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Application of ultrafiltration membrane technology in environmental engineering water treatment

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Abstract: *With the development of society and the advancement of various technologies, the development of industry has been promoted, and the problem of environmental pollution has arisen to a certain extent. It is particularly necessary to strengthen water treatment in environmental engineering. The application of ultrafiltration membrane technology will help the sewage to be thoroughly filtered and purified, and effectively ensure that the filtered water quality meets the basic detection standards of environmental engineering. Therefore, when analyzing ultrafiltration membrane technology for water treatment in environmental engineering, this paper further analyzes the application points of ultrafiltration membrane technology in environmental engineering treatment from the common technology types and application status.*

Keywords: *Ultrafiltration membrane, Environmental engineering, Water treatment*

1. Introduction

The quality of people's domestic water is related to their own health. From the current ecological situation of water environment, the quality of drinking water cannot be completely guaranteed. And for other water, there is also some pollution. With the in-depth implementation of environmental protection development concepts such as Sponge City, various cities are also vigorously promoting the application of water resources treatment technology, but there is a problem of low effectiveness in the depth of technology application. At the end of last century, China generally used the methods of adding purifying agent and disinfectant to sterilize the water source of underground river basin, and then added the precipitated impurities of chemical reaction to treat the tiny particles in the water[1]. This traditional water treatment method has complicated steps and is easy to cause chemical reagent residues, which directly affects the quality standard of drinking water and is difficult to meet the development needs of modern society[2]. At this stage, due to the rapid development of social economy and the continuous progress of science and technology, ultrafiltration membrane technology has been fully applied in the development of water treatment[3-4]. Ultrafiltration membrane used in ultrafiltration membrane technology is an artificial membrane, which can filter colloidal impurities and suspended particles in underground water sources, thus achieving the effect of purifying water. Now, many areas in China have met the needs of regional drinking water purification and people's requirements for water resources by using ultrafiltration membrane technology[5]. In the new era, we should pay more attention to environmental protection, reasonably deal with the present situation of water pollution, and then improve people's quality of life. It is the most important thing in environmental engineering[6]. Doing a good job in water treatment can effectively protect the environment and improve the utilization rate of water resources. Therefore, attention should be paid to water treatment. There are many kinds of water treatment technologies, among which ultrafiltration membrane technology is the most widely used environmental engineering water treatment technology at present[7]. Through ultrafiltration membrane technology, impurities such as sewage, dirty water and waste water contained in water bodies can be effectively filtered, the recycling efficiency of water resources can be improved, and water resources can be effectively cleaned.

2. Overview of ultrafiltration membrane technology

2.1. Brief introduction of ultrafiltration membrane water treatment technology

Ultrafiltration membrane is a kind of artificial permeable membrane, which has the property of semi permeable membrane. Using the principle of micropore, it allows water molecules to pass through in

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one direction and blocks solutes in water from passing through the membrane, so as to achieve the purpose of filtering water. It can effectively separate impurities and particles in water, thus ensuring the safety of drinking water [8]. Ultrafiltration is mainly carried out under pressure. Solvents and some low molecular weight solutes reach the other side of the membrane through the micropores on the membrane. The principle of trapping polymer solutes and other emulsions is mainly screening, and sometimes the chemical properties of the membrane surface will also play a role in the interception. During ultrafiltration separation, polymer and colloidal substances are blocked by ultrafiltration membrane due to initial adsorption of membrane surface and micropore and mechanical separation of membrane surface. However, water, inorganic salts and low molecular weight substances are not allowed to pass through the membrane. Compared with the traditional filtering method, the advantages of the traditional filtering method are very significant [9]. The traditional filtering method can only filter out the larger particle impurities, and it is difficult to filter out the small and micro particles dissolved in water, which will have a certain impact on the follow-up use of urban tap water and affect the health of drinkers. The traditional filtration method generally requires the establishment of an independent filter tank to treat drinking water, and the use of ultrafiltration membrane technology greatly reduces the site consumption. The use of ultrafiltration membrane technology is of great significance to ensure the health of urban drinking water in the new era, and can fully meet the needs of people for drinking water. At present, ultrafiltration membrane technology has been widely used in environmental engineering water treatment, especially in sewage treatment and seawater desalination.

2.2. Characteristics of filter membrane technology

Through the analysis and study of the existing data and cases related to water treatment in environmental engineering, it can be known that the application characteristics of ultrafiltration membrane technology include the following aspects, as shown in Figure 1.

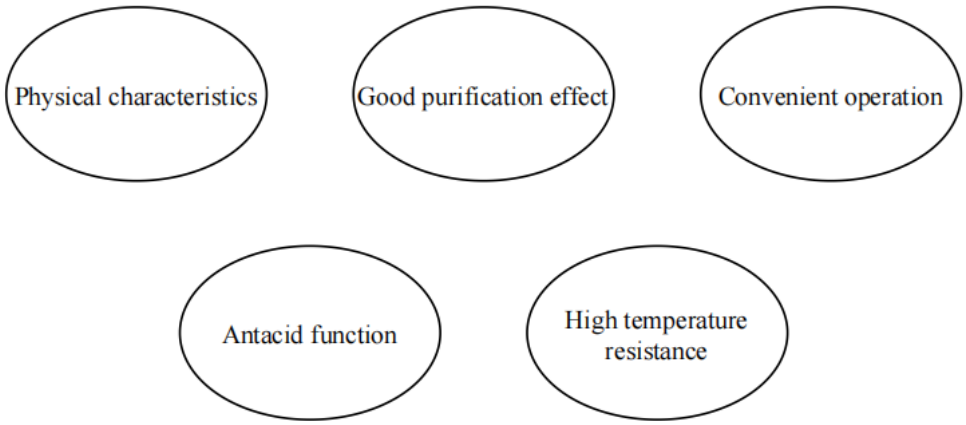

Figure 1: Application characteristics of ultrafiltration membrane technology

Ultrafiltration membrane technology has the following three technical advantages: First, it has outstanding stability advantages, especially in high-temperature treatment environment, which can play a stable process treatment role, will not produce excessive chemicals, and can reduce the secondary pollution of water treatment. Secondly, the outstanding safety advantage has a strong role in promoting the water quality conversion efficiency, especially for the treatment of suspended solids, which can completely remove harmful chemical substances such as colloid, bacteria and suspended solids in water, and the removal effect can reach 99%. Third, it is an outstanding economic advantage. In the process of technology application, it can reduce the capital cost and have better adaptability to sewage treatment in different fields. Ultrafiltration membrane technology also has many excellent characteristics, and its key characteristics are mainly manifested in the following aspects: First, it is safe and reliable. Compared with traditional filtration technology, ultrafiltration membrane technology is safer and more reliable, and its application range is wider. Instead, ultrafiltration membrane technology causes less chemical pollution. Ultrafiltration membrane technology hardly uses chemical reagents, which will not cause secondary pollution and is good for ecology. Thirdly, the ultrafiltration membrane technology is convenient to use, and the technical threshold is low. With the help of automatic equipment, manual

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operation can be basically realized, which greatly reduces the investment of material resources and manpower and saves the cost [10]. Fourthly, the ultrafiltration membrane technology has good filtration effect and stable properties. The materials used in ultrafiltration membrane facilities are mostly high-molecular materials, which have high-quality properties such as acid resistance, alkali resistance, temperature resistance and hydrolysis resistance. Fifth, ultrafiltration membrane technology is widely used, and has many ways of use. Besides filtering urban drinking water system, it can also recycle industrial wastewater and reduce its pollution to the ecological environment.

3. Application of ultrafiltration membrane technology

3.1. Application in daily water pollution

When ultrafiltration membrane technology is adopted in people's daily life, tap water is filtered to remove some chemical impurities and toxic substances, thus effectively ensuring the safety and health of drinking water in people's daily life. At present, due to the worsening of living environment, water pollution has become more and more serious, even affecting people's normal domestic water. The application of ultrafiltration membrane technology can filter the toxic substances in the effluent to ensure the safety of people's drinking water and safe domestic water.

During the water source detection in a water plant, it is found that the water sample has a large turbidity, and contains iron, manganese, fluoride, total coliform, etc. The overall water quality is poor, which is far from the standard of drinking water for residents, so it needs to be purified. After on-site investigation and understanding of the water quality, technicians decided to use ultrafiltration membrane technology for treatment to effectively remove suspended particles. Practice has proved that ultrafiltration membrane technology is effective in purifying drinking water. After treatment, the water quality has improved significantly. See Table 1 for the specific outlet water value.

Table 1: Effluent Index Values of a Water Plant

Inspection items	Chroma	Turbidity	Iron	Zinc
Inspection requirements	<15	<1	<0.3	<0.1
Inspection results	4	0.18	0.21	0.06
Conclusion	Qualified	Qualified	Qualified	Qualified

3.2. Application of industrial wastewater purification

As one of the main sources of urban sewage, industrial wastewater contains a lot of pollutants. If industrial wastewater is directly discharged into the natural water environment, it will inevitably cause a large area of water environment pollution. However, the traditional sewage treatment technology has some drawbacks and shortcomings, which can't completely filter the pollutants in industrial wastewater. Therefore, choosing ultrafiltration membrane technology with better purification effect has become the main development trend of industrial wastewater purification. Electroplating industry needs a lot of water resources, resulting in a lot of wastewater. Different from other wastewater, electroplating wastewater contains heavy metal elements such as Cu, Pb, Al, etc., which will not only pollute the water, but also cause irreversible effects on animals and plants. If people drink this wastewater, it will cause serious damage to their health, so it needs to be treated in time. However, in the past environmental engineering water treatment, it was difficult to effectively treat heavy metals in water, and the cost was high, so it could not be applied on a large scale. Ultrafiltration membrane technology can solve this problem well.

3.3. Application of seawater desalination treatment

The earth is rich in water resources, but 96.5% of the water resources are undrinkable ocean water, and 69% of the drinkable fresh water resources are stored by glaciers, so it is difficult to exploit them. Therefore, the focus of environmental engineering water treatment is to solve the shortage of freshwater resources in China. Throughout the world, it can be found that many countries and regions have a huge demand for water resources, but the actual fresh water resources are in short supply. Especially for some countries and regions, there has been a very obvious shortage of fresh water resources, resulting in the death of a large number of local people due to lack of water resources. Therefore, it is very necessary to convert seawater resources into fresh water resources that people need

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for survival, which will help to promote the sustainable survival and development of mankind. Analysis of previous seawater desalination methods shows that electroosmosis technology is mainly used, which can achieve a certain desalination effect, but the recovery rate is low. In the subsequent seawater desalination process, researchers gradually developed the reverse osmosis technology, which can effectively improve the recovery rate, but it is still not high. The wide application of ultrafiltration membrane technology provides a new opportunity for seawater purification. Compared with other seawater purification methods, ultrafiltration membrane technology has the advantages of low investment cost, good purification effect and high cost performance. The new materials used in ultrafiltration membrane technology can effectively avoid seawater corrosion, and can effectively realize seawater desalination by combining with reverse osmosis technology.

3.4. Application of urban sewage

Nowadays, the city size is growing, the number of urban population is also growing, and the amount of urban sewage generated is also growing, which greatly increases the pressure on urban sewage discharge. The pollution degree of urban sewage is relatively light, and it can be discharged into rivers and lakes only by simple treatment. However, due to the large amount of urban wastewater, high treatment cost and large land occupation, it is impossible to conduct large-scale batch treatment of urban wastewater. The application of ultrafiltration membrane technology can effectively solve the problem of difficult urban sewage discharge. With the help of ultrafiltration membrane treatment technology, the pollutants in urban wastewater can be effectively treated to improve the quality and purity of water. The water resources after treatment in the waterworks can be re supplied to residents for use.

4. Conclusions

Generally speaking, it is indeed very difficult to effectively implement the current environmental engineering water treatment, and there are various types of sewage to be purified. Engineering water treatment has become an important measure to protect water ecological balance. In the process of treating specific polluted water sources, advanced water source treatment technology, namely ultrafiltration membrane technology, should be vigorously promoted. Ultrafiltration membrane technology is a brand-new water treatment technology. In order to make full use of ultrafiltration membrane technology and make better use of water resources in environmental engineering water treatment, we should improve and perfect ultrafiltration membrane technology on the premise of continuous progress of science and technology and gradual improvement of people's living environment, so as to make it in the water treatment period of environmental engineering, improve the effect and quality of water treatment, and ensure the storage and protection of water resources.

Ultrafiltration membrane technology plays an indispensable role in many aspects of real life, and it is of great significance to ensure the health of urban drinking water and purify all kinds of industrial wastewater. However, it should also be adjusted according to the specific needs in the specific use process to avoid the excessive consumption of ultrafiltration membrane caused by the adsorption and precipitation of membrane. Through relevant means to improve the pollution resistance of ultrafiltration membrane, and strengthen the training and publicity of professional technology, effectively promote the upgrading of ultrafiltration membrane technology. The ultrafiltration membrane technology can be better applied to residential drinking water, seawater desalination, industrial wastewater purification and urban sewage recycling, so as to give full play to the application value of ultrafiltration membrane technology, promote the development of social ecological civilization and ensure the rational utilization of water resources.

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