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Effect of Chlorine in Wastewater Disinfection Process

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Abstract: The quality of water used for technological processes should be higher than the quality of water contained in circulating systems. When we say the quality of water, a complex of physical, chemical, biological and bacteriological indicators is understood, which ensures that it can be used in an industrial enterprise. The quality of water used in the enterprise is determined by the advantage of the enterprise's finished output, the requirements of the technological process, referring to the composition of the Applied Material, the equipment used, depending on how it is used in each case. However, despite the above advantages, the main drawback of chlorination is that as a result of the formation of chlorinated organic compounds, they form highly toxic, mutagenic and carcinogenicogen affecting substances, which accumulate in the tissues of tubular sediments, soil, aquatic organisms, causing their physiological changes and death. Usually it is impossible to neutralize water by 100%. Therefore, it is now accepted to increase the effectiveness of disinfection by 99; in this case, the rate of disinfection of purified water to 99,9% of the number of processed microbes is observed according to the post-treatment in the primary, secondary method.

Key words: Water Resources, fresh water, mineralization level, clarity, raw materials, sandpaper, grating, aerator, disinfection, microorganism, bacterial contamination.

Until now, methods of chlorination of wastewater using gaseous chlorine and its derivatives are widely used in Uzbekistan. The main reasons for such widespread use of chlorination are: high reliability of the bactericidal effect of chlorine products with deterioration of water supply and drainage pipes, simplicity of design and operational management, etc. Chemical treatment of wastewater is used in cases where the pollutants contained in the water can be separated only by chemical reactions. In this process, as a result of polluting substances being oxidized, they lose their toxic properties, become water-insoluble compounds, and acids and alkalis are neutralized. The ozonation method is effective in cleaning dissolved or colloidal organic pollutants in wastewater, because ozone has high oxidizing properties. The chemical method also includes electrochemical cleaning. In this process, pollutants can be decomposed and electrochemically oxidized on the surface of the anode, or precious metals (iron, copper, etc.) can be extracted from them and sent to production. Physico-chemical method. Physico-chemical methods of wastewater treatment include coagulation, sorption, extraction, evaporation, flotation, ion exchange, crystallization, dialysis, deactivation and desalination. Wastewater and modern methods of its treatment.

Waste water means fresh water whose physico-chemical properties have changed as a result of various anthropogenic effects. Such waters contain various pollutants and are divided into three groups according to their origin:

- agricultural wastewater - these are seepage waters from the soil of irrigated agricultural fields, which contain residues of mineral fertilizers and chemical poisons used in agriculture. Such waters are highly mineralized and are discharged into an open water basin through ditches without passing through a special water treatment facility;
- domestic sewage - sewage from households. Such waters are highly polluted because they contain mineral and organic impurities. Their biological oxygen demand (BOD-KBT) is 100-400 mg/l; and the chemical demand for oxygen (COD-KKT) is equal to 150-600 mg/l; Domestic sewage is sent to the water treatment plant through the sewage system;
- production effluents from industrial enterprises. The composition of these effluents is rich in various mineral wastes and is sent to special water treatment facilities through the sewage system of the enterprise.

Wastewater treatment methods differ depending on their composition. Mechanical, physico-chemical and biological methods, which are considered universal, are used more often in the treatment of municipal wastewater.

Domestic wastewater treatment. The mechanical method is based on the separation of objects of various sizes that are not dissolved in the water contained in the wastewater and the settling of the wastewater, and it is used in primary treatment. At this stage of cleaning, metal grids with a mesh size of 16-30 mm, filters, sand separators, vertical, horizontal and radial separators, oil separators, grease separators, etc. are used. Currently, hydrocyclones are also used in mechanical wastewater treatment. The advantage of the hydrocyclone is that it takes up little space due to its relatively small size and high power.

Domestic sewage from the sewer first passes through the grate, where the objects caught in it are crushed in a special device and added to the water. The water passing through the grate falls into the sandbox. A sand trap is a type of clarifier, in which, due to the slow flow of water, particles of sand and other heavy substances sink to the bottom of the water, semi-sediments are formed from organic substances.

At the next stage of purification, the water goes to softeners. The purpose of the clarifiers is to reduce the suspended substances in the water and increase the clarity of the water. They have horizontal, vertical and radial types. The depth of the bed clarifier is 1.5-2 m, the bottom is sloping, one side is deeper, and the sediment accumulates in this pit. The vertical clarifier is a cylinder with a conical bottom, 7-9 m deep and 10 m wide. In the lower part of the cone, a sedimentation pipe is installed. A central deflector in the cooler slows down the water movement to 0.7 mm per second.

The depth of the radial clarifier is 2-2.5 m, the width is 40 m. It consists of a pool with a conical bottom. Such clarifiers are usually used for sedimentation of suspended substances contained in sewage in conditions of large sewage volume. It has a slowly rotating shovel, with the help of which the sediment is pushed to the bottom and pumped out. Household waste water collected in clarifiers is sent to biological treatment.

The process of sedimentation in the methane tank can be divided into two stages. At the first stage, the process is acidic, in which gases such as fatty acids, amino acids, alcohols, ammonia, and hydrogen sulfide are used, and the sediment begins to rot. The second stage is called methane or alkaline fermentation stage. At this stage, acids are decomposed, carbon dioxide and methane gases, carbonates and hydrocarbons are formed, as a result, an alkaline reaction occurs during fermentation. Saprophytic bacteria that functioned in the first stage adapt to new alkaline conditions and increase their activity. In the second stage, the eggs of helminths, pathogenic bacteria and viruses are killed by the activity of mesophilic (25-37oC) and thermophilic (40-55oC) bacteria. 62-64% of the gases released from the process are methane, 32-34% are carbon dioxide, and 4% are nitrogen and oxygen. The generated methane is collected in the hood above the methane tank and sent to the gasholder for use. Since the decayed sediment contains many biogenic elements - nitrogen, phosphorus, potassium, sodium, calcium, copper, zinc, etc., it can be used as an organic fertilizer in agriculture.

In recent years, the number of wastewaters has increased, and the question of whether to completely abandon chlorination in their treatment remains the most urgent problem. All wastewater discharged into water bodies must be neutralized and the amount of residual chlorine in them should not exceed 1.5 mg / dm3

Studies have shown that the limiting concentration of residual chlorine in wastewater is about 0.43 - 0.45 mg / dm3 in river water (1: 1) when diluted. At this dose, the residual chlorine in the water remains for 8 hours, and after 4 hours the number of saprophytic bacteria decreases to 500 cells/cm3. When this concentration is exceeded, residual chlorine remains in the mixture of river and waste water for 1-2 days, which leads to an almost complete stoppage of its self-purification processes, and even the presence of a small amount of residual chlorine is toxic to the fauna of water bodies.

Chemical compounds formed as a result of chlorination of waste water in the process of water treatment have mutagenic and carcinogenic properties, they enter drinking water bodies, pollute water and are practically not removed. Therefore, at present, many countries are conducting scientific research on alternative methods of waste disinfection. Decontamination of waste and drinking water is carried out in two ways: 1. Creating new cleaning methods, finding new safe reagents and technologies for their use. 2. Reduction of hazardous substances or prevention of their occurrence, improvement of outdated equipment technologies for chlorination, use of new reagents and use of chlorine derivatives (chlorine dioxide).

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