatment, solids are allowed to settle out from the water, and the effluent from the tank is then treated by chlorination to kill disease-causing bacteria and reduce odours. Although 30% of the municipalities in the United States give sewage only primary treatment, this process is inadequate for most water needs. In secondary treatment, up to 90% of organic material in sewage is removed simply by making use of the bacteria in the organic material. In this process the effluent leaving sedimentation tanks is acted on by bacteria that consume a substantial amount of the organic material in the sewage. Secondary treatment is completed by the addition of chlorine, which kills more than 90% of harmful bacteria in the effluent. In a very few areas, notably near Lake Tahoe, water is subjected to advanced tertiary treatment involving many, notably near Lake Tahoe, water is subjected to advanced tertiary ·treatment involving many new processes that further purify the water.

In areas lacking a sewer system or treatment plant, lagoons or septic tanks are used. A septic tank receives wastewater from home and holds it while bacteria in the sewage break down the organic material so that clearer water flows out into a leaching field. Lagoons that provide for proper depth and detention while sunlight, algae and oxygen interact can also restore water to a quality equal to that provided by the standard secondary treatment.

New words and Expressions

aesthetic [i:s'θetik]	*a.*	美学的
restrain...from (doing)		制止……（干）……
waste disposal		废物处理
feasibility [fi:zə'biliti]	*a.*	可行性
enactment [i'næktmənt]	*n.*	颁布
enforcement [in'fɔ:smənt]	*n.*	实施
combined sewer(system)		合流制下水管（系统）
separate sewer(system)		分流制下水管（系统）
drain off		把……拔除
bypass ['baipɑ:s, -pæs]	*vt.*	越过，绕……走
minimize ['minimaiz]	*vt.*	最小化
dilute [dai'lju:t, di-]	*vt.*	冲淡
settle out		沉淀出来
municipality [mju:ˌnisi'pæləti]	*n.*	市；市政府
undesirable [ˌʌndi'zaiərəbl]	*a.*	讨厌的；令人不快的
inadequate [in'ædikwit]	*a.*	不足的；不适当的
be acted on		受……作用
notably ['nəutəbli]	*ad.*	显著地；著名地
tertiary ['tə:ʃəri]	*a.*	第三级的
leach [li:tʃ]	*vt.*	滤去（物质）
leaching ['li:tʃiŋ]		渗滤场
septic ['septik]	*a.*	引起腐烂的
septic tank		化粪池

detention [di'tenʃən]	*n.*	滞留
interact ['intərækt]	*vi.*	互相作用，互相影响

【译文】

第二单元 水污染防治

有效的污染控制系统取决于综合考虑技术、经济、社会及美学因素而制订出来的决策。这些决策必须回答许多复杂的问题。例如，我们供应何种水质的水、什么时候、提供多少、向什么人、为了什么目的？谁将受到限制而不允许向水系中的哪一部分排入多少哪一类的废水？谁在什么条件、什么情况下被允许利用水体来处置废物？谁将付出高昂的费用来保护地表和地下水体？

要求绝对清洁或绝对纯净水的那种极端的观点就像要求对水的污染不加控制一样是不可接受的，因为在实际思考问题时必须考虑技术和经济上的可行性。

有几种防治水污染的方法。第一，通过废水处理可使水再利用和具有好的水质；第二，颁布和实施各项政府法规来禁止和限制水体的污染；第三，开发一些技术来防止或限制天然污染径流（例如，从农业区域排出的天然污染物径流）进入水体。

美国控制水污染的传统方法是将废水收集在污水管道系统中，并将其输送到污水处理厂，在处理厂将污水加以处理以便排入河流或重用。

有两类污水管道系统：合流制系统和分流制系统。合流下水管道既输送经人们利用后污染的水，又输送从住房、街道或大地排泄的受污染了的雨水。在分流制系统中，污水管道只输送生活污水，而大量的雨水径流则由雨水道输送。在旱季，合流下水道只输送正常的污水量，这部分污水全部被送至污水处理厂。但在雨季，合流下水道仅输送正常水量的污水至污水处理厂。其中一定数量未经处理的生活污水，常常会跨越污水处理厂直接排入受纳河流。在这种情况下，可以依靠稀释作用减少污染，但这是一种很糟糕的情况。

废水通常采用两种工艺过程进行处理，称为一级处理和二级处理。在一级处理中，固体物质从水中沉淀出来，然后沉淀池的出水通过加氯处理以杀灭致病细菌和降低臭味。虽然美国有 30%的城市对生活污水只进行一次处理，但该工艺过程不能满足大多数用水的要求。在二级处理中，只要有利用有机物的细菌就能去除生活污水中 90%以上的有机物。在该工艺过程中，沉淀池的出水受细菌作用，细菌会消耗污水中大量的有机物质。二级处理的最后工序是投氯以杀灭出水中 90%以上的有害细菌。在极少数的一些地区，如著名的塔霍湖附近区域，废水要进行三级处理，包括深度处理的许多新工艺。

在缺少下水道系统或污水处理厂的地区，可采用氧化塘或化粪池。化粪池接收并储存家庭生活废水，让污水中的细菌破坏有机物以便清洁的水流进渗滤场。氧化塘具有适当的水深及停留时间，在太阳光、藻类和氧的综合作用下，也可使水恢复至水质相当于标准二级处理可能提供的水质程度。

Unit 3 Water and Wastewater Treatment Methods

Over the years, a variety of methods have been developed for the treatment of water and wastewater. In most situations, a combination or sequence of methods will be needed. The specific sequence required will depend on the quality of the untreated water or wastewater and the desired quality of the product. Although treating water is relatively inexpensive on a per-cubic-metre basis; there is little opportunity to modify water quality directly in most natural systems such as streams, lakes, and groundwaters because of the large volumes involved. Rather, what is done is to treat the water used for public water supplies and to treat wastewater before it is returned to the environment in engineered systems.

A wide variety of contaminants that may be found in water and wastewater were identified. Contaminants that may have to be removed from groundwater, surfacewater, and wastewater to meet specific water quality objectives are identified in Table 3.1. Because of their importance, treatment methods for contaminants of anthropogenic origin are also considered.

[Water treatment methods] The most important objective of water treatment is to produce water that is biologically and chemically safe for human consumption. Quality requirements similar to those for domestic use will generally apply for most industrial users. In some cases, such as in the manufacture of printed circuits, even higher quality requirements may have to be met.

Table 3.1 Typical contaminants found in various waters that may need to be removed to meet specific water quality objectives*

	Typical contaminants found in		
Class	Groundwater	Surfacewater	Wastewater
Floating and suspended materials	None	Branches, leaves, algal mats, soil particles	Wood, rags, paper, grit, food wastes, feces
Colloidal materials	Microorganisms, trace organic and inorganic constituents①	Clay, silt, organic materials, pathogenic organisms, algae, other microorganisms	Food wastes, feces, pathogenic bacteria, other microorganisms, silt
Dissolved materials	Iron and manganese, hardness ions, inorganic salts, trace organic compounds	Organic compounds, tannic acids, hardness ions, inorganic salts	Organic compounds (e. g., BOD)nutrients, heavy metals, inorganic salts
Dissolved gases	Carbon dioxide, hydrogen sulfide	②	Ammonia, hydrogen sulfide, methane
Immiscible liquids	③	Oils and greases	Oils and greases

* Specific water quality objectives may be related to drinking water standards, industrial use requirements, effluent discharge requirements, or agricultural reuse.

① Typically of anthropogenic origin.

② Gas super saturation may have to be reduced if surface water is to be used in fish hatcheries.

③ Unusually in natural groundwater aquifers.

The principal contaminants found in water and the unit operations and processes used for their removal are summarized in Table 3.2. As noted there, commonly used water treatment methods are either physical operations or chemical processes. Biological processes as are not used because appreciable amounts of organic matter are not present in most natural waters and biological processes are not suitable in situations where contaminant concentrations are low. In general, effluents from biological treatment processes do not meet source standards for domestic water supplies. However, many community water supplies contain treated effluents from upstream wastewater discharges, but dilution and the assimilative capacity of the receiving water are sufficient to make the mixture acceptable as a water supply source.

Table 3.2 Unit operations, processes, and treatment systems used to remove the major contaminants found in water

Contaminant	Unit operation, unit process or treatment system	Classification*
Pathogenic organisms	Chlorination, ozonation	C, C
Turbidity and suspended matter	Screening, sedimentation, filtration	P, P, P
Color	Coagulation/flocculation/sedimentation/filtration Adsorption, ion exchange	C/P/P/P P, C
Tastes and odors	Coagulation/flocculation/Sedimentation/ filtration	C/P/P/P
Organic matter	Oxidation (aeration), adsorption Chemical oxidation Adsorption, ion exchange, ozonation	C, P C P, C, C
Hardness ions (Ca^{2+}, Mg^{2+})	Coagulation/flocculation/sedimentation/filtration Chemical precipitation, ion exchange	C/P/P/P C, C
Dissolved gases	Aeration, vacuum deaeration Chlorination, ion exchange	P, P C, C
Heavy metals	Chemical precipitation, ion exchange	C, C C,
Iron and manganese	Ion exchange, oxidation/precipitation/filtration	C/P/P
Dissolved solids	Reverse osmosis, distillation	P, P

* C=chemical, P=physical.

[Wastewater treatment methods] The principal objective of wastewater treatment is to produce an effluent that can be discharged without causing serious environmental impacts. The principal contaminants found in wastewater and the unit operations and processes used for their removal are summarized in Table 3.3. Processes and operations used in wastewater treatment are similar to those used in water treatment, except for biological methods. The principal use of biological treatment is for the removal of easily biodegradable organic compounds, although biological processes are also used for removal of nitrogen and phosphorus in some situations. A large number of biological process configurations are in use, and several combine physical operations and chemical and biological processes are within the same unit.

Table 3.3 Unit operations, processes, and treatment systems used to remove the major contaminants found in wastewater

Contaminant	Unit operation, unit process or treatment system	Classification*
Suspended solids	Screening and comminution, sedimentation Flotation, filtration Coagulation/sedimentation, land treatment	P, P P, P C/P, P
Biodegradable organics	Activated sludge, trickling filters Rotating biological contactors aerated lagoons	B/B B/B
Pathogens	Oxidation ponds, physical/chemical Intermittent sand filtration, land treatment Chlorination, ozonation, land treatment	B, P/C P/B, B/C/P C, C, P
Nutrients Nitrogen	Suspended-growth nitrification and denitrification Fixed-film nitrification and denitrification Ammonia stripping, ion exchange Breakpoint chlorination, land treatment	B B C/P, C C, B/C/P
Phosphorus	Metal salt coagulation/sedimentation Lime coagulation/sedimentation Biological/chemical phosphorus removal Land treatment	C/P C/P B/C C/P
Refractory organics	Carbon adsorption, tertiary ozonation Land treatment systems	P/C P
Heavy metals	Chemical precipitation, ion exchange Land treatment	C/C C/P
Dissolved inorganic solids	Ion exchange, reverse osmosis, electrodialysis	C/P/C

* B=biological, C=chemical, P=physical.

[Contaminated groundwater treatment methods] Serious health and environmental hazards exist in a wide variety of chemicals of anthropogenic origin that have been found in both surface waters and groundwaters. The principal objectives to be met in treating contaminated groundwaters are to eliminate the health hazards and to restore, to the extent possible, the quality of the groundwater. Treatment methods for contaminated groundwaters are listed in Table 3.4.

Table 3.4 Unit operations, processes, and treatment systems used to remove the major contaminants found in groundwater

Contaminant	Unit operation, unit process or treatment system	Classification*
Acids and alkalis	Membrane separation/reuse neutralization	P C
Biodegradable organics	Activated sludge, aerobic filtration Aerobic ponds, anaerobic digestion	B B

Continued

Contaminant	Unit operation, unit process or treatment system	Classification*
Heavy metals	Adsorption (traces), chemical reduction	P, C
	Gravimetric separation, precipitation	P, C
Inorganic ions and salts	Adsorption (traces)	P
	Encapsulation/fixation, gravimetric separation	P, P
	Membrane separation/reuse, landfill	P,P
	Precipitation	C
Organ-metallic compounds	Adsorption (traces)	P
	Chemical oxidation/reduction	C
	Gravimetric separation	P
Reactive ions and compounds Refractory organics	Chemical oxidation/reduction	C
	Encapsulation/fixation, dissolving, hydrolysis	P, C, C
	Chemical oxidation，incineration	C, C
Solvents and oils	Solvent extraction/incineration	C
	Solvent extraction/reuse	C
	Acid/caustic stripping, distillation	C, P
	Evaporation, filtration, steam stripping	P, P, P
	Gravimetric separation, incineration	P, C

* B=biological, C=chemical, P=physical.

New Words and Expressions

engineer [endʒi'niə]	*v.*	设计，操纵
contaminant [kən'tæminənt]	*n.*	污染物
coagulation [kəu'ægju'leiʃən]	*n.*	混凝（作用），凝聚
flocculation [flɔkju'leiʃən]	*n.*	絮凝（作用）
algal ['ælgəl]	*a.*	藻类的
grit [grit]	*n.*	砂砾，金属屑
feces ['fi:si:z]	*n.*	排泄物，粪便
silt [silt]	*n.*	泥砂，淤泥
algae ['ældʒi:]	*n. pl.*	藻类
trace [treis]	*n.*	痕量，微量
immiscible [i'misəbl]	*a.*	不混合的，不混溶的
colloidal [kə'lɔidl]	*a.*	胶体[态]的
assimilative [ə'similətiv]	*a.*	同化的，吸收的
biodegradable [baiəudi'greidəbəl]	*a.*	可生物降解的
screening ['skri:niŋ]	*n.*	筛选[分]，筛屑，（金属），网眼
adsorption [æd'sɔ:pʃən]	*n.*	吸附（作用）
deaeration [dieiə'reiʃən]	*n.*	除气[氧]，脱气[氧]
osmosis [ɔz'məusis]	*n.*	渗透
distillation [disti'leiʃən]	*n.*	粉碎，破碎