МІНІСТЕРСТВО ОСВІТИ І НАУКИ, МОЛОДІ ТА СПОРТУ УКРАЇНИ
ХАРКІВСЬКА НАЦІОНАЛЬНА АКАДЕМІЯ МІСЬКОГО ГОСПОДАРСТВА

МЕТОДИЧНІ ВКАЗІВКИ
ДЛЯ ПРАКТИЧНИХ ЗАНЯТЬ
З ДИСЦИПЛІНИ
«ІНОЗЕМНА МОВА»

(англійська мова)

для студентів 2 курсу заочної форми навчання
освітньо-кваліфікаційного рівня бакалавр
напрямів підготовки 6.060103 «Гідротехніка (Водні ресурси)» та
6.060101 «Будівництво» спеціальності «Водопостачання та водовідведення»

Харків – ХНАМГ – 2012

Методичні вказівки для практичних занять з дисципліни «Іноземна мова» (англійська мова) для студентів 2 курсу заочної форми навчання освітньо-кваліфікаційного рівня бакалавр напрямів підготовки 6.060103 «Гідротехніка (Водні ресурси)» та 6.060101 «Будівництво» спеціальності «Водопостачання та водовідведення» / Харк. нац. акад. міськ. госп-ва; уклад.: О. О. Костенко. – Х.: ХНАМГ, 2012. – 40 с.

Укладач: О. О. Костенко

Рецензент: канд. філол. наук, доцент кафедри іноземних мов О. Л. Ільєнко

Рекомендовано кафедрою іноземних мов,
протокол № 1 від 28.08.2012 р.

CONTENT:

Introduction **4**
UNIT 1 Usage of Water **5**
UNIT 2 Wastewater **10**
UNIT 3 Water Treatment **19**
UNIT 4 Sewerage **23**
UNIT 5 Pollution **29**
References **39**

INTRODUCTION

These educational materials are designed for the ESP students of the 2nd year of studies of the speciality “Water Supply and Distribution” to develop their knowledge and skills in technical English according to their profession.

This manual is based on the authentic texts from different sources concerning water supply and distribution problems. It contains the tasks for reading and translation, speaking, writing, vocabulary tasks, texts and tasks for summarizing. The manual consists of 5 units and is expected to be covered during practical classes.

Each unit contains:

- pre-reading activity
- an authentic text for reading, translation and discussion in class;
- comprehension exercises;
- exercises for memorization and mastering key vocabulary;
- texts for summarizing.

UNIT 1

USAGE OF WATER

Usage of fresh water

1. Find the following words using the vocabulary:

1. sewage	
2. consumptive	
3. irrigation	
4. run-off	
5. demand for	
6. estimate	
7. refinery	
8. enhance	
9. artificial	
10. whitewater boating	

2. Match the opposites:

1) renewable	a) minimize
2) produce	b) profitable
3) expensive	c) increase
4) enlarge	d) cooling (system)
5)unavailable	e) worst
6) reduce	f) consume
7) unprofitable	g) natural
8) improvement	h) non-renewable
9) artificial	i) available
10) heating	j) cheap

Usage of fresh water can be categorized as consumptive and non-consumptive (sometimes called "renewable"). A use of water is consumptive if that water is not immediately available for another use. Losses to sub-surface seepage and evaporation are considered consumptive, as is water incorporated into a product (such as farm produce). Water that can be treated and returned as surface water, such as sewage, is generally considered non-consumptive if that water can be put to additional use.

Agricultural

A farm in Ontario

It is estimated that 69% of world-wide water use is for irrigation, with 15-35% of irrigation withdrawals being unsustainable. In some areas of the world irrigation is necessary to grow any crop at all, in other areas it permits more profitable crops to be grown or enhances crop yield. Various irrigation methods involve different trade-offs between crop yield, water consumption and capital cost of equipment and structures. Irrigation methods such as most furrow and overhead sprinkler irrigation are usually less expensive but also less efficient, because much of the water evaporates or runs off. More efficient irrigation methods include drip or trickle irrigation, surge irrigation, and some types of sprinkler systems where the sprinklers are operated near ground level. These types of systems, while more expensive, can minimize runoff and evaporation. Any system that is improperly managed can be wasteful. Another trade-off that is often insufficiently considered is salinization of sub-surface water. Aquaculture is a small but growing agricultural use of water. Freshwater commercial fisheries may also be considered as agricultural uses of water, but have generally been assigned a lower priority than irrigation. As global populations grow, and as demand for food increases in a world with a fixed water supply, there are efforts underway to learn how to produce more food with less water, through improvements in irrigation methods and technologies, agricultural water management, crop types, and water monitoring.

Industrial

A power plant in Poland.

It is estimated that 15% of world-wide water use is industrial. Major industrial users include power plants, which use water for cooling or as a power source (i.e. hydroelectric plants), ore and oil refineries, which use water in chemical processes,

and manufacturing plants, which use water as a solvent. The portion of industrial water usage that is consumptive varies widely, but as a whole is lower than agricultural use.

Household

Drinking water.

It is estimated that 15% of world-wide water use is for household purposes. These include drinking water, bathing, cooking, sanitation, and gardening. Basic household water requirements have been estimated by Peter Gleick at around 50 liters per person per day, excluding water for gardens.

Recreational

Whitewater rapids.

Recreational water use is usually a very small but growing percentage of total water use. Recreational water use is mostly tied to reservoirs. If a reservoir is kept fuller than it would otherwise be for recreation, then the water retained could be categorized as recreational usage. Release of water from a few reservoirs is also timed to enhance whitewater boating, which also could be considered a recreational usage. Other examples are anglers, water skiers, nature enthusiasts and swimmers. Recreational usage is usually non-consumptive. Golf courses are often targeted as using excessive amounts of water, especially in drier regions. It is, however, unclear

whether recreational irrigation (which would include private gardens) has a noticeable effect on water resources. This is largely due to the unavailability of reliable data. Some governments, including the Californian Government, have labeled golf course usage as agricultural in order to deflect environmentalists' charges of wasting water. However, using the above figures as a basis, the actual statistical effect of this reassignment is close to zero.

Additionally, recreational usage may reduce the availability of water for other users at specific times and places. For example, water retained in a reservoir to allow boating in the late summer is not available to farmers during the spring planting season. Water released for whitewater rafting may not be available for hydroelectric generation during the time of peak electrical demand.

Environmental

Explicit environmental water use is also a very small but growing percentage of total water use. Environmental water usage includes artificial wetlands, artificial lakes intended to create wildlife habitat, fish ladders around dams, and water releases from reservoirs timed to help fish spawn. Like recreational usage, environmental usage is non-consumptive but may reduce the availability of water for other users at specific times and places. For example, water release from a reservoir to help fish spawn may not be available to farms upstream.

3. Match words with their definitions:

1. sewage	a) the protection of public health by removing and treating waste, dirty water etc;
2. reservoir	b) a building where electricity is produced to supply a large area [= power station]
3. sanitation	c) an activity that you do for pleasure or amusement
4. crop	d) a lake, especially an artificial one, where water is stored before it is supplied to people's houses;
5. power plant	e) the amount of wheat, rice, fruit etc that is produced in a season [= harvest]
6. fishery (plural fisheries)	f) the mixture of waste from the human body and used water that is carried away from houses by pipes under the ground
7. recreation	g) a part of the sea where fish are caught in large numbers

4. Complete the table.

Usage of water:	**Advantages**	**Disadvantages**
Agricultural		
Recreation.		
Environmental		
Industrial		
Household		

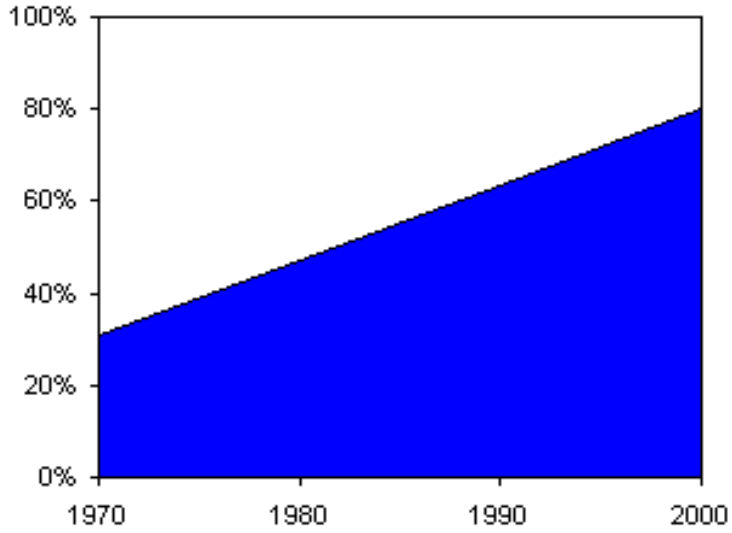
5. Complete these sentences with the following words:

**available for *to grow *rafting *amounts of *be considered *specific times*

1. A use of water is consumptive if that water is not immediately _____ another use.
2. In some areas of the world irrigation is necessary _____ any crop at all.
3. Water released for whitewater _____ may not be available for hydroelectric generation during the time of peak electrical demand.
4. Golf courses are often targeted as using excessive _____ water, especially in drier regions.
5. Freshwater commercial fisheries may also _____ as agricultural uses of water, but have generally been assigned a lower priority than irrigation.
6. Recreational usage may reduce the availability of water for other users at _____ and places.

6. Make up a summary of this text completing the following sentences:

1. The article (paper)
   - is headlined .....
   - about .....
   - carries information on .....
   - informs the reader of .....
2. Among the other problems the article raises the problem .....
3. The author gives some facts concerning .....
4. The author states that (thinks, emphasizes, explains, describes, presents) .....
5. Upon reading the paper, one realizes that .....
6. The paper surveys briefly (presents some interesting facts concerning) .....



Water stress

Best estimate of the share of people in developing countries with access to drinking water 1970–2000.

The concept of water stress is relatively simple: According to the World Business Council for Sustainable Development, it applies to situations where there is not enough water for all uses, whether agricultural, industrial or domestic. Defining thresholds for stress in terms of available water per capita is more complex, however,

entailing assumptions about water use and its efficiency. Nevertheless, it has been proposed that when annual per capita renewable freshwater availability is less than 1,700 cubic meters, countries begin to experience periodic or regular water stress. Below 1,000 cubic meters, water scarcity begins to hamper economic development and human health and well-being.

UNIT 2

WASTEWATER

Wastewater. Origins of Wastewater

1) Wastewater is any water that has been adversely affected in quality by anthropogenic influence. It comprises liquid waste discharged by domestic residences, commercial properties, industry, and/or agriculture and can encompass a wide range of potential contaminants and concentrations. In the most common usage, it refers to the municipal wastewater that contains a broad spectrum of contaminants resulting from the mixing of wastewaters from different sources.

2) Wastewater or sewage can come from:

Human waste: so called *black water* from lavatories; sewage treatment plant discharge; washing water, rainfall collected on roofs, yards.

Industrial waste: industrial site drainage, industrial process waters, organic, inorganic , extreme pH, agricultural drainage.

3) The composition of wastewater varies widely. This is a partial list of what it may contain: water (> 95%), pathogens, organic particles, inorganic particles, soluble inorganic material, animals, gases, emulsions, toxins.

4) Some industrial facilities generate ordinary domestic sewage that can be treated by municipal facilities. Industries that generate wastewater with high concentrations of conventional pollutants, toxic pollutants or other nonconventional pollutants such as ammonia need specialized treatment systems. Some of these facilities can install a pre-treatment system to remove the toxic components, and then send the partially-treated wastewater to the municipal system. Industries generating large volumes of wastewater typically operate their own complete on-site treatment systems.

Some industries have been successful at redesigning their manufacturing processes to reduce or eliminate pollutants, through a process called pollution prevention.

5) Sedimentation is often used as a primary stage in modern waste water treatment plant. Due to the large amount of reagent necessary to treat domestic wastewater, preliminary chemical coagulation and flocculation are generally not used, remaining suspended solids being reduced by following stages of the system.

6) Sediment (loose soil) washed off fields is the largest source of agricultural pollution in the United States. Farmers may utilize erosion controls to reduce runoff

flows and retain soil on their fields. Common techniques include contour plowing, crop mulching, crop rotation, planting perennial crops and installing riparian buffers.

7) Nutrients (nitrogen and phosphorus) are typically applied to farmland as commercial fertilizer. Nutrients may also enter runoff from crop residues, irrigation water, wildlife, and atmospheric deposition. Farmers can develop and implement nutrient management plans to reduce excess application of nutrients.

1. Arrange the paragraph titles in the right order:

A. Agricultural wastewater.
B. Nutrient management.
C. Waste Water Treatment.
D. Wastewater constituents.
E. Wastewater origin.
F. Industrial wastewater.
G. Sedimentation.

2. Answer the questions:

1. What is wastewater?
2. What does wastewater consist of?
3. What is an origin of wastewater?
4. What do you know about nutrients?
5. What do some plants do to treat wastewater?

3. Match the following pollutants with their groups:

Pathogens	protozoa, insects, arthropods, small fish
Gases	paints, adhesives, mayonnaise, hair colourants
Emulsions	hairs, food, paper, plant materials
Organic particles	sand, metal particles, ceramics
Toxins	hydrogen sulphide, carbon dioxide, methane
Animals	ammonia, road-salt, sea-salt
Soluble inorganic material	bacteria, viruses and parasitic worms
Inorganic particles	pesticides, poisons, herbicides.

Sewage.

Sewage is created by residences, institutions and commercial and industrial establishments. Raw sewage includes household waste liquid from toilets, baths, showers, kitchens, sinks that is disposed of via sewers. In many areas, sewage also includes liquid waste from industry and commerce.

The separation and draining of household waste into grey water and black water is becoming more common in the developed world, with grey water being permitted to be used for watering plants or recycled for flushing toilets. Municipal wastewater therefore includes residential, commercial, and industrial liquid waste discharges, and may include storm water runoff.

Domestic sewage is 99.9% pure water; the other 1% is pollutants. These pollutants although small, pose risk on a large scale. In urban areas, domestic sewage is typically treated by centralized sewage treatment plants. In the U.S., most of these

plants are operated by local government agencies. Municipal treatment plants are designed to control conventional pollutants. Well-designed and operated systems can remove 90 percent or more of these pollutants. Some plants have additional sub-systems to treat nutrients and pathogens. Most municipal plants are not designed to treat toxic pollutants found in industrial wastewater.

Sewage systems capable of handling storm water are known as combined systems or combined sewers. Such systems are usually avoided since they complicate and thereby reduce the efficiency of sewage treatment plants owing to their seasonality. The variability in flow also leads to often larger than necessary, and subsequently more expensive, treatment facilities. In addition, heavy storms that contribute more flows than the treatment plant can handle may overwhelm the sewage treatment system, causing a spill or overflow. It is preferable to have a separate storm drain system for storm water in areas that are developed with sewer systems.

As rainfall runs over the surface of roofs and the ground, it may pick up various contaminants including soil particles and other sediment, heavy metals, organic compounds, animal waste, and oil and grease. Examples of treatment processes used for storm water include sedimentation basins, wetlands, buried concrete vaults with various kinds of filters, and vortex separators.

1. Answer the questions:

1. How sewage is created?
2. What does raw sewage consist of?
3. What is a combined sewer?
4. Do you know the examples of treatment processes used for storm water?

2. Match the words with their definitions:

organic compounds	to pass a substance through a system again for further treatment
contaminate	the precipitation in the form of raindrops
sewage	relating to living plants or animals
rainfall	any combination of two or more parts
compound	to make impure by touching or mixing, pollute
recycle	waste matter from domestic or industrial establishments

3. Complete the sentences:

1. Sewage is created by_____
2. Raw sewage includes_____
3. The separation and draining of household waste into grey water and black water is becoming _____
4. It is preferable to have a separate storm drain system for_____
5. Sewage systems capable of_____
6. Municipal wastewater therefore includes_____
7. Sewage also includes liquid waste from_____

4. Fill in the gaps with the words:

septic, sewage, pollutants, employ, control

1. Well-designed and operated systems can remove 90 percent or more of the_____.
2. Domestic sewage is typically treated by centralized_____ treatment plants.
3. Municipal treatment plants are designed to _____ conventional pollutants.
4. A household or business not served by a municipal treatment plant may have an individual_____ tank, which treats the wastewater on site and discharges into the soil.
5. Cities with sanitary sewer overflow _____one or more engineering approaches to reduce discharges of untreated sewage.

Sewage treatment. Process overview.

Sewage treatment, or domestic wastewater treatment, is the process of removing contaminants from wastewater and household sewage, both runoff and domestic. It includes physical, chemical, and biological processes to remove physical, chemical and biological contaminants. Its objective is to produce a waste stream and a solid waste or sludge suitable for discharge or reuse back into the environment. This material is often contaminated with many toxic organic and inorganic compounds.

To be effective, sewage must be conveyed to a treatment plant by appropriate pipes and infrastructure and the process itself must be subject to regulation and controls. Some wastewaters require different and sometimes specialized treatment methods. At the simplest level, treatment of sewage and most wastewaters is carried out through separation of solids from liquids, usually by settlement. By progressively converting dissolved material into solids, usually a biological flock which is then settled out, an effluent stream of increasing purity is produced.

Sewage can be treated close to where it is created, or collected and transported via a network of pipes and pump stations to a municipal treatment plant. Sewage collection and treatment is typically subject to local, state and federal regulations and standards. Industrial sources of wastewater often require specialized treatment processes. Conventional sewage treatment may involve three stages, called primary, secondary and tertiary treatment**.**

Primary treatment consists of temporarily holding the sewage in a quiescent basin where heavy solids can settle to the bottom while oil, grease and lighter solids float to the surface. The settled and floating materials are removed and the remaining liquid may be discharged or subjected to secondary treatment.

Secondary treatment removes dissolved and suspended biological matter. Secondary treatment is typically performed by indigenous, water-borne micro-organisms in a managed habitat. Secondary treatment may require a separation process to remove the micro-organisms from the treated water prior to discharge or tertiary treatment.

Tertiary treatment is sometimes defined as anything more than primary and secondary treatment. Treated water is sometimes disinfected chemically or physically prior to discharge into a stream, river, bay, lagoon or wetland, or it can be used for the irrigation of a golf course, green way or park. If it is sufficiently clean, it can also be used for groundwater recharge or agricultural purposes.

As of 2006, waterborne diseases are estimated to cause 1.8 million deaths each year. These deaths are attributable to inadequate public sanitation systems and it is clear that proper sewerage need to be installed**.**

Appropriate technology options in water treatment include both community-scale and household-scale point-of-use designs.

In order for the decrease of waterborne diseases to have long term effects, water treatment programs implemented by research and development groups in developing countries must be sustainable by its own residents. This can ensure the efficiency of such programs after the departure of the research team as monitoring is difficult because of the remoteness of many locations.

1. Answer the questions:

1. What is a sewage treatment?
2. What is the goal of this process?
3. What is a way to make sewage less dangerous for nature?
4. How many stages may conventional sewage treatment involve?
5. What is the reason for waterborne diseases to appear?

2. Fill in the gaps in the sentences, using the correct form of the verbs:

to convey, to call, to estimate, to require, to disinfect, to contaminate, to remove

1. Waterborne diseases _____to cause 1.8 million deaths each year.
2. Secondary treatment _____dissolved and suspended biological matter.
3. Conventional sewage treatment may involve three stages, _____primary, secondary and tertiary treatment.
4. Some wastewaters different and sometimes specialized treatment methods.
5. This material often _____ with many toxic organic and inorganic compounds.
6. To be effective, sewage must be _____ to a treatment plant.
7. Treated water sometimes _____ chemically or physically.

3. Decide whether the following statements are true or false, correct those ones which are false.

1. Secondary treatment is sometimes defined as anything more than primary and secondary treatment.
2. Sewage treatment includes just chemical and biological processes.
3. Conventional sewage treatment may involve three stages, called primary, secondary and tertiary treatment.
4. Treated water can be used for the irrigation of a golf course, green way or park.
5. In order for the decrease of waterborne diseases to have long term effects, water treatment programs can be ignored by the residents.

6. Secondary treatment may require a separation process to remove the micro-organisms from the treated water prior to discharge.
7. The government should regulate and control the process of sewage treatment.
8. If treated water is sufficiently clean, it can be used for agricultural purposes.
9. Sewage must be transported to a treatment plant by appropriate pipes and infrastructure.
10. Appropriate technology options in water treatment include tree designs.

Sedimentation stages.

Match the following words with their Russian equivalents.

1. tank	A. простейшие (микроорганизмы)
2. grease	B. растворимый
3. homogeneous liquid	C. смазочные вещества
4. mechanically driven scrapers	D. резервуар
5. saponification	E. осаждение, отложение осадка
6. biological content	F. омыление
7. biota	G. флора и фауна определённого района
8. soluble	H. однородная жидкость
9. protozoa	I. Разлагаемый
10. biodegradable	J. механические грейдеры (скребки)
11. sedimentation	K. биологический состав

In the primary sedimentation stage, sewage flows through large tanks, commonly called "primary clarifiers" or "primary sedimentation tanks". The tanks are large enough that sludge can settle and floating material such as grease and oils can rise to the surface and be skimmed off. The main purpose of the primary sedimentation stage is to produce both a generally homogeneous liquid capable of being treated biologically and a sludge that can be separately treated or processed. Primary settling tanks are usually equipped with mechanically driven scrapers that continually drive the collected sludge towards a hopper in the base of the tank from where it can be pumped to further sludge treatment stages. Grease and oil from the floating material can sometimes be recovered for saponification.

Secondary treatment is designed to substantially degrade the biological content of the sewage such as are derived from human waste, food waste, soaps and detergent. The majority of municipal plants treat the settled sewage liquor using aerobic biological processes. For this to be effective, the biota requires both oxygen and a substrate on which to live. There are a number of ways in which this is done. In all these methods, the bacteria and protozoa consume biodegradable soluble organic contaminants (sugars, fats, organic short-chain carbon molecules) and bind much of the less soluble fractions into floc.

The purpose of tertiary treatment is to provide a final treatment stage to raise the effluent quality before it is discharged to the receiving environment (sea, river, lake, ground). More than one tertiary treatment process may be used at any treatment plant. If disinfection is practiced, it is always the final process.

1. Answer the questions:

1. What is the main purpose of the primary sedimentation stage?
2. Why the tanks for the primary treatment should be of the large size?
3. How are the primary settling tanks usually equipped?
4. What is the main purpose of the secondary sedimentation stage?
5. Which way do the majority of municipal plants treat the settled sewage liquor?
6. What is the main purpose of tertiary treatment?
7. What biodegradable soluble organic contaminants do you know?

2. Fill in the gaps:

1. n the primary sedimentation stage, sewage flows through large tanks, commonly called _____ or _____.
2. he main purpose of the primary sedimentation stage is _____ both a generally homogeneous liquid and a sludge.
3. rease and oil from the floating material can sometimes be recovered _____.
4. econdary treatment is designed to substantially degrade the biological content of the sewage such as _____.
5. he biota requires both _____ and _____ on which to live.
6. he soluble organic contaminants are _____.
7. he receiving environment is _____.
8. f _____ is practiced, it is always the final process.

3. Try to define which stage of sedimentation these words are belong to:

Treatment	Process
primary	biodegradable, floc, human waste, aerobic biological processes, biota, oxygen, biological content
secondary	disinfection, final, effluent, discharge
tertiary	tanks, sludge, scrapers, homogeneous, floating material, saponification

Disinfection.

The purpose of disinfection in the treatment of wastewater is to substantially reduce the number of microorganisms in the water to be discharged back into the environment. The effectiveness of disinfection depends on the quality of the water being treated (cloudiness, pH), the type of disinfection being used, the disinfectant dosage (concentration and time), and other environmental variables. Cloudy water will be treated less successfully since solid matter can shield organisms, especially from ultraviolet light or if contact times are low. Generally, short contact times, low doses and high flows all militate against effective disinfection. Common methods of disinfection include ozone, chlorine, or ultraviolet light.

Chlorination remains the most common form of wastewater disinfection in North America due to its low cost and long-term history of effectiveness.

Ultraviolet (UV) light can be used instead of chlorine, iodine, or other chemicals. Because no chemicals are used, the treated water has no adverse effect on

organisms that later consume it, as may be the case with other methods. UV radiation causes damage to the genetic structure of bacteria, viruses, and other pathogens, making them incapable of reproduction. The key disadvantages of UV disinfection are the need for frequent lamp maintenance and replacement and the need for a highly treated effluent to ensure that the target microorganisms are not shielded from the UV radiation. In the United Kingdom, light is becoming the most common means of disinfection because of the concerns about the impacts of chlorine in chlorinating residual organics in the wastewater and in chlorinating organics in the receiving water.

1. Answer the questions:

1. What is the purpose of disinfection?
2. What does the effectiveness of disinfection depend on?
3. What parameters does a disinfectant dosage contain of?
4. Ozone, chlorine, or ultraviolet light are the common methods of disinfection, aren`t they?
5. Why does chlorination remain the most common form of wastewater disinfection in North America?
6. What are the key disadvantages of UV disinfection?
7. Why in the United Kingdom scientists prefer light as the most common means of disinfection?

2. Complete the sentences:

1. The purpose of disinfection in the treatment of wastewater is _____.
2. The effectiveness of disinfection depends on _____ .
3. The disinfectant dosage is _____ .
4. Common methods of disinfection include _____ .
5. Chlorination remains the most common form of wastewater disinfection in North America due _____ .
6. Ultraviolet (UV) light can be used instead of _____ .
7. UV radiation causes damage to _____ .
8. The key disadvantages of UV disinfection are _____ .
9. In the United Kingdom, light is becoming the most common means of disinfection because of _____.

Water Treatment Situations In Different Countries.

In the US and EU, uncontrolled discharges of wastewater to the environment are not permitted under law, and strict water quality requirements are to be met.

A significant threat in the coming decades will be the increasing uncontrolled discharges of wastewater within rapidly developing countries. In many developing countries the bulk of domestic and industrial wastewater is discharged without any treatment or after primary treatment only. In Latin America about 15% of collected wastewater passes through treatment plants. In Venezuela, 97 percent of the country’s sewage is discharged raw into the environment.

In a relatively developed Middle Eastern country such as Iran, Tehran's majority of population has totally untreated sewage injected to the city's groundwater. In Israel, about 50 percent of agricultural water usage is provided through reclaimed sewer water. Future plans call for increased use of treated sewer water as well as more desalination plants.

Most of sub-Saharan Africa is without wastewater treatment.

Water utilities in developing countries are chronically underfunded because of low water tariffs, the inexistence of sanitation tariffs in many cases, low billing efficiency and low quality operational efficiency. In addition, wastewater treatment typically is the process within the utility that receives the least attention, partly because enforcement of environmental standards is poor. As a result of all these factors, operation and maintenance of many wastewater treatment plants is poor. Developing countries as diverse as Egypt, Algeria, China or Colombia have invested substantial sums in wastewater treatment without achieving a significant impact in terms of environmental improvement.

1. Answer the questions:

1. Is there any difference between the highly developed countries and developing ones in utility of wastewater?
2. Why do you think the bulk of domestic and industrial wastewater is discharged without any treatment in many developing countries?
3. In which Latin country the situation with discharging wastewater into the environment is the worst?
4. Why water utilities in developing countries are dramatically underfunded?
5. Which developing countries have made a progress investing substantial sums in wastewater treatment?

2. Decide whether the following statements are true or false, correct those ones which are false.

1. In Latin America about 15% of collected wastewater is discharged into the environment.
2. Operation and maintenance of many wastewater treatment plants in developing countries is poor.
3. In Israel, about 50 percent of agricultural water usage is injected to the city's groundwater.
4. Israel tends to maintain the enterprises for desalination of water.
5. Most of sub-Saharan Africa is with perfect wastewater treatment.

3. Make a short report about the wastewater treatment situation in your own country.

UNIT 3

WATER TREATMENT

Bottled water

Give the Russian equivalents to the words and phrases:

bottled water, tap water, scientific study, the Natural Resources Defense Council, high quality, contamination, organic chemicals, to recycle, toxic chemicals, food chain, marine life, re-usable water bottle

The fact is that bottled water sold in our country is not always filtered and not necessarily cleaner or safer than most tap water, according to a four-year scientific study recently made public by the Natural Resources Defense Council (NRDC). The NRDC's study included testing of more than 1,000 bottles of 103 brands of bottled water. While most of the tested waters were found to be of high quality, some brands were significantly contaminated.

About one-third of the waters tested contained levels of contamination including synthetic organic chemicals, bacteria, and arsenic. In fact, about a quarter of all bottled water is actually bottled tap water, according to government and industry estimates.

Most water companies use polyethylene plastics to bottle their products. The manufacturing process of these bottles requires a combination of natural gas and petroleum. It takes more than 17 million barrels of oil annually to create enough plastic to meet the demand for bottled water. That is enough to fuel more than one million cars for 1 full year.

Another problem is the transportation costs of bottled water. Water is very heavy and it takes a lot of fuel to transport millions of tons of drinking water every day. When the time comes to recycle these plastic bottles, even more oil is needed as recycling plants require large amounts of fuel and clean water to operate. So even the recycling of plastic bottles becomes a major depletion of the Earth's precious natural resources.

It is estimated that only about 15-20% of plastic bottles get recycled. The majority ends up in landfills, with a good portion making it out to the oceans where they will break down into smaller pieces. These plastic pellets absorb many toxic chemicals and are often mistaken for food by all types of marine life. This adversely affects the entire eco-system of the ocean as sickness and death is passed up and down the food chain. Since people eat seafood, our health is also affected by the plastics that pollute the seas.

The truth is we can all make a difference in the world simply by making a small change in our lifestyle and reducing our dependence on bottled water. Filtering your own pure water at home and using a re-usable water bottle is a small step that can make a big difference for the environment.

1. Answer the questions:

1. Which brands for bottled water do you know? Which one do you prefer?

2. Are you sure that the quality of the bottled water you usually buy is perfect?
3. What environmental problems we have due to recycling of plastic bottles?
4. Can we solve this problem or not?

2. Find out if the following statements are true or false:

1. Bottled water sold in our country is for sure filtered and safer than tap-water.
2. Changing our lifestyle and reducing our dependence on bottled water we can save our world.
3. A great percentage of plastic bottles get recycled.
4. Recycling of plastic bottles won`t solve the problem causing by the usage of bottled water.
5. Our health is also affected by the plastics.

Water Filter

A good water filter is the best and maybe the only solution nowadays. You can install and maintain the filters yourself and can ensure and feel safe about the water which you and your family drink. Just make sure the filter you choose removes the most spectrum of contaminants. Usually a professional filtration system worth invest-in is a 4 to 5 stage water purifier system. Each stage will remove certain types of contaminants, and all stages combined should protect you from just about every contaminant. Reverse osmosis water filters with activated carbon pre-filters, plus an ultraviolet light, are what we believe to be the most thorough and cost effective way to purify drinking water. Such a system will pay for itself within half a year and can last 10-15 years with easy annual filter changes.

Explain how a water filter works and why it is considered to be the best solution for today.

The History of Modern Water Filtration

The history of water filters is indelibly tied to the history of water, itself. As human industry has grown and water has become more contaminated, water filters have emerged over the centuries in response to the growing recognition of the need for pure, clean water to drink and the realization that such water does not occur naturally. Water has greatly affected humanity and civilization for millennia. Because

water is so absolutely vital to our body systems, we, as living beings, are entirely dependent upon water. In fact, this simple substance, more than any other factor, guided the formation of civilization.

Early civilizations were clustered around water sources, and it was water that initiated the first substantial agriculture in the Fertile Crescent, leading to more complex and sedentary civilizations. For centuries, water availability guided the type of foodstuff that could be grown in an area. Water was also the impetus and guiding force behind the first cross-cultural interactions. Early trade was completely dependent upon water, for transportation of goods and sustenance of people and animals. Throughout the centuries, as technology developed, people have gradually gained more control of water. They have been able to transport water to arid lands, stop and redirect rivers, and even determine when, where, and how much rain will fall.

Even with increased control of water resources, water still continues to dominate the political, economic, and social structure of all nations. This statement can be verified by looking at political struggles within the United States over water resources or throughout the Middle East over access to limited water. Concerning conflict in the Middle East, former World Bank Vice President Ismail Serageldin stated in 2000, "Many of the wars of this century were about oil, but the wars of the next century will be about water". In modern times, concerns over water quality remain supreme. Over the years, scientists have discovered more and more contaminants in fresh water sources, and these same scientists have noted a strong correlation between drinking water contamination and many significant health problems.

Due to the rampant impurity of water and the crucial, physiological need for clean, fresh drinking water, several treatment alternatives have emerged throughout the history of water treatment. Water filtration, one of the more viable and prominent of these treatment alternatives, has something of a remarkable past. Historians believe that the use of water filters began more than 4000 years ago! The earliest recorded attempts to find or generate pure water date back to 2000 b.c.e. Early Sanskrit writings outlined methods for purifying water. These methods ranged from boiling or placing hot metal instruments in water before drinking it to filtering that water through crude sand or charcoal filters (Baker & Taras, 1981). These writings suggest that the major motive in purifying water was to provide better tasting drinking water. It was assumed that good tasting water was also clean. People did not yet connect impure water with disease nor did they have the technology necessary to recognize tasteless yet harmful organisms and sentiments in water.

Centuries later, Hippocrates, the famed father of medicine, began to conduct his own experiments in water purification. He created the theory of the "four humors," or essential fluids, of the body that related directly to the four temperatures of the seasons. According to Hippocrates, in order to maintain good health, these four humors should be kept in balance. As a part of his theory of the four humors, Hippocrates recognized the healing power of water. For feverish patients, he often recommended a bath in cool water. Such a bath would realign the temperature and

harmony of the four humors. Hippocrates acknowledged that the water available in Greek aqueducts was far from pure in its quality. Like the ancients before him, Hippocrates also believed good taste in water meant cleanliness and purity of that water. Hippocrates designed his own crude water filter to "purify" the water he used for his patients. Later known as the "Hippocratic sleeve," this filter was a cloth bag through which water could be poured after being boiled (Baker & Taras, 1981). The cloth would trap any sentiments in the water that were causing bad taste or smell. The ancient civilizations of Greece and Rome designed amazing aqueducts to route water pathways and provide the first municipal water systems.

On the American continent, archeological evidence suggests that the ancient Mayan civilization used similar aqueduct technology to provide water to urban residents. Further advancements in water technology ended, for the most part, with the fall of these civilizations. During the middle Ages, few experiments were attempted in water purification or filtration. Devout Catholicism throughout Europe marked this time period, often known as the Dark Ages due to the lack of scientific innovations and experiments. Because of the low level of scientific experimentation, the future for water purification and filtration seemed very dark.

The first record of experimentation in water filtration, after the blight of the Dark Ages, came from Sir Francis Bacon in 1627 (Baker & Taras, 1981). Hearing rumors that the salty water of the ocean could be purified and cleansed for drinking water purposes, he began experimenting in the desalination of seawater. Using a sand filter method, Bacon believed that if he dug a hole near the shore through which seawater would pass, sand particles (presumable heavier than salt particles) would obstruct the passage of salt in the upward passage of the water; the other side of the hole would then provide pure, salt-free water. Sadly, his hypothesis did not prove true, and Bacon was left with salty, undrinkable water. His experiment did mark rejuvenation in water filter experimentation. Later scientists would follow his lead and continue to experiment with water filtration technology.

1. Answer the questions:

1. Did water effect the human civilization? In what way?
2. Do you think we are entirely dependent upon water? Why?
3. Did Hippocrates make a great contribution into the process of water purification? What do you know about him?
4. When did people start to use the water filters?

2. Fill in the gaps in the sentences:

1. Water guided the formation of _____.
2. Early civilizations were clustered around _____, and it was water that led to more complex civilizations.
3. Early _____ was completely dependent upon water, for transportation of _____ and sustenance of _____ and _____.
4. Water still continues to dominate the _____, _____, and _____ structure of all nations.
5. It is noted a strong correlation between _____ _____ contamination and many significant_____ _____.

6. The major motive in purifying water was to _____ better tasting drinking water.

3. Make up a summary of the text.

UNIT 4

SEWERAGE

Sewerage

The problem of protecting natural water resources has grown very pressing for many countries since the beginning of the second half of the 20th century. The development of human society, the growth of civilization and social and technical progress has resulted in the changing of the composition of natural water resources. The rivers, lakes and ground waters contain today a considerable amount of the products of mechanical, chemical and biological pollution.

"Sewage" includes domestic, municipal, or industrial liquid waste products disposed of, usually via a pipe or sewer or similar structure. The physical infrastructure, including pipes, pumps and channels used to convey sewage from its origin to the point of eventual treatment or disposal is termed sewerage. In the past the word "sewage" also meant what is now called "sewerage". Possibly because of that, the word "sewerage" is often mistakenly used to mean "sewage".

The waste products that result from the daily activities in a community are of two general types: namely, the liquid waste, known as sewage and the solid wastes, known as refuse. The different wastes of which sewage is composed are the following: the wastes from lavatories, baths, sinks, and laundry tanks in residences, institutions, and business buildings; certain liquid wastes from various types of manufacturing or industrial plants, and, in many communities, the surface run-off that results from storms or street flushing operations.

Sewage may also be divided according to its source into the following three classes. The sewage from residences, institutions and business buildings is called domestic sewage, sanitary sewage or house sewage; that resulting from manufacturing or industrial processes is known as industrial waste; and that form run-off during or immediately following storms is called storm sewage. A combination of domestic sewage, industrial waste and storm water is called combined sewage.

Both sewage and refuse must be removed promptly in order to avoid endangering the health of the community and also prevent decomposition of the materials of animal or vegetable origin and the subsequent production of nuisances and odours.

The removal of all kinds of sewage is usually accomplished by means of sewers. The sewers are placed in the streets at several feet below the ground surface. The general process of removing sewage is designated as sewerage and the entire systems of sewers including a sewage treatment plant are known as a sewerage system.

The method of sewage treatment to be adopted in a particular case will depend almost entirely on local conditions. It may consist only of the discharge of the raw sewage into a stream or a large body of water. The usual methods of sewage treatment consist either of preliminary treatment alone or of primary treatment followed by secondary treatment.

During primary treatment the larger and heavier solid particles settle out from the liquid. These solid particles that settle out form a slimy paste which is known as sludge.

The partly clarified sewage that has been given primary treatment generally contains much decomposable materials. Therefore, further treatment which may be used with either primary or secondary treatment is disinfection or the killing of the most of the bacteria in the sewage by means of chemicals.

1. Answer the questions:

1. Is there any difference between the words "sewerage" and "sewage"?
2. Has the composition of natural water resources remained the same since the ancient time?
3. What kind of products does modern sewerage include?
4. What does sewerage system contain of?
5. What are the different wastes of which sewage is composed?
6. What is the difference between the sewage and refuse?
7. What is a sewerage system?
8. What are the usual methods of sewage treatment?
9. Why disinfection is used for while treating the waste?
10. The method of sewage treatment will depend almost entirely on local conditions, won`t it?

2. Fill in the gaps:

1. The rivers, lakes and ground waters contain today a considerable amount of the products of_____, _____ and _____ pollution.
2. The physical infrastructure used to convey sewage from its origin to the point of eventual treatment or disposal is termed_____.
3. The waste products that result from the daily activities in a community are of _____ general types: the _____ waste, known as sewage and the solid wastes, known as_____.
4. Sewage may also be divided according to its _____ into the following three_____.
5. The sewage resulting from manufacturing or industrial processes is known as _____waste.
6. A _____ of domestic sewage, industrial waste and storm water is called _____sewage.
7. The general process of removing sewage is designated as _____ and the entire systems of sewers including a sewage treatment plant are known as a_____.
8. The usual methods of sewage treatment consist either of preliminary treatment alone or of primary treatment followed by_____ _____.

9. The solid particles that settle out form a slimy paste which is known as_____.
10. The most of the bacteria in the sewage are killed by means of_____.

3. Decide whether the following statements are true or false, correct those ones which are false.

1. The problem of protecting natural water resources has grown very pressing for many countries since the beginning of the second half of the last century.
2. Solid waste products disposed of usually via a pipe.
3. The products of mechanical, chemical and biological pollution are discharged into the environment.
4. The rivers, lakes and ground waters are not contaminated very much today.
5. Sewerage is the chemical infrastructure.
6. Sewage may also be divided according to its source into several classes.
7. The method of sewage treatment to be adopted in a particular case is the same in any situation.
8. Sewerage system is the entire systems of sewers including a sewage treatment plant.

From the History of Sewerage

Man's sewerage practice has been known from ancient times. Explorations revealed sewers in Babylon dating from the 17th century before our era. Considerable information is available about the sewers of Jerusalem, works of this class in ancient Greek cities are fairly well known and the great underground drains of Rome have repeatedly been described.

The history of the progress of sanitation in London probably affords a typical picture of what took place quite generally about the middle of the 19th century in the largest cities of Great Britain and the United States. Well into the 19th century while London outgrew the narrow limits of the city proper and its adjacent parishes and became a great metropolis, the centre of the world's commerce, sanitation was as little considered as magnetism or the use of steam for power purposes.

The lack of central authority rendered a systematic study and execution of sewerage work impossible. As late as 1845 there was no survey of the metropolis adequate as a basis for planning sewers. The sewers in adjoining parishes were of different elevation so that a junction of them was impracticable.

But the strong feeling that good public health is a valuable municipal asset and depends largely upon good sewerage was the deciding factor in the growing popular recognition of the sanitary importance of a good sewerage system.

The first engineer who made a comprehensive study of metropolitan sewerage needs, thus described the conditions of London basement and cellars in 1847:"There are hundreds, I may say thousands of houses in this metropolis which have no drainage whatever and the greater part of them have stinking overflowing cesspools. And there are also hundreds of streets, courts and alleys that have no sewers". After 2 outbreaks of cholera a royal commission was appointed to inquire into sanitary

improvements of London. In 1855 Parliament passed an act for the better local management of the metropolis which laid the basis for the sanitation of London.

In the continent of marked progress in sewerage began in 1842 when a severe fire destroyed the old part of the city of Hamburg. The portion ruined was the oldest and it was decided to rebuild it according to the modern ideas of convenience. As a result Hamburg was the first city which had a complete systematic sewerage system throughout built according to modern ideas. The system proved so well designed and maintained that twenty-five years after the sewers were completed they were found by a committee of experts to be clean and almost without odour.

At the present time the problem of good sanitation is closely connected with that of protecting the purity of natural water reservoirs, since often the same body of water must serve both as a source and as a recipient of sewage and storm drainage. And it is this dual use of water in nature and within communities and industrial premises that establishes the most impelling reasons for water sanitation.

The source of pollution lies largely in the effluents of industry, urban life, agricultural production and transport, the worst pollution being caused by the chemical industry. Modern agriculture which utilizes huge quantities of chemical fertilizers also pollutes the ground water and rivers.

Despite the growing improvement in water treatment methods many regions of the world cannot cope with the rapid rate of water contamination. The highly industrialized countries naturally suffer more than others. Certainly the conditions which existed only a century ago cannot be restored in present or future large cities. But we badly need to find new ways of using the water in industry and agriculture and of radically improving the technology of drainage purification.

1. Choose the correct variant to complete the sentences:

1. One of the main reasons for the backward condition of the sewerage system in London was…
   a) that large sewers were made to discharge into small sewers.
   b) that some of the sewers were higher than the cesspools which they were supposed to drain.
   c) that there was no authority to make landlords connect their houses with sewers.
   d) that there were hundreds or even thousands of houses which were connected by great underground drains.
2. The sewers in adjoining parishes were of different elevation so…
   a) sanitation was as little considered as the utilization of steam for power purposes.
   b) a junction of them was impracticable.
   c) the public recognition of the importance of good sewerage systems was growing.
   d) there were hundreds of houses which had no drainage whatever.
3. After 2 outbreaks of cholera a royal commission was appointed…
   a) to find new ways of water treatment.
   b) to inquire into sanitary improvements for London.

c) to produce reports clearly showing the need for extensive sewerage works.
d) to make landlords connect their houses with sewers.

4. While London grew and became a great metropolis, the centre of the world's commerce,...
   a) it was impracticable to make an adequate survey as a basis for planning sewers
   b) the connection between a contaminated water supply and the spreading of diseases was evident.
   c) sanitation was as little considered as magnetism or the use of steam for power purposes.
   d) it was only a central authority that could make a systematic study of sewerage work possible.
5. Nowadays the problem of good sanitation is closely connected with that of protecting the purity of natural water reservoirs…
   a) since the chemical industry causes the worst pollution.
   b) since highly industrializes countries suffer greatly from water contamination.
   c) since the same body of water serves both as a source of water and recipient of sewage and storm drainage.
   d) since public health depends greatly on good sewerage.

2. a) What do the following numbers refer to?
1842, 17th, 1847, 1855, 19th, 1845

b) Make out questions to which these numbers are answers.

3. Make up the summary of the text.

Regulatory Policy

A great variety of institutions have responsibilities in water supply. A basic distinction is between institutions responsible for policy and regulation on the one hand; and institutions in charge of providing services on the other hand.

Dozens of countries around the world have established regulatory agencies for infrastructure services, including often water supply and sanitation, in order to better protect consumers and to improve efficiency. Regulatory agencies can be entrusted with a variety of responsibilities. They are supposed to be autonomous from the executive branch of government, but in many countries have often not been able to exercise a great degree of autonomy.

In the United States regulatory agencies for utilities have existed for almost a century at the level of states, and in Canada at the level of provinces. In many US states they are called Public Utility Commissions. For England and Wales, a regulatory agency for water was created as part of the privatization of the water industry in 1989.

In many developing countries, water regulatory agencies were created during the 1990s in parallel with efforts at increasing private sector participation.

Many countries do not have regulatory agencies for water. In these countries service providers are regulated directly by local government, or the national government. This is, for example, the case in the countries of continental Europe, in China and India.

Water supply policies and regulation are usually defined by one or several Ministries. In the United States Environmental Protection Agency, whose administrator reports directly to the President, is responsible for water and sanitation policy and standard setting within the executive branch. In other countries responsibility for sector policy is entrusted to a Ministry of Environment (such as in Mexico and Colombia), to a Ministry of Health (such as in Panama, Honduras and Uruguay), a Ministry of Public Works (such as in Ecuador and Haiti), a Ministry of Economy (such as in German states) or a Ministry of Energy (such as in Iran). A few countries, such as Jordan and Bolivia, even have a Ministry of Water. Often several Ministries share responsibilities for water supply. In the European Union, important policy functions have been entrusted to the supranational level.

Water supply providers can be public, private, mixed or cooperative. Most urban water supply services around the world are provided by public entities.

An estimated 10 percent of urban water supply is provided by private or mixed public-private companies, usually under concessions, leases or management contracts. These arrangements are common in France and in Spain. Only in few parts of the world water supply systems have been completely sold to the private sector (privatization), such as in England and Wales as well as in Chile. The largest private water companies in the world are SUEZ and Veolia Environment from France; Aguas de Barcelona from Spain; and Thames Water from the UK, all of which are engaged internationally.

Water supply service providers, which are often utilities, differ from each other in terms of their geographical coverage relative to administrative boundaries; their sector coverage; their ownership structure; and their governance arrangements.

Many water utilities provide services in a single city, town or municipality. In some federal countries there are water service providers covering most or all cities and towns in an entire state, such as in all states of Brazil and some states in Mexico. In England and Wales water supply and sewerage is supplied almost entirely through ten regional companies.

Some smaller countries, especially developed countries, have established service providers that cover the entire country or at least most of its cities and major towns. Such national service providers are especially prevalent in West Africa and Central America, but also exist, for example, in Tunisia, Jordan and Uruguay. In rural areas, where about half the world population lives, water services are often not provided by utilities, but by community-based organizations which usually cover one or sometimes several villages.

Some water utilities provide only water supply services, while sewerage is under the responsibility of a different entity. This is for example the case in Tunisia. However, in most cases water utilities also provide sewer and wastewater treatment

services. In some cities or countries utilities also distribute electricity. In a few cases such multi-utilities also collect solid waste and provide local telephone services.

Fill in the table writing down the country opposite the regulation agency it has:

The agency	The country
a Ministry of Health	
a Ministry of Water	
a Ministry of Public Works	
a Ministry of Economy	
a Ministry of Energy	
an Environmental Protection Agency	
a Ministry of Environment	

UNIT 5

POLLUTION

Pollution. Forms of Pollution

Pollution is the introduction of contaminants into an environment that causes instability, disorder, harm or discomfort to the ecosystem: physical systems or living organisms. Pollution can take the form of chemical substances, or energy, such as noise, heat, or light. Pollutants, the elements of pollution, can be foreign substances or energies, or naturally occurring; when naturally occurring, they are considered contaminants when they exceed natural levels.

The earliest known writings concerned with pollution were Arabic medical treatises written between the 9th and 13th centuries. King Edward I of England banned the burning of sea-coal by proclamation in London in 1272, after its smoke had become a problem. Air pollution would continue to be a problem in England, especially later during the industrial revolution.

It was the industrial revolution that gave birth to environmental pollution as we know it today. The emergence of great factories and consumption of immense quantities of coal and other fossil fuels gave rise to unprecedented air pollution and the large volume of industrial chemical discharges added to the growing load of untreated human waste. Chicago and Cincinnati were the first two American cities to enact laws ensuring cleaner air in 1881. Other cities followed around the country until early in the 20th century, when the short lived Office of Air Pollution was created under the Department of the Interior. Extreme smog events were experienced by the cities of Los Angeles and Donora, Pennsylvania in the late 1940s, serving as another public reminder.

The major forms of pollution are: air pollution, water pollution, soil contamination, littering, radioactive contamination, noise pollution, Light pollution, Visual pollution, thermal pollution, Pollution can also be the consequence of a natural

disaster. For example, hurricanes often involve water contamination from sewage, and petrochemical spills from ruptured boats or automobiles.

Growing evidence of local and global pollution and an increasingly informed public over time have given rise to environmentalism and the environmental movement, which generally seek to limit human impact on the environment.

1. Answer the questions:

1. What is pollution?
2. What forms can pollution take of?
3. What historic period gave birth to environmental pollution? Why?
4. Which American cities were the first to regulate the air pollution?
5. Are modern people getting more aware of environment pollution?
6. Is there any role of mass media in supporting the environmental movement?

2. Match the forms of pollution with their definitions:

Air pollution	the release of chemicals by spill or underground leakage. Among the most significant contaminants are hydrocarbons, heavy metals, herbicides, pesticides and chlorinated hydrocarbons.
Water pollution	roadway noise, aircraft noise, industrial noise as well as high-intensity sonar.
Soil contamination	a small refuse or waste materials carelessly dropped, esp. in public places
Noise pollution	the release of chemicals and particulates into the atmosphere
Littering	a temperature change in natural water bodies caused by human influence, such as use of water as coolant in a power plant.
Light pollution	the presence of overhead power lines, motorway billboards, scarred landforms, open storage of trash or municipal solid waste.
Visual pollution	the release of waste products and contaminants into river drainage systems, liquid spills, wastewater discharges, eutrophication and littering.
Thermal pollution	light trespass, over-illumination and astronomical interference.

Water Pollution

Before reading the text answer the questions:

1. What do you know about pollution as a whole? What types of pollution do you know?
2. Are there any polluted bodies of water in your place?
3. How people in your place try to protect the environment? Have you ever taken part in the actions of such kind?

Water pollution is the contamination of water bodies such as lakes, rivers, oceans, and groundwater caused by human activities. Although natural phenomena such as volcanoes, storms, earthquakes also cause major changes in water quality and the ecological status of water, these are not deemed to be pollution.

All water pollution affects organisms and plants that live in these water bodies and in almost all cases the effect is damaging either to individual species and populations but also to the natural biological communities. It occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful constituents.

Water pollution is a major problem in the global context. It has been suggested that it is the leading worldwide cause of deaths and diseases, and that it accounts for the deaths of more than 14,000 people daily. An estimated 700 million Indians have no access to a proper toilet, and 1,000 Indian children die of diarrheal sickness every day. Some 90% of China's cities suffer from some degree of water pollution, and nearly 500 million people lack access to safe drinking water. In addition to the acute problems of water pollution in developing countries, industrialized countries continue to struggle with pollution problems as well.

The governments of many countries have striven to find solutions to reduce this problem. Many pollutants threaten water supplies, but the most widespread, especially in underdeveloped countries, is the discharge of raw sewage into natural waters; this method of sewage disposal is the most common method in underdeveloped countries, but also is prevalent in quasi-developed countries such as China, India and Iran.

Sewage, sludge, garbage, and even toxic pollutants are all dumped into the water. Even if sewage is treated, problems still arise. Treated sewage forms sludge, which may be placed in landfills, spread out on land, incinerated or dumped at sea. In addition to sewage, nonpoint source pollution such as agricultural runoff is a significant source of pollution in some parts of the world, along with urban storm water runoff and chemical wastes dumped by industries and governments.

Water pollution has many causes and characteristics.

Industries discharge a variety of pollutants in their wastewater including heavy metals, organic toxins, oils, nutrients, and solids. Pollutants in water include a wide spectrum of chemicals, pathogens, and physical chemistry or sensory changes. Many of the chemical substances are toxic.

Discharges can also have thermal effects, especially those from power stations.

1. Answer the questions:

1. What is water pollution?
2. Why water pollution effects the whole natural biological communities?
3. Do you think governments are able to stop dumping the sewage, sludge, garbage and toxic pollutants into the water?
4. What is the situation in India, China and other developing countries?
5. Which natural phenomena also cause major changes in water quality?

2. Which statements are True (T) or false (F) according to the article?

1. The governments of many countries reduce this problem of pollution.

2. If sewage is treated, problems disappear.
3. Polluted water includes a wide spectrum of chemicals and pathogens.
4. 1,000 Indian children die of diarrheal sickness every week.

3. a) What do these numbers refer to?

90, 700, 14,000, 90%, 1,000

b) Make out questions to which the following numbers are answers.

Water Pollutants

Match the following words with Russian equivalents.

1. contaminants	A. моющие средства
2. pollutants	B. продукты гигиены
3. detergents	C. загрязняющие вещества
4. aquifers	D. разжижение, разбавление
5. electrical conductivity	E. заражающие вещества
6. hygiene products	F. всасывание, впитывание
7. transform	G. водоносный пласт
8. acidity	H. кислотность
9. dilution	I. электропроводимость
10. absorption	J. преобразовывать, превращать

The specific contaminants leading to pollution in water include a wide spectrum of chemicals, pathogens, and physical or sensory changes such as elevated temperature and discoloration. While many of the chemicals and substances that are regulated may be naturally occurring (calcium, sodium, iron, manganese) the concentration is often the key in determining what is a natural component of water, and what is a contaminant.

Many of the chemical substances are toxic. Pathogens can produce waterborne diseases in either human or animal hosts. Alteration of water's physical chemistry includes acidity (change in pH), electrical conductivity, temperature, and eutrophication. Eutrophication is the fertilization of surface water by nutrients that were previously scarce.

The microorganisms sometimes found in surface waters which have caused human health problems include: salmonella, viruses and parasitic worms.

Contaminants may include organic and inorganic substances.

Organic water pollutants include: detergents, food processing waste such as fats and grease, fuels such as gasoline, diesel fuel, jet fuels, motor oil, tree and bush debris from logging operations, various chemical compounds found in personal hygiene and cosmetic products.

Inorganic water pollutants include: acidity caused by industrial discharges, chemical waste as industrial by-products, fertilizers which are found in storm water runoff from agriculture, as well as commercial and residential use.

Most water pollutants are eventually carried by rivers into the oceans. In some areas of the world the influence can be traced hundred miles from the mouth by studies using hydrology transport models. Advanced computer models have been

used in many locations worldwide to examine the fate of pollutants in aquatic systems.

Many chemicals undergo reactive decay or chemically change especially over long periods of time in groundwater reservoirs. Groundwater pollution is much more difficult to abate than surface pollution because groundwater can move great distances through unseen aquifers. Non-porous aquifers such as clays partially purify water of bacteria by simple filtration (absorption), dilution, and, in some cases, chemical reactions and biological activity: however, in some cases, the pollutants merely transform to soil contaminants. Groundwater that moves through cracks and caverns is not filtered and can be transported as easily as surface water.

Water pollution may be analyzed through several broad categories of methods: physical, chemical and biological.

There are several ways to test water: physical, chemical, and biological.

Common physical tests of water include temperature, solids concentration and turbidity.

Water samples may be examined using the principles of analytical chemistry. Many published test methods are available for both organic and inorganic compounds. Frequently-used methods include pH, biochemical oxygen demand, chemical oxygen demand, nutrient, metals (including copper, zinc, cadmium, lead and mercury), oil and grease, total petroleum hydrocarbons, and pesticides.

Biological testing involves the use of plant, animal, and/or microbial indicators to monitor the health of an aquatic ecosystem.

1. Write down the endings of the following sentences:

1. Contaminants may include_____
2. Naturally occurring chemicals and substances are _____
3. Non-porous aquifers partially purify water of bacteria by_____
4. Groundwater can be transported _____
5. Organic water pollutants include_____
6. Alteration of water's physical chemistry includes_____

2. Put the questions to the text. Use different types of questions.

3. Fill in the gaps using the words:

computer, pollutants, analyzed, toxic, pollution, groundwater, aquatic

1. Most water _____are eventually carried by rivers into the oceans.
2. Many of the chemical substances are _____.
3. _____pollution is much more difficult to abate than surface _____because groundwater can move great distances through unseen aquifers.
4. Water pollution may be _____through several broad categories of methods.
5. Advanced _____ models have been used in many locations worldwide to examine the fate of pollutants in_____ systems.

4. Tell about the differences between the physical, chemical and biological ways of testing water. Which of them is the most difficult to provide?

Marine Pollution

Match the following words with their Russian equivalents:

1. marine pollution	A. сухогруз
2. residential waste	B. удушье
3. invasive organisms	C. ткань
4. nonpoint sources	D. загрязнение моря
5. devastating effects	E. организмы-захватчики
6. oil spills	F. отходы из жилых массивов
7. harmful algae	G. нефтяные пятна
8. suffocation	H. вредные водоросли
9. tissues	I. осколки, обломки
10. debris	J. опустошительный эффект

1) Marine pollution occurs when harmful effects can result from the entry into the ocean of chemicals, particles, industrial, agricultural and residential waste, noise, or the spread of invasive organisms. Most sources of marine pollution are land based. The pollution often comes from nonpoint sources such as agricultural runoff and windblown debris.

2) There are many different ways to categorize, and examine the inputs of pollution into our marine ecosystems. Generally there are three main types of inputs of pollution into the ocean: direct discharge of waste into the oceans, runoff into the waters due to rain, and pollutants that are released from the atmosphere.

3) Ships can pollute waterways and oceans in many ways. Oil spills can have devastating effects. While being toxic to marine life, the components in oil are very difficult to clean up, and last for years in the sediment and marine environment.

Discharge of cargo residues from bulk carriers can pollute ports, waterways and oceans. Ships create noise pollution that disturbs natural wildlife, and water from ballast tanks can spread harmful algae and other invasive species.

4) Discarded plastic bags, pack rings and other forms of plastic waste which finish up in the ocean present dangers to wildlife and fisheries. Aquatic life can be threatened through entanglement, suffocation, and ingestion. Fishing nets, usually made of plastic, can be left or lost in the ocean by fishermen. Known as ghost nets, these entangle fish, dolphins, sea turtles, sharks, dugongs, crocodiles, seabirds, crabs, and other creatures, restricting movement, causing starvation, laceration and infection, and, in those that need to return to the surface to breathe, suffocation.

5) Marine life can be susceptible to noise or sound pollution from sources such as passing ships, oil exploration seismic surveys. Sound travels more rapidly and over larger distances in the sea than in the atmosphere. Marine animals, such as cetaceans, often have weak eyesight, and live in a world largely defined by acoustic information. This applies also to many deeper sea fish, which live in a world of darkness. Between 1950 and 1975, ambient noise in the ocean increased by about ten decibels.

6) – Chinese and Russian industrial pollution such as phenols and heavy metals in the Amur River have devastated fish stocks and damaged its estuary soil.

– Wabamun Lake in Alberta, Canada, once the best whitefish lake in the area, now has unacceptable levels of heavy metals in its sediment and fish.

– Due to their high position in the food chain, mercury levels can be high in larger species such as bluefin and albacore. As a result, in March 2004 the United States issued guidelines recommending that pregnant women, nursing mothers and children limit their intake of tuna and other types of predatory fish.

– Some shellfish and crabs can survive polluted environments, accumulating heavy metals or toxins in their tissues. For example, mitten crabs have a remarkable ability to survive in highly modified aquatic habitats, including polluted waters. The farming and harvesting of such species needs careful management if they are to be used as a food.

– Mining has a poor environmental track record. For example, according to the United States Environmental Protection Agency, mining has contaminated portions of the headwaters of over 40% of watersheds in the western continental US. Much of this pollution finishes up in the sea.

– Heavy metals enter the environment through oil spills or from other natural or anthropogenic sources.

7) Marine pollution is part of the problem of too much pollution by humans in general. There are only two ways to remedy this: either the human population is reduced, or the ecological footprint left behind by the average human is reduced. If we do not follow the second way, then the first way may be imposed upon us, as world ecosystems falter and cease to support us.

The second way is for us, individually, to consume and pollute less than we do currently. For this there must be social and political will, together with a shift in awareness, so more people respect their environment and are less disposed to abuse it.

8) At an operational level, regulations, and international government participation is needed. It is often very difficult to regulate marine pollution because pollution spreads over international barriers, thus making regulations hard to create as well as enforce.

9) Perhaps the most important strategy for reducing marine pollution is education. Most are unaware of the sources, and harmful effects of marine pollution, and therefore little is done to address the situation. In order to inform the population of all the facts, in depth research must be done to provide the full scale of the situation. Then this information must be made public.

1. Find out the titles for the paragraphs of the text:

1. Regulation of marine pollution.
2. Specific examples.
3. Strategy for reducing marine pollution
4. Noise pollution.
5. Solutions.
6. Main types of inputs of marine pollution.
7. Sources of marine pollution.

8. Plastic debris.
9. Pollution from ships.

2. Answer the questions:

1. What are the most sources of marine pollution?
2. What is noise pollution? Is it dangerous for humanity too? Why?
3. Why is plastic debris so dangerous to aquatic life?
4. What is the solution of the marine pollution problem?
5. What is the most important strategy for reducing marine pollution? Why education is so important in reducing any form of pollution?

3. Fill in the gaps with the words below:

regulations, agricultural ***runoff****, to inform, full scale,* ***noise pollution****, inputs , aquatic life*

1. The pollution often comes from **nonpoint sources** such as _____ and windblown debris.
2. Generally, there are three main types of _____ of pollution into the ocean.
3. Ships create _____ that disturbs natural wildlife, and water from **ballast** tanks can spread harmful **algae** and other **invasive species**.
4. _____can be threatened through entanglement, suffocation, and ingestion.
5. _____ and international government participation is needed.
6. In order _____ the population of all the facts, in depth research must be done to provide the _____ of the situation.

Effects of Pollution

Adverse air quality can kill many organisms including humans. Ozone pollution can cause respiratory disease, cardiovascular disease, throat inflammation, chest pain, and congestion. Water pollution causes approximately 14,000 deaths per day, mostly due to contamination of drinking water by untreated sewage in developing countries. As estimated 700 million Indians have no access to a proper toilet, and 1,000 Indian children die of diarrheal sickness every day. Nearly 500 million Chinese lack access to safe drinking water. 656,000 people die prematurely each year in China because of air pollution. In India, air pollution is believed to cause 527,700 fatalities a year. Studies have estimated that the number of people killed annually in the US could be over 50,000.

Oil spills can cause skin irritations and rashes. Noise pollution induces hearing loss, high blood pressure, stress, and sleep disturbance. Mercury has been linked to developmental deficits in children and neurologic symptoms. Older people are majorly exposed to diseases induced by air pollution. Those with heart or lung disorders are under additional risk. Children and infants are also at serious risk. Lead and other heavy metals have been shown to cause neurological problems. Chemical and radioactive substances can cause cancer and as well as birth defects.

Pollution has been found to be present widely in the environment. There are a number of effects of this:

– Sulphur dioxide and nitrogen oxides can cause acid rain which lowers the pH value of soil.

– Soil can become infertile and unsuitable for plants. This will affect other organisms in the food web.

– Smog and haze can reduce the amount of sunlight received by plants to carry out photosynthesis and leads to the production of troposphere ozone which damages plants.

– Invasive species can out compete native species and reduce biodiversity.

– The emission of greenhouse gases leads to global warming which affects ecosystems in many ways.

Carbon dioxide (CO2), while vital for photosynthesis, is sometimes referred to as pollution, because raised levels of the gas in the atmosphere are affecting the Earth's climate. Disruption of the environment can also highlight the connection between areas of pollution that would normally be classified separately, such as those of water and air.

Pollution control is a term used in environmental management. It means the control of emissions and effluents into air, water or soil. Without pollution control, the waste products from consumption, heating, agriculture, mining, manufacturing, transportation and other human activities, whether they accumulate or disperse, will degrade the environment. In the hierarchy of controls, pollution prevention and waste minimization are more desirable than pollution control.

1. Answer the questions:

1. What are the effects of pollution on human health?
2. What is the situation in India and China due to terrible water supply system and air pollution?
3. What are the effects of pollution on environment?
4. Which form of pollution induces hearing loss, high blood pressure, stress, and sleep disturbance?
5. Which disease can cause chemical and radioactive substances?
6. Are the areas of pollution classified separately connected between?
7. What means pollution control?

2. Complete the sentences:

1. Ozone pollution can cause_____.
2. 1,000 Indian children die of _____ .
3. Nearly 500 million Chinese lack access to_____ .
4. Oil spills can cause _____ .
5. **Lead** and other **heavy metals** cause_____.
6. **Smog** and haze can reduce the amount_____.
7. The emission of **greenhouse gases** leads to_____.
8. Pollution control is a term used in_____.
9. Pollution control means the_____.
10. **Carbon dioxide** is sometimes referred to as _____.

3. Match the words with the definitions:

congestion	to bring notice or emphasis to
disperse	the act, process or industry of extracting coal, ores from the Earth
heating	to distribute over a wide area
manufacturing	the science or occupation of cultivating land; farming
mining	a tangible matter of which a thing consists
agriculture	the reaction of living tissue to injury or infection, characterized by heat, redness and pain
inflammation	the state of being overcrowded, overloaded
photosynthesis	a device or a system for supplying heat
highlight	the production of goods
substance	the synthesis of organic compounds from carbon dioxide and water using light energy

4. Match the heading with the paragraphs:

1. Pollution control.
2. The effects of pollution on environment.
3. The effects of greenhouse gases and global warming.
4. The effects of pollution on human health.

REFERENCES

1. G. Yatel, B. Knyazevsky, F. Kuzyk, «Senior English for Technical Students», Вища школа, Київ, 1995.
2. «Английский язык для инженеров»: Учеб. / Т. Ю. Полякова, Е. В. Синявская, О. И. Тьшкова, З. С. Улановская. – 6-е изд. – М.: Высш. шк., 2003.
3. English for Science and Technology: *http://www.hut.fi/~rvilmi/EST*
4. Wikipedia.

Навчальне видання

Методичні вказівки
для практичних занять
з дисципліни

«Іноземна мова»
(англійська мова)

для студентів 2 курсу заочної форми навчання
освітньо-кваліфікаційного рівня бакалавр
напрямів підготовки 6.060103 «Гідротехніка (Водні ресурси)» та
6.060101 «Будівництво» спеціальності «Водопостачання та водовідведення»

Укладач **Костенко** Олена Олександрівна

Відповідальний за випуск *І. О. Наумова,*
канд. філол. н., завідувач кафедри іноземних мов

В авторській редакції

План 2012, поз. 525 М

Підп. до друку 17.10.2012 Формат 60×84/16
Друк на ризографі. Ум. друк. арк. 2,3
Зам. № Тираж 50 пр.

Видавець і виготовлювач:
Харківська національна академія міського господарства,
вул. Революції, 12, Харків, 61002
Електронна адреса: rectorat@ksame.kharkov.ua
Свідоцтво суб'єкта видавничої справи:
ДК № 4064 від 12.05.2011 р.