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WATER CLEANING BY MECHANICAL AND BIOLOGICAL METHODS

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Abstract
Organic substances in wastewater are oxidized with the help of microorganisms. In this, dissolved, colloidal and undissolved substances in water are oxidized. Together with organic substances, incompletely oxidized inorganic substances, namely hydrogen sulfide, ammonia and nitrites, are also reoxidized. Pollutants in water participate in constructive and energy exchange processes in the tissues of microorganisms. Microorganisms can grow in aerobic and anaerobic conditions.

Keywords: Aerobic, anaerobic, mechanical, KKS indicator, biofilter, nitrification, sorption, disinfection.

Introuction

The sewage treatment station for water treatment includes the following: mechanical treatment, biological treatment, additional water treatment, water disinfection, sediment treatment. Large pollutants in wastewater are separated by passing through grates or sieves. The impurities accumulated in the grid are cleaned by mechanical grinding and sent to grinding. In grinders, large pollutants are crushed to 1-7 mm. The amount of retained sludge is often 10-15l per 1000 m3 of wastewater. Recently, grate-shredders are installed in the treatment stations, and large pollutants are captured and crushed in them. In this device, wastewater is cleaned of sand particles and other heavy particles for 1-3 minutes. The speed of water passing through sand traps is about 0.3 m/sec.

Sand holders can have different structures. The most commonly used are horizontal sand holders. Only particles with a size of 0.2-0.25 mm are retained in sand traps. If the water is kept in the device for a long time, other substances may settle out along with the sand and contaminate the sand. If the sand is not completely separated from the water, the performance of the subsequent cleaning devices will decrease. Recently, aerated sand traps are widely used. In these devices, the sand is cleaned of additional impurities and settles completely with the help of air. The quality and quantity of the retained sand is checked to control the operation of the sand holders. The sanitary-chemical indicators of the water passing through the grate and sand traps do not change, and the amount of helminths decreases by 10-25% due to sedimentation with sand. There are three types of strainers according to their structure: radial, horizontal and vertical strainers. In the clarifiers, the largest and heaviest part of the suspended particles settles. At the same time, untrapped sand in the sand traps, crushed debris and large organic matter in the grates are also deposited.

The efficiency of the clarifiers depends on the amount of suspended particles in the wastewater, the clarifier time, the temperature of the water and the design of the device. On average, the amount of suspended particles is reduced by 40-50%. During the control of the operation of the primary clarifiers, the amount of suspended particles in the waste water and clarified water, as well as the quality and

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quantity of sludge, are checked. Wastewater from primary clarifiers is fed to biological treatment facilities.

In biological treatment facilities, organic substances contained in wastewater are oxidized with the help of microorganisms. In this, dissolved, colloidal and undissolved substances in water are oxidized. Together with organic substances, incompletely oxidized inorganic substances, namely hydrogen sulfide, ammonia and nitrites, are also reoxidized. Pollutants in water participate in constructive and energy exchange processes in the tissues of microorganisms. Microorganisms can grow in aerobic and anaerobic conditions. Under anaerobic conditions, highly polluted and sludge from sewage is cleaned. Anaerobic cleaning is followed by aerobic cleaning for deep cleaning. In biological treatment, various complex organic substances in water are oxidized. Non-oxidizing substances are separated from water using the sorption process. Toxic substances in some water can have a harmful effect on microorganisms. Such substances must be separated from the water before it is sent to biological treatment. If the KBS index of biologically treated wastewater is less than 20 mg/l, the treatment is considered complete, if it is more than 20 mg/l, the treatment process is considered incomplete. is considered Complete biological treatment can be carried out in two ways: with nitrification of ammonium salts and without nitrification. During nitrification, ammonium nitrogen is converted into nitrites and nitrates. In biological processes, the KBS indicator of purified water is equal to 10-20 mg/l, the KKS indicator can be reduced by 50-80%, ammonium nitrogen is reduced by 30% without nitrification, by 80-85% with nitrification, phosphates It can be reduced by 60-90%.

After biological treatment, chlorination, ozonation and UV disinfection processes are used for deep water disinfection.

Aerobic biological treatment can be carried out in natural and artificial conditions. Under natural conditions, wastewater is treated in irrigation fields or filtration fields. All soil organisms, such as bacteria, fungi, algae, earthworms, earthworms, and simple animals participate in this. Artificial biooxidation process can be carried out in two ways - with microorganisms attached to the filter material and with microorganisms free floating in water. The first type of cleaning devices are called biofilters. Slag, cramsite, plastic, etc. are used as filter material. According to the size of the filtering material, biofilters are divided into several types: droplet biofilters - the size of the filtering material grains is 15-25 mm, the height of the filtering layer is 2-3 m; highly loaded filters-material size 20-40 mm, height - 4 m; tower-shaped biofilters - material size 60-100 mm, height - 16 m. In these devices, wastewater is filtered from the top down. Air is supplied to the biofilters naturally or artificially, that is, with the help of fans.

Water disinfection. Gaseous chlorine or chlorinated lime is used to disinfect treated wastewater. When wastewater is treated, more chlorine is obtained than natural water. The amount of chlorine in mechanical treatment facilities is 15 mg/l, in complete biological treatment facilities -5 mg/l and in incomplete biological treatment facilities is 10 mg/l. Sodium hypochlorite can sometimes be used for disinfection. In the process of disinfection, chlorine is added to the water in solution and thoroughly mixed using various mixers. After that, the water is supplied to the contact reservoirs, where it is kept

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for 30 min. is held throughout. During this time, the water is completely neutralized. The effectiveness of the disinfection process is evaluated by the amount of Coli bacteria. When residual chlorine in water is 0.5 mg/l, the decontamination effect can be up to 100%. If the wastewater is cooled for an additional 30 minutes, active sludge and biofilm will be separated from the water and the cleaning efficiency will increase.

The quality of the disinfection process is controlled by determining the bacteriological indicators of the water and determining the residual chlorine in the water.

References

1. S.M. Turobjonov, T.T. Tursunov, K.M.Adilova. Atrof-muhit kimyosi. Toshkent 2012-yil.
2. Xojitdinova M. Suv kimyosi va mikrobiologiya. T.: Cho'lpon, 2011
3. http://biology.krc.karelia.ru/misc/hydro/mon5.html
4. www.window.edu.ru