EFFECTIVE WATER PURIFICATION METHOD

Sadikova Mashkhura Idilloevna
Bukhara State Technological University
Assistant Professor at the Department of Chemical Engineering
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Abstract: The principle of biochemical wastewater treatment is based on the fact that microorganisms, and in particular various types of bacteria, use organic matter contained in the wastewater as a source of energy and nutrients.

Key words: wastewater treatment, anaerobic, method, aerobic treatment, reactor, biochemical reactions

Biochemical wastewater treatment is one of the most effective treatment methods used in modern water treatment systems. This process is based on the use of biological processes that occur under the influence of microorganisms. They are able to break down organic matter contained in wastewater, converting it into simpler and safer compounds. At the moment, the relevance of the issue of wastewater bio-treatment has increased. Overall, stormwater treatment plant is an integral part of sustainable development and environmental protection. Without it, we face risks of water pollution, deterioration of drinking water quality, and negative consequences for human health and the ecosystem. The principle of biochemical wastewater treatment is based on the fact that microorganisms, and in particular various types of bacteria, use organic matter contained in the wastewater as a source of energy and nutrients. At the same time, biochemical reactions occur, as a result of which organic substances are converted into simpler compounds, such as water and carbon dioxide. There are several different methods that can be used to purify and filter water, each with its own advantages and disadvantages. In this blog, we will discuss some of the most common methods for purifying and filtering water, as well as some tips for choosing the best method for your needs. There are two main methods of biochemical wastewater treatment: aerobic and anaerobic. In aerobic methods, oxygen is essential for microbial life. They operate in the presence of oxygen and are capable of effectively decomposing organic matter. Anaerobic methods, on the contrary, are based on the activity of microorganisms without access to oxygen. They are used mainly for biological treatment of highly polluted wastewater, such as industrial wastewater. There are a number of biochemical purification methods. There are two subtypes: natural (filtration fields, irrigation and hydroponics) and artificial (aeration tanks, anaerobic reactors and biofilters). In natural conditions, a natural process occurs without any acceleration. In artificial ones, biochemical purification is intensified by technical methods. The principle of operation of bacteria in biochemical wastewater treatment is that they absorb organic matter and minerals from the wastewater as a source of energy and nutrients for their growth and development. In this case, the active decomposition of organic substances occurs and they are converted into simple compounds, which are then removed from the treatment system.

Aerobic cleansing. Aerobic treatment occurs in the presence of oxygen and is an effective wastewater treatment method. Through the active oxidation of organic matter by microorganisms, contaminants are effectively removed from wastewater.

Anaerobic treatment. Anaerobic treatment is carried out without access to oxygen and is used primarily to treat highly contaminated wastewater that contains substances harmful to aerobic microorganisms. Biochemical wastewater treatment has a number of advantages and disadvantages.

Benefits include:

- Cleaning efficiency.
- Possibility of using local energy sources to support biological processes.
- Lower operating costs compared to physical-chemical cleaning methods.
- Independent operation of equipment.
- No harm to the environment.
- Minimum amount of sediment.

However, the disadvantages of this method include higher costs for the construction and operation of the treatment system, as well as difficulties in managing and controlling the process, which is necessary to avoid consequences in the form of insufficient microorganism content for the treatment process. Wastewater treatment standards in bioponds are key parameters regulating the quality of wastewater treatment in this type of system. They define the necessary requirements for the efficiency of treatment processes and the corresponding limit values of contaminants that must be removed before release into the environment.

The main standards that apply to wastewater treatment in bioponds may include the following:

- Biochemical oxygen demand (BOD).
- Total suspended solids (TSS) concentration.
- Chemical oxygen demand (COD).
- Total nitrogen concentration (NO_3-N, NO_2-N, NH_4-N).
- Total phosphorus (P) concentration.

Biochemical wastewater treatment plays an important role in ensuring the environmental cleanliness of water resources. It finds application in various fields including public utilities, industry and agriculture. Biological ponds, aerobic and anaerobic wastewater treatment methods are relevant and effective methods of biochemical treatment. It is important to comply with wastewater treatment standards and recommendations when using biological methods, as well as to conduct systematic inspection and maintenance of the treatment system to ensure its reliable and efficient operation.

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