Municipal Wastewater and Sludge Treatment Detection Technology in Water Environment Protection

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Abstract: In the process of municipal development in China, we should give top priority to the conservation of water resources. Currently, environmental pollution is the most important environmental problem in the development of municipalization in China. The construction scale of municipal wastewater treatment plant has been further expanded, and the relevant municipal wastewater treatment process has been improved. In the process of municipal wastewater treatment, a large amount of sludge will be produced. Under the action of rainwater seepage, a large amount of wastewater from wastewater will flow into the river around the city, resulting in secondary pollution. Therefore, the municipal treatment plant for wastewater should pay attention to sludge treatment during wastewater treatment, the introduction of new wastewater treatment technology, improve the wastewater treatment process, to avoid more sludge in the wastewater treatment process, so as not to give rise to secondary pollution to the rivers around the city.
***Keywords*:** water environment protection, municipal wastewater treatment, sludge treatment detection technology

1. Introduction

With the acceleration of municipalization and the rapid development of cities in China, water has been a very important protective factor. Especially in the construction process of municipal ecological environment, the government should pay close eyes to the treatment of municipal wastewater and sludge, so as to form a new municipal wastewater and sludge treatment detection technology, and thus protecting the water environment and forming an eco-friendly development in the municipal process.

2. Overview of water environment

More than 70 percent of the earth's area is covered by water,and thus the earth can also be said to be the "water balloon". In people's daily life, water resource is also an indispensable and important factor, which is the basis of people's survival and production. According to relevant data, at present, the proportion of global natural resources has reached 13.9 trillion m^3, the amount of marine fresh water resources has exceeded 4.6 trillion m^3, and the domestic fresh water resources have reached 2.8 trillion m^3, standing at about 6% of the global total fresh water resources[1].

However, taking into consideration of the large population of China, the national average marine fresh water resources stand at only two thousand two hundred cubic meters. In addition, natural resources in China is not evenly distributed with the mismatched distribution of marine natural resources and land resources. There are more natural resources in South of China but less cultivated land, while more cultivated land and less natural resources in North.

Due to the accelerated pace of municipalization, the gradual change of people's living environment, and the continuous increase of municipal wastewater and industrial wastewater discharge, environmental protection has become a major issue in the process of municipal development, and the existing environmental problems should be reasonably improved to improve the ecological environment. Attention should be paid to the pollution and destruction of water resources. The deterioration of water quality has a great impact on water resources, directly affecting people's daily life and economic development. Therefore, we should not give a turn-back posture to resources protection in the process of municipal development.

3. Municipal wastewater treatment technology in water environment protection

3.1 Ultrasonic based treatment technology

Ultrasonic treatment technology refers to the use of ultrasonic cavitation effect to degrade the substances in wastewater. The vacuumization reaction bubbles of ultrasonic wave will form more heat energy in the collapse process, which leads to the oxidation caused by the destruction of the chemical bond of H_2O, the oxidation of hydrogen and hydroxide groups, as

well as the organic matter in the waste gas of cities, and the formation of new carbon dioxide and water [2].

By ultrasonic method, at the same time, other science and technology can effectively improve the municipal quality of printing and dyeing wastewater.For instance, through this method, the related wastewater such as BOD and COD in municipal wastewater can be decomposed efficiently and separated from solid and liquid. The decolorization process and biochemical method can be combined to apply to washing and dyeing wastewater. The amount of chemical substances produced in the process of municipal printing and dyeing wastewater treatment can be effectively reduced to meet the treatment standards.

3.2 Earthworm biofilter technology

Earthworm and other ecological filter technology refers to the treatment of wastewater through the degradation of earthworms and other ecological and biological phagocytosis technology and effect, and then through the filter filter or interception technology. The most important components of earthworm ecological filter are water replenisher, filter bed, settling chamber, etc. The main role of water replenishers is the treatment of wastewater, while the filter layer is the main part of printing and dyeing wastewater, which is generally composed of earthworms and even plant substances. After wastewater treatment, the inflow of settling indoor travel is separated from mud. Therefore, the use of earthworm ecological filter technology in wastewater treatment can reduce the cost of treatment, and the amount of wastewater has been reduced. Besides, preliminary safe and effective treatment can be adopted and then for further wastewater based treatment, and thus environmental quality can be effectively improved.

3.3 Photocatalytic oxidation technology

The photocatalytic process is achieved with semiconductors or conductors as catalysts for the increase of pollutants under the condition of light, and the non-uniform distribution of organic matter and OH^- can quickly form an oxidation system to generate OH^- free radicals. At the same time, the possible organic pollutants in the municipal garbage are destroyed and converted into carbon dioxide or water[3]. The comparison between the photocatalytic oxidation process and the conventional municipal wastewater treatment process can remove the pesticide waste gas, grease waste, etc., which may exist in the municipal industrial wastewater, which add convenience to the removal of pollutants.

3.4 Anaerobic biological treatment technology

Anaerobic state environment refers to the anaerobic biological treatment technology state environment formed by microbes.The main purpose of using this technology in the process of printing and dyeing wastewater treatment is to decompose the organisms in the wastewater, because this technology has had a long time in the printing and dyeing wastewater, and this technology is also a key part of the water treatment. The development of the technology is quite mature and this technology is used in wastewater treatments in many cities.

3.5 Chemical treatment technology

Biochemical treatment process. Firstly, the flocculant is added to the water to promote the chemical reaction between the flocculant and the remaining substances in the wastewater after the physical treatment of the larger particle size substances in the wastewater. These more soluble polluting wastes are then separated by screening or segregation techniques. Medium method refers to the use of physical and chemical means to adjust the pH of substances in domestic wastewater so that the pH can meet the prescribed standards. Some regulators such as lime, sulfuric acid and hydrochloric acid are commonly used[4].

Chemical precipitation refers to the addition of certain chemical substances to the municipal wastewater, and the precipitation occurs after the reaction between the two. On most occasions, if there are toxic substances such as sulfur, copper and mercury in the wastewater, the chemical precipitation treatment method will be adopted. REDOX method refers to the use of peroxide reduction in wastewater. It can convert harmful and toxic substances into non-toxic and harmless substances, forming gases or solids, which can be separated from waste water

4. New technology of municipal sludge treatment and detection in water environment protection

4.1 Water quality biological detection technology

The main hazardous substances in water are organic matter and inorganic matter, such as non-ferrous heavy metals in nature or artificial pesticides, whose structures are quite complex and varied. In order to improve the disposal capacity of municipal garbage and wastewater, the environmental biological monitoring technology used in the process of disposal is also quite perfect technology. It mainly uses the luminescent bacteria to carry on the qualitative monitoring to the biological

specific luminescence process in the water. The purpose and effect of the test process: (1) For toxicity monitoring, 30 minutes for qualitative and 60 minutes for quantitative; (2) The test time for biological sterilization activity lasts generally five minutes, two days earlier than the conventional test time; 3. Biochemical oxygen demand test within four hours.

Therefore, the biggest advantage of biological monitoring technology for drinking water safety is that it can be used once, quantitative detection of biological toxicants in water samples has high accuracy and sensitivity, which can be quickly completed in the detection process and can be used in large fields. For example, this method can be used in the detection of some organic and inorganic substances such as heavy metal ions, detergents and solvents. In addition, this detection technology does not have high requirements for detection technicians. As long as they master the basic operating machine, the detection cost is low and it can be used in many fields.

4.2 Sludge non-heating dewatering and drying technology

More than 48% of the sludge is water. Heating, drying and dehydrating it can generate a lot of heat, but the cost is high, and it will release a lot of harmful gases. The mechanical method for sludge dewatering is now a common method, which can effectively reduce the cost and reduce the emission of polluting gases[5].

In the process of sludge non-heating dehydration and drying technology, the support of advanced equipment is needed. Now many cities use ISP complete set of machine dehydration equipment in the process of sludge non-heating dehydration and drying. The dehydration effect of ordinary equipment is 4~10 times higher than that of other equipment. Therefore, the use of this equipment can not only make the advantages of sludge non-heating dehydration and drying technology more prominent, but also the sludge treatment rate and effective utilization rate have been effectively improved.

4.3 Sludge heavy metal detection technology

In the process of sludge treatment and utilization, the heavy metal content is relatively large, which has certain harm to human body. Say so in the process that undertakes processing, must notice the detection of heavy metal. Sludge heavy metal detection technology can be used for a large range of detection and the accuracy is good. In addition, the instrument used in this detection technology is small in size and convenient to carry. The staff will be more convenient in the process of detection and can ensure data interaction.

5. Municipal wastewater and sludge treatment strategy in water environment protection

5.1 Perfect laws and regulations

Corresponding laws and regulations are required to be introduced to improve the effect of water resources protection. Although the current water resources protection policy is carried out by the leaders of various ministries and commissions under the State Council, it is implemented by local governments. In the process of implementation, the responsibilities of all parties should be clarified, and the "One post with two responsibilities" system should be formed, which is a responsible organic mechanism implemented by the state for water pollution control.

China has formed corresponding laws and regulations on the protection of water pollution, which have clear provisions on the responsibility of water resources protection and the corresponding law enforcement. Laws and regulations should be constantly improved, local rules should also be improved, and laws and regulations should be used to restrict people's behavior, so as to fulfill the responsibilities of environmental law and avoid water pollution or environmental damage.

5.2 Recognition of the importance of water resources protection

We should have a correct understanding of ecological resources and integrate them with the help of advanced scientific and technological concepts. We should make clear the analysis of water sources and ensure that the work content is scientific and reasonable. For example, when analyzing the quality of water sources, cash technology can be used to effectively monitor the water resources data, collect the related parameter information in the later stage, and define the water ecological control system, so as to achieve the best effect of ecological control.

Moreover, when the prevention and control personnel analyze and monitor the watershed vegetation, they should also make comprehensive consideration according to the situation of soil and water loss, and have specific classification on the vegetation coverage area, so as to reduce the loss of soil and water resources, so as to achieve the rainwater can penetrate into the land.In this way, the natural resources can be redeveloped and utilized, and the development of low-carbon environment can be realized. The emission of supercritical carbon dioxide is also reduced.Under the condition of ensuring the protection of natural resources, the atmospheric environment is protected scientifically. Generally speaking, water resources quality analysis is also one of the key links of water ecological environment protection in China. Effective protection can promote

the recycling of water resources.

5.3 Adoption of new technology for effective degradation

The main component of municipal wastewater is nitrogen-containing wastewater, which is produced in the process of chemical and pharmaceutical production. Such pollutants will also appear in the production of gas and oil refining. Currently, many countries have listed it as one of the main elements of water resources hazards. The treatment of industrial wastewater containing phenol mainly includes two ways. The first method is the most important treatment method for industrial wastewater containing nitrogen in high concentration, that is, phenol treatment.Another solution is to treat phenol-containing wastewater with low temperature by using activated sludge process. After wastewater treatment, carbon and COD in wastewater can be separated through activated sludge composed of phenol-reducing bacteria and other microbial activities. However, considering that the activity of phenolics and other bacteria is much less effective at temperatures below 15 degrees Celsius, even the use of such disposal processes in northern regions may cause some effects.

Advanced oxidation technology is one of the new oxidation technologies,which is mainly for the separation and oxidation of water pollutants, and a set of the REDOX for ·OH standards is more than 2.8V, which has a good oxidation effect. Organic matter in water is rapidly dissolved and can be converted to H_2O and carbon dioxide. It can effectively solve the municipal water pollution and improve the overall treatment effect of phenolic wastewater.

6. Conclusion

Currently, the domestic municipalization is gaining momentum.In the process of municipal development to achieve municipal ecological environment protection. Government departments should fully understand the importance of municipal wastewater treatment, and take effective measures for wastewater treatment and sludge treatment. Advanced technology and detection methods should be introduced in the operation process. Municipal wastewater treatment plants have to adopt strict standards and incorporate new technologies. The original technology should be optimized, so as to bring the municipal wastewater and sludge treatment technology into a new development space so as to ensure water resources, and avoid the impact of municipal wastewater on domestic wastewater. At the same time, the adoption of new science and technology can not only improve the effect of wastewater treatment, ensure that water resources, which can also bring a certain impact on the effect of municipal wastewater treatment. The process of municipal water resources protection is accelerated, which can maximize water resources protection.

References

[1] Kabdaşlı Işık,Tünay Olcay. Concentration techniques tailored for the detection of SARS-CoV-2 genetic material in domestic wastewater and treatment plant sludge: A review[J]. *Journal of environmental chemical engineering*, 2021,9(5).

[2] Li Juan, Huang Jing, Zhang Jun, Pan Guisheng, Wang Hai. Study on water ecological environment protection and management strategy of Houhu River Basin in Wuhan during the 14th Five-Year Plan Period[J]. *Jilin Water Resources*, 2021(07):49-52. DOI:10.15920/j.cnki.22-1179/tv.2021.07.010.

[3] Yang Haifeng. Analysis of water environmental protection of municipal wastewater and sludge treatment detection technology[J]. *Building Materials and Decoration*, 2020(19):197+200.

[4] Zhao Yongxin. Discussion on the development of municipal wastewater treatment plant to the importance of water environmental protection[J]. *Energy Conservation*, 2019,38(02):89-90.

[5] Yang Bin. Strengthening water environmental protection and adhering to green development -- Thinking about protecting and improving water environmental quality in Hainan cities and towns[J]. *Hainan People's Congress*, 2016(01):48-50.