

Research of Urban Wastewater Treatment Technology

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Abstract: With the accelerating process of urbanization in China, the urban sewage discharge in China has been continuously increasing. As a result, we have to gradually shift the focus of water pollution control from the former industrial point source to urban living sewage treatment. However, the difficulty is very large, because for this problem, there are problems such as low urban sewage treatment rate and pressure on environmental pollution. At the same time, due to a variety of factors, many urban sewage treatment technology can not be effectively used. In this context, this article will analyze the research progress of urban sewage treatment technology.

Keywords: Wastewater Treatment, Technology Method, Urban Development

1. INTRODUCTION

The rapid development of urbanization has brought about increasingly serious problems of water resources pollution. How to effectively solve the problem of urban sewage has become the focus of the current urbanization process. In recent years, although the country has given a high degree of importance to the problem of water pollution, there are still many problems in the current urban sewage treatment, which not only affects the water resources environment of the city, but also causes the sustainable development of urbanization in China. Obstruction. Therefore, through the discussion of the current status of urban sewage treatment, it is helpful to promote the development of urban sewage treatment in China to a more efficient direction.

2. STATUS OF URBAN WASTEWATER TREATMENT TECHNOLOGY

The research on urban sewage treatment technology in China mainly focuses on the physical and chemical methods of biological wastewater treatment. The physical method is mainly used to treat difficult-to-dissolve suspended substances in sewage. The chemical method is to add chemical substances into the sewage, dissolve the sewage in the sewage by chemical reaction, and thus purify the sewage. The biological method is constructed through manual measures and is suitable for construction. The environment creates conditions for the growth and reproduction of microorganisms, promotes the proliferation of microorganisms, and strengthens the ability of microorganisms to oxidize and decompose organic pollutants in sewage. Among them, the biological method has advantages in dealing with

dissolved and colloidal organic matters, organic carbon, sulfur, nitrogen, phosphorus, and other contaminants in sewage as compared with physical and chemical treatment methods. At present, activated sludge and biofilm methods are most commonly used for urban sewage treatment. The activated sludge process mainly includes A/O process and A²/O process, and it is innovative and improved in terms of oxygen supply mode, operating conditions, and reactor equipment. The treatment process is continuously improved, but its controllability is improved. Still poor. The biofilm method mainly includes two kinds of anaerobic and aerated biological filter methods. It uses the growth and reproduction of microorganisms and oxidative decomposition to dispose of the impurities in the sewage. The method is not mature enough, the sewage treatment efficiency is not high, and the filter is used. Pool material needs further development. Although other sewage treatment methods are also used, it is still difficult to meet the need for further development in the treatment of sewage from the rapid development of cities.

3. COMMON SEWAGE TREATMENT METHODS

The traditional activated sludge process mainly removes organic matter and suspended matter in the sewage, and can efficiently purify the sewage, but it is difficult to remove the nitrogen and phosphorus elements in the water, and the effect of nitrogen and phosphorus element treatment is improved in the activated sludge. Based on the method, the A/O process and A²/O process have been studied and have very good results. The A/O process is mainly applied in denitrification and dephosphorization treatment in large activated sludge wastewater treatment plants. For denitrification, the A/O process has high loads, short sludge age, and short hydraulic retention time. For dephosphorization, the load is low, the sludge age is long, and the hydraulic retention time is long. . In general, although the process of A/O process is relatively complex and there are many processing units that cannot simultaneously perform dephosphorization and denitrification, its treatment effect is relatively stable and can achieve the purpose of denitrification or dephosphorization.

The main principle of the A²/O process is to use the anaerobic zone to release phosphorus and then absorb phosphorus in the aerobic zone. The oxidative decomposition reaction converts the phosphorus and nitrogen in the wastewater to an easily removable state, especially organic nitrogen. Under the action of

nitrifying bacteria, it is converted into ammonia nitrogen, which is then converted into nitrite nitrogen and nitrate nitrogen. The mixture containing a large amount of nitrate nitrogen is then returned to the anoxic zone for denitrification. The process can simultaneously perform denitrification and phosphorus removal, has the advantages of low operating cost, small footprint, and good effluent quality, but it also has the disadvantages of high operational management requirements, large investment, and poor energy conservation.

The biofilm method mainly utilizes the biofilm formed by the microbial population and adheres to the surface of the solid filler through the microbial population. After a large number of multiplication, a layer of biofilm having the ability of purification is formed, thereby purifying the sewage, and the role of the biofilm. The soil with automatic purification function is almost the same. For example, the anaerobic biological filter process is to use the filler in the biological filter as a bed for the growth of microorganisms, and use the decomposition of microorganisms to decompose the organic matter in the urban sewage to achieve the hydrolysis and acidification of organic matter, and then further aerobic Deal with and improve the post-processing of sewage treatment to achieve the purpose of purifying sewage.

4. SELECTION OF URBAN SEWAGE TREATMENT PROCESS

The urban-rural relationship between cities and cities has become more and more close to the reform and opening up. The traditional differences between urban and rural areas have begun to shrink. Regional and spatial structures have emerged as a mixture of agricultural and industrial activities in agricultural and non-agricultural activities, and urban and rural areas in non-urban and urban areas. This determines that the main components of the sewage are domestic sewage and a certain amount of industrial wastewater. The individual livestock husbandry and aquaculture industries have developed a good city. The main components of sewage are animal husbandry and aquaculture sewage and domestic sewage. The sewage water quality of a city is completely different from that of urban sewage. The sewage quality of different cities is completely different, and there is no analogy. It is impossible to have a reference and analogy of water quality data like urban sewage. The main component of urban sewage is domestic sewage, and domestic sewage accounts for more than 50%. However, the amount of urban sewage is relatively small, and the proportion of domestic sewage is relatively large, which easily causes the non-uniformity of the sewage, and also causes the fluctuation of the water quality. In addition, the production of enterprises in the city is backward, the concentration of pollutants in the sewage is high, and the comprehensive factors cause the city's sewage pollutant content to be higher than that of the city. In some regions, the concentration of organic matter is low, and the content of ammonia nitrogen is also slightly higher, especially in some cities. The drainage system is not sound, and the use of open channel drainage is more, resulting in a large amount of rainwater inflow and

groundwater infiltration, but also reduces the concentration of organic matter in the sewage.

Most of the cities in China belong to comprehensive towns, that is, residential, commercial, and industrial industries are mixed together. Residential sewage and wastewater are the main components, and industrial wastewater accounts for a small proportion. Of course, there are exceptions for some cities. In Zhejiang Province, some cities have concentrated large numbers of industrial enterprises with local characteristics due to the rapid development of township and village enterprises. For example, a large number of printing and dyeing factories are concentrated in Shaoxing County, and a large number of paper mills are concentrated in Fuyang City. The leather industry in Haining City is well developed and the fine chemical industry and food processing industry in Huangyan City (area) are numerous. The proportion of industrial wastewater in these cities is quite large. In most cities, there is no significant difference in the nature of urban sewage. Generally, the BOD₅ is 100-150 mg/l, the COD_{Cr} is 250-300 mg/l, and the SS is about 200 mg/l. For those cities with a large proportion of industrial waste water and affecting the urban sewage treatment effect, corresponding measures should be taken according to specific conditions, such as pretreatment of industrial waste water into the urban sewage system or concentration of industrial waste water. Performing the parallel processing and so on.

In many cities, the drainage system is a rain-flood confluence system, and the age is long, the quality is very poor, and some are still brick and stone channels. Even the pipeline has many problems. Such systems in the rainy season or when the groundwater level is high, a large amount of rainwater and groundwater enter, causing the sewage plant to operate at an overloaded level. It also causes a large amount of untreated water to be discharged into the storage water body on rainy days, and the sewage concentration is low. The processing effect is very poor. Therefore, in the construction of a sewage treatment plant, the original drainage system should be improved and reconstructed. Excrement sewage from many urban dwellings is discharged directly into the water through septic tanks (domestic wastewater is mixed with effluent from septic tanks). The concentration of such domestic sewage BOD₅ is very low, often only 30-40mg/l, unfavorable to biochemical treatment. Therefore, the original septic tank should be removed, and it is no longer necessary to separate the waste sewage from the domestic waste water inside the residential house. With the above measures, the urban sewage water quality in the city can be maintained at a normal level, so as to ensure that the urban sewage treatment plant can achieve higher treatment efficiency.

The city is surrounded by cities and counties. In a certain sense, the city has become their satellite city. One of the methods for sewage treatment can be to collect the sewage in a concentrated way and integrate it into the urban sewage plants in various regions. (1) Advantages:

The centralized collection of urban sewage into the central city sewage treatment plant for treatment, can reduce the number of construction of sewage treatment plants (stations), greatly reducing the investment of the sewage plant, and the sewage plant can form a larger scale, the number of Less, overall easier to manage, lower operating costs. Moreover, due to centralized management, it can save more than 80% of manpower, and the electricity and pharmaceutical expenses can be greatly reduced. It can be equipped with small and sophisticated professional management personnel to ensure the stable operation of the processing system, so as to ensure the best treatment effect. The best environmental benefits can also improve processing efficiency. (2) Disadvantages: The cities are scattered around the central city and there is a certain distance between them. It is easier to collect the sewage in the city, but the distance to the central city is longer, so the investment in the sewage pipeline network is huge and the construction is difficult. The total investment is More. In addition, urban sewage is collected in central cities. Invisibly, a large number of water sources are concentrated. There are many water shortage areas in China. If wastewater is reused in urban areas, the water transmission network needs to be duplicated and the investment is huge.

(1) Advantages: Modern cities are quite large, with populations ranging from a few thousand to less than 50,000. The scale of cities and towns in developed coastal areas is relatively large, and there is a large amount of domestic sewage, together with industrial drainage and sewage. The total amount is also considerable. If each city establishes its own wastewater treatment plant and collects and treats the sewage in its own area, it can greatly reduce the construction of sewage collection pipelines. Although the number of wastewater treatment plants is generally increased, the scale of the wastewater treatment plant is reduced. However, on the other hand, investment in water transmission network can be greatly reduced. In terms of overall investment, it can generally save 20% to 30% of construction funds. In addition, with the economic development, the living standards of residents have been continuously improved, and the domestic water consumption is rapidly increasing. The per capita water consumption of urban areas in developed regions is no less than the urban per capita water consumption, and the increase in the amount of greening and road water consumption is even greater. Taken together, the city's water consumption grows rapidly. In many areas, the environmental pollution and the lack of water resources have made the availability of water for drinking and industrial water supply less and less, and there have been varying degrees of water shortages. One of the solutions is to reuse wastewater. Urban construction of sewage treatment plant provides feasibility for this method [20]. Urban sewage treatment plants, after general secondary biochemical treatment, are supplemented with three-stage treatment processes such as sedimentation and filtration, and the water quality can fully meet the water

reuse quality index. Water reuse points are generally concentrated in cities and towns with relatively few pipelines. Economic analysis is completely feasible. The city's own construction of a wastewater treatment plant can also, to a certain extent, accumulate certain experience for the relevant local authorities, lay a certain foundation for future development, and also provide a reference for other cities that later conducted sewage treatment. (2) Disadvantages: The number of cities is relatively large. The construction of a sewage treatment plant on its own does not facilitate the centralized management of cities and counties. It is difficult to manage the daily operation and the management level is also reduced. The total investment in the wastewater plant will certainly increase.

Sewage treatment technology can be divided into physical treatment, chemical treatment and biological treatment. The physical treatment is mainly used to remove substances that are not favorable in the subsequent treatment process in terms of properties or particle size. The physical treatment methods used in wastewater treatment include screening, retention, gravity separation (including natural sedimentation, natural floatation, and air floatation), and centrifugal separation. The corresponding treatment equipment includes grids, screens, filters, microfiltration machines, grit chambers, sedimentation tanks, deoiling tanks, air flotation devices, and centrifuges and cyclone separation equipment. Sewage chemical treatment is usually in the sewage treatment process dosing chemical reagents, so that it reacts with harmful substances in the wastewater to achieve the purpose of purification of sewage. Such as chemical phosphorus removal, ozone disinfection. Biological treatment is divided into artificial biological treatment and natural biological treatment. Artificial biological treatment adopts certain artificial technological measures to create a favorable environment conducive to the growth and reproduction of microorganisms, accelerate the proliferation of microorganisms and their metabolic functions, and oxidize and decompose organic matters to convert them into stable inorganic substances, thereby contaminating the sewage. Degraded and removed. Biological treatment is divided into aerobic biological treatment and anaerobic biological treatment depending on the types of microorganisms involved in metabolic activities. Aerobic biological treatment is further divided into activated sludge and biofilm methods. The activated sludge method is a method of artificially strengthening the natural purification of water. When air is continuously input into the sewage, a certain amount of flocks that reproduce a large amount of aerobic microorganisms, activated sludge, and microorganisms that live on activated sludge are formed in the water. Organic foods are used to obtain energy and continue to grow and multiply, so that organic matter can be removed and sewage can be purified. The biofilm method allows the sewage to continuously pass through the solid filler, and a sludge-like biofilm can be formed on the filler, and a large number of microorganisms are propagated on the

biofilm, and can perform the same purification action as the activated sludge. Natural biological treatment mainly includes biological pond treatment system and land treatment system.

5. CONCLUSION

Each procedure in urban sewage treatment will have a direct impact on the final treatment results, and the characteristics of each process application are also different, and the advantages and disadvantages are all very prominent. Therefore, in the selection of different processes, according to the specific conditions of sewage treatment, select targeted processes to improve the urban sewage treatment effect. At the same time, it is necessary to strengthen the cost reduction on the basis of the sewage treatment technology and increase the economic benefits of the sewage treatment. Moreover, it is necessary to step up publicity efforts to raise people's awareness of water conservation and reduce the pressure on sewage treatment.

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