Research and Application of Water Pollution Control Technology

Wang Xueqing
College of Geosciences and Environmental Engineering, Southwest Jiaotong University, Chengdu, Sichuan, 610031
vj162774@163.com

Abstract: The rapid development of the modern economy has also brought huge impacts on water resources. So far, the water pollution situation in China has been serious. The water that meets the drinking water hygiene standards only accounts for 10%, and the national water resources has been polluted up to 50%. Moreover, the types of modern water pollution are increasing, and the degree of water pollution is gradually deepening. Faced with the above situation, this paper starts the analysis and preliminary treatment methods of the status quo, grade, and pollution types of water pollution, and takes a representative of activated sludge method and biofilm method as an example to carry out in-depth introduction and analysis, providing theoretical reserve for water pollution control and construction projects for the future.

1. Introduction
The negative impact of high industrial development is expected to be insufficient and prevention is unfavorable, leading to three major global crises: resource shortage, environmental pollution, and ecological damage. Due to the effects of diffusion, dilution, redox, biodegradation, etc. of the atmosphere, water, soil, etc., the concentration and toxicity of pollutants will naturally decrease. This phenomenon is called environmental self-purification. However, if the discharged substances exceed the self-purification capacity of the environment, the environmental quality will undergo bad changes, endangering human health and survival, and environmental pollution will occur.

This paper mainly analyzes the current environmental status and relatively obvious environmental pollution problems, mainly researching the types of environmental pollution, including water pollution and its treatment, air pollution and pollution, noise pollution, solid waste pollution and treatment.

2. Activated Sludge Method
Sludge expansion phenomenon: sludge volume and sludge index increase; after 30 minutes of static, the sludge in the sludge cylinder does not sink or seldom sink; the mud moisture in the cylinder is unclear, and the sludge concentration after sludge removal is reduced. The volume is still not reduced; the sludge floc structure is destroyed, the particles are fine and extremely scattered; in severe cases, the sludge volume in the lower part of the sedimentation zone increases, the sludge sedimentation performance deteriorates, and the sludge surface rises to a point close to the water surface, and the sludge overflows. The sludge is lightly feathered and difficult to precipitate. Microscopic examination can find a large number of filamentous bacteria, the bacterial gum mass is reduced, the structure is not tight, and the treatment effect is seriously degraded.

The main reason for the expansion of sludge is due to the expansion caused by the growth of filamentous bacteria, and the reasons for the excessive growth of filamentous bacteria are as follows:
a. Dissolved oxygen is too low, <0.7-2.0mg/l
b. Impact load - organic matter exceeds normal load, causing sludge expansion
c. Changes in chemical conditions of influent water:

First, the nutritional conditions change. Generally, the bacteria grow under the condition that the nutrition is bod5:n:p=100:5:1. However, if the phosphorus content is insufficient, c/n is increased, and this nutritional condition is suitable for the filamentous fungus.

Second, the influence of sulfides, excessive septic tank decomposed water and fecal waste water into the activated sludge equipment, will cause sludge expansion. The same problem arises with sulphide-containing papermaking wastewater. Generally, 5~10mL/L of chlorin e is added to control or the sulfide is oxidized to sulfate by pre-aeration.

The solution for the excessive growth of filamentous bacteria are as follows:

a. Maintain a certain concentration of activated sludge, control the net increase of sludge every day, and control the reflux ratio.
b. Control F / M (sludge load)
c. Keep the sludge age unchanged
Lo - Influent organic matter concentration; X - MLSS concentration;
Sr——Return sludge concentration; Qw——Return sludge volume
d. Add iron salt flocculant or organic cation flocculant when the sludge is seriously expanded.

3. Biofilm Method

3.1 Biofilm formation

The biofilm method is a method of treating organic wastewater by attaching microorganisms (ie, biofilms) grown on the surface of certain solid objects. The biofilm is an ecosystem consisting of highly dense aerobic bacteria, anaerobic bacteria, facultative bacteria, fungi, protozoa, and algae. The solid medium to which it is attached is called a filter or carrier. The biofilm can be divided into a celebration layer, an aerobic layer, an attached water layer and a moving water layer. The principle of the biofilm method is that the biofilm first adsorbs and attaches the organic matter in the water layer, decomposes it by the aerobic bacteria of the aerobic layer, and then enters the anaerobic layer for anaerobic decomposition, and the flowing water layer washes away the aged biofilm to grow new. The biofilm is so reciprocated to achieve the purpose of purifying the sewage.

- Prerequisites: the carrier that acts as a support - filler or filter material;
- Nutrients - organic matter, n, p and others;
- Inoculated microorganisms

3.2 Basic Characteristics of Biofilm

A carrier for collecting and accumulating microorganisms (generally referred to as a filler) is disposed in the sewage treatment structure, and under the condition of oxygenation, the microorganisms are aggregated on the surface of the filler to form a biofilm, and the oxygenated sewage flows through the filler at a certain flow rate, the biofilm The microorganisms in the body absorb and decompose the organic matter in the water, so that the sewage is purified, and the microorganisms are also proliferated, and the biofilm is thickened accordingly. When the biofilm grows to a certain thickness, the oxygen diffused into the interior of the biofilm is restricted, and the surface is still in an aerobic state, while the inner layer is in an anoxic or even anaerobic state, and eventually causes the biofilm to fall off. Subsequently, the surface of the filler will continue to grow new biofilms, and the sewage will be purified.

After the microbes adhere to the surface of the filler to form a biofilm, due to the adsorption of the biofilm, there is a thin layer of water on the surface. The organic matter in the water layer has been oxidized and decomposed by the biofilm, so the concentration ratio of the organic matter in the water layer is higher. The influent water is much lower. When the wastewater flows from the surface of the biofilm, the organic matter is transferred from the moving wastewater to the water layer attached to the
The oxygen also enters the biofilm water layer through the wastewater and is transferred to the interior.

4. Comparative Analysis of Activated Sludge Method and Biofilm Method

The biofilm method is the same as the activated sludge method and belongs to the aerobic biological treatment method. However, the activated sludge method relies on the activated sludge suspended in the aeration tank to decompose the organic matter, and the biofilm method relies on the microbial membrane fixed on the surface of the carrier to purify the organic matter. Compared with the activated sludge process, the biofilm process has the following characteristics:

1) The biofilm fixed on the solid surface has strong adaptability to changes in wastewater quality and quantity of water, and the operation stability is good.
2) Sludge expansion will not occur, and operation management is convenient.
3) Since microorganisms are fixed on the solid surface, even microorganisms with a slow proliferation rate can grow and multiply. In the activated sludge process, microorganisms with a longer residence time than the residence time are discharged into the aeration tank. Therefore, the biological phase in the biofilm is more abundant, and the biological population in the membrane along the water flow direction has a certain distribution.
4) The same high-nutrient microbes exist, the metabolism of organic matter is more energy, and the amount of residual new sludge is less.
5) Natural ventilation is used for oxygen supply.
6) Active organisms are difficult to control artificially and thus are less flexible in terms of operation.

5. Conclusion

The two sewage treatment methods studied in this paper have their own adaptation scopes. They must complement each other. It is often difficult to achieve good governance effects by one method. It is worth considering which method should be used to treat wastewater. Firstly, the initial options are determined according to the quality and quantity of wastewater, the water demand at the time of effluent, the economic value of wastewater reuse, and the characteristics of treatment methods. Then, the final options are determined through scientific research and investigation, regional conditions and technical feasibility.

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