



**TOSHKENT TIBBIYOT AKADEMIYASI URGANCH FILIALI**  
**JANUBIY OROLBO‘YI TIBBIYOT JURNALI**  
**2-TOM, MAXSUS SON. 2026**  
**14.00.00 - TIBBIYOT FANLARI ISSN: 3093-8740**

**UDK: 616.314-002-003.231+577.154.3**

**NEUTRALIZATION OF INDUSTRIAL WASTEWATER AND DISPOSAL OF SLUDGE.**



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### **ABSTRACT**

Water is a precious natural resource. It plays a crucial role in metabolic processes, which are the basis of life. Water is of paramount importance in industrial and agricultural production. Its essential needs for the daily needs of humans, all plants, and animals are well known. It serves as a habitat for many living creatures. Wastewater containing plant fibers, animal and vegetable fats, fecal matter, fruit and vegetable scraps, waste from the tanning and pulp and paper industries, sugar factories, breweries, meat and dairy plants, canning factories, and confectionery industries all contribute to the organic pollution of water bodies.

**Keywords.** Water from mines, quarries, timber processing and rafting, discharges from water and rail transport, waste from primary flax processing, pesticides.

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Tabiiy fanlar va agrobiotexnologiya fakulteti

Ekologiya va geografiya kafedrası katta o‘qituvchilari

Buxoro davlat universiteti

**“Sanoat oqava suvlarini zararsizlantirish va cho‘kmani yo‘q qilish usullari”**



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**ANNOTATSIYA**

Suv qimmatbaho tabiiy resursdir. U hayotning asosi bo'lgan metabolik jarayonlarda hal qiluvchi rol o'ynaydi. Suv sanoat va qishloq xo'jaligi ishlab chiqarishida juda muhim ahamiyatga ega. Uning insonlar, barcha o'simliklar va hayvonlarning kundalik ehtiyojlari uchun zarur bo'lgan xususiyatlari yaxshi ma'lum. U ko'plab tirik mavjudotlar uchun yashash joyi bo'lib xizmat qiladi. Tarkibida o'simlik tolalari, hayvon va o'simlik yog'lari, najas moddalari, meva va sabzavot qoldiqlari, ko'pchilik va sellyuloza-qog'oz sanoati, shakar zavodlari, pivo zavodlari, go'sht va sut zavodlari, konserva fabrikalari va qandolat sanoati chiqindilari bo'lgan oqava suvlar suv havzalarining organik ifloslanishiga olib keladi.

**Kalit so'zlar.** Konlar, karerlar, yog'ochni qayta ishlash va raftingdan chiqadigan suv, suv va temir yo'l transportidan chiqadigan suvlar, zig'irni birlamchi qayta ishlash chiqindilari, pestitsidlar.

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**АННОТАЦИЯ**

Вода - ценнейший природный ресурс. Она играет исключительную роль в процессах обмена веществ, составляющих основу жизни. Огромное значение вода имеет в промышленном и сельскохозяйственном производстве. Общеизвестна необходимость ее для бытовых потребностей человека, всех растений и животных. Для многих живых существ она служит средой обитания. Сточные воды, содержащие растительные волокна, животные и растительные жиры, фекальную массу, остатки плодов и овощей, отходы кожевенной и целлюлозно-бумажной промышленности, сахарных и пивоваренных заводов, предприятий мясо-молочной, консервной и кондитерской промышленности, являются причиной органических загрязнений водоемов.

**Ключевые слова:** Воды шахт, рудников, обработке и сплаве лесоматериалов, сбросы водного и железнодорожного транспорта, отходы первичной обработки льна, пестициды.

**Introduction.** Urban growth, rapid industrial development, intensified agriculture, significant expansion of irrigated land, improved living conditions, and a number of other factors are increasingly complicating water supply issues. Water needs are enormous and growing annually. Annual global water consumption across all water supply systems amounts to 3,300-3,500 cubic kilometers. Agriculture accounts for 70% of all water consumption [1,3].

The chemical and pulp and paper industries, as well as ferrous and non-ferrous metallurgy, consume significant amounts of water. Energy development is also leading to a sharp increase in water demand. Significant amounts of water are consumed by the livestock industry, as well as for household needs. Much of the water used for household needs returns to rivers as wastewater [3]. Freshwater shortages are already becoming a global problem. The ever-increasing water needs of industry and agriculture are forcing countries and scientists worldwide to seek various solutions[5].

**The aim of the study.** Currently, the following areas of rational water resource use are being identified: more comprehensive utilization and expanded restoration of freshwater resources; and the development of new technological processes to prevent water pollution and minimize freshwater consumption. Water pollution is defined as any changes in the physical, chemical, and biological properties of water in reservoirs due to the discharge of liquid, solid, and gaseous substances that cause or may create nuisances, rendering the water in these reservoirs hazardous for use and harming the national economy and public health and safety.[6]

Surface and groundwater pollution can be divided into the following types:



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- Mechanical - an increase in the content of mechanical impurities, characteristic mainly of surface pollution;
- Chemical - the presence of organic and inorganic substances of toxic and non-toxic nature in water;
- Bacterial and biological - the presence of various pathogenic microorganisms, fungi, and small algae in water;
- Radioactive - the presence of radioactive substances in surface or groundwater;
- Thermal - the release of heated water from thermal and nuclear power plants into water bodies.

**Research material and method.** The main sources of pollution and clogging of water bodies are insufficiently treated wastewater from industrial and municipal enterprises, large livestock complexes, waste from production during the development of ore minerals; water from mines, pits, processing and rafting of timber; discharges from water and rail transport; waste from the primary processing of flax, pesticides, etc. Pollutants, entering natural water bodies, lead to qualitative changes in water, which are mainly manifested in a change in the physical properties of water, in particular, the appearance of unpleasant odors, tastes, etc.); in a change in the chemical composition of water, in particular, the appearance of harmful substances in it, in the presence of floating substances on the surface of the water and their deposition on the bottom of water bodies [3,4].

Industrial wastewater is primarily contaminated by industrial waste and emissions. Its quantitative and qualitative composition varies depending on the industry and its technological processes. It is divided into two main groups: those containing inorganic impurities, including toxic ones, and those containing poisons[6].

The first group includes wastewater from soda, sulfate, and nitrogen fertilizer plants, as well as lead, zinc, and nickel ore processing plants, and other sources. These wastewaters contain acids, alkalis, heavy metal ions, and other contaminants. Wastewater from this group primarily alters the physical properties of water.

Wastewater from the second group is discharged by oil refineries, petrochemical plants, organic synthesis plants, coke plants, and other industries. The wastewater contains various petroleum products, ammonia, aldehydes, resins, phenols, and other harmful substances. The harmful effects of wastewater of this group are mainly due to oxidation processes, as a result of which the oxygen content in water decreases, the biochemical need for it increases, and the organoleptic properties of water deteriorate[8].

Oil and petroleum products are currently the main pollutants of inland waters, seas, and the World Ocean. When they enter water bodies, they create various forms of pollution: floating oil films, dissolved or emulsified oil products, heavy fractions that settle to the bottom, etc. This affects the odor, taste, color, surface tension, and viscosity of the water, reduces oxygen levels, and produces harmful organic compounds, making the water toxic and posing a threat not only to humans [5, 7].

Phenol is a particularly harmful pollutant of industrial waters. It is found in wastewater from many petrochemical plants. This significantly reduces the biological processes in water bodies, as well as their self-purification process, and the water acquires a specific carbolic odor.

Wastewater from the pulp and paper industry has a detrimental effect on the lives of water users. The oxidation of wood pulp is accompanied by the absorption of significant amounts of oxygen, leading to the death of eggs, fry, and adult fish. Fibers and other insoluble substances pollute the water and impair its physicochemical properties. Mole drifts adversely affect fish and their prey— invertebrates. Rotting wood and bark release various tannins into the water. Resin and other extractive products decompose and absorb significant amounts of oxygen, causing the death of fish, especially juveniles and eggs. Furthermore, mole drifts heavily pollute rivers, and driftwood often completely clogs their bottoms, depriving fish of spawning and feeding grounds.[5,7]



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Nuclear power plants pollute rivers with radioactive waste. Radioactive substances are concentrated by tiny planktonic microorganisms and fish, then passed along the food chain to other animals. It has been established that the radioactivity of planktonic inhabitants is thousands of times higher than that of the water in which they live [6].

Wastewater with elevated radioactivity (100 curies per liter or more) is subject to disposal in underground closed basins and special reservoirs. Population growth, the expansion of old cities, and the emergence of new ones have significantly increased the flow of household waste into inland water bodies. This waste has become a source of contamination of rivers and lakes with pathogenic bacteria and helminths. Synthetic detergents, widely used in everyday life, pollute water bodies to an even greater extent. They are also widely used in industry and agriculture. The chemicals they contain, entering rivers and lakes with wastewater, have a significant impact on the biological and physical conditions of water bodies. As a result, the ability of water to be saturated with oxygen is reduced, and the activity of bacteria that mineralize organic matter is paralyzed [4,8].

**Results and discussion.** Pollution of water bodies with pesticides and mineral fertilizers, carried from fields by rain and meltwater, is a serious concern. Research has shown, for example, that insecticides suspended in water dissolve in petroleum products that pollute rivers and lakes. This interaction significantly weakens the oxidative functions of aquatic plants. Once in water bodies, pesticides accumulate in plankton, benthos, and fish, and enter the human body via the food chain, negatively affecting both individual organs and the body as a whole.

With the intensification of livestock farming, wastewater from agricultural enterprises is becoming increasingly noticeable [6, 8]. Wastewater typically contains about 60% of substances of organic origin; this category of organic matter also includes biological (bacteria, viruses, fungi, algae) pollutants in municipal, medical and sanitary waters and waste from tanneries and wool washing plants.

Heated wastewater from thermal power plants and other industries causes "thermal pollution," which has serious consequences: heated water contains less oxygen, dramatically altering the thermal regime, which negatively impacts the flora and fauna of water bodies. This creates favorable conditions for the massive growth of blue-green algae in reservoirs—so-called "algal blooms." Rivers also become polluted during rafting, hydroelectric construction, and with the onset of the navigation season, pollution from river vessels increases [8,9].

Rivers and other bodies of water undergo a natural process of self-purification. However, this process is slow. When industrial and domestic discharges were small, rivers managed to cope with them themselves. In our industrial age, due to the dramatic increase in waste, reservoirs can no longer cope with such significant pollution. The need has arisen to neutralize, purify, and dispose of wastewater. Wastewater treatment is the processing of wastewater to destroy or remove harmful substances. Removing contaminants from wastewater is a complex process. Like any other process, it involves raw materials (wastewater) and finished products (purified water) [1,5].

Wastewater treatment methods can be divided into mechanical, chemical, physicochemical, and biological. When these methods are used together, the method of wastewater treatment and disposal is called combined. The use of a particular method in each specific case is determined by the nature of the contamination and the degree of harmfulness of the impurities.

The essence of the mechanical method is that mechanical impurities are removed from wastewater through settling and filtration. Coarse particles, depending on their size, are captured by grates, screens, sand traps, septic tanks, and manure traps of various designs, while surface contaminants are captured by oil traps, gasoline-oil traps, settling tanks, and other devices. Mechanical treatment allows for the removal of up to 60-75% of insoluble impurities from domestic wastewater, and up to 95% from industrial wastewater, many of which are used as valuable impurities in production [6, 8]. The chemical method involves adding various chemical reagents to wastewater,



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which react with contaminants and precipitate them as insoluble sediments. Chemical treatment reduces insoluble impurities by up to 95% and soluble impurities by up to 25%.

Physicochemical treatment removes finely dispersed and dissolved inorganic impurities from wastewater and destroys organic and poorly oxidizable substances. Physicochemical methods most commonly used include coagulation, oxidation, sorption, extraction, and so on. Electrolysis is also widely used. It breaks down organic matter in wastewater and extracts metals, acids, and other inorganic substances. Electrolytic purification is carried out in specialized facilities called electrolyzers. Wastewater treatment using electrolysis is effective in lead and copper smelting plants, the paint and varnish industry, and some other industries.

Contaminated wastewater is also purified using ultrasound, ozone, ion-exchange resins, and high pressure. Chlorination has proven effective in this regard [5]. Among wastewater treatment methods, biological methods, based on the principles of biochemical and physiological self-purification in rivers and other bodies of water, are expected to play a major role. There are several types of biological wastewater treatment devices: biofilters, biological ponds, and aeration tanks.

**Conclusion.** In biofilters, wastewater passes through a layer of coarse-grained material coated with a thin bacterial film. This film facilitates intensive biological oxidation processes, which is the active ingredient in biofilters. In biological ponds, all organisms inhabiting the body of water participate in wastewater treatment. Aeration tanks are huge reinforced concrete reservoirs. Here, the purifying agent is activated sludge, consisting of bacteria and microscopic animals. All these living organisms thrive in the aeration tanks, facilitated by organic matter in the wastewater and excess oxygen introduced into the structure by the air flow. The bacteria clump together into flocs and secrete enzymes that mineralize organic contaminants. The sludge and flocs quickly settle, separating from the purified water. Ciliates, flagellates, amoebae, rotifers, and other tiny animals, by consuming bacteria that do not adhere to the flocs, rejuvenate the bacterial mass of the sludge.

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