Research Progress in Pharmaceutical Wastewater Treatment Technology

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Abstract: With the development of the medical industry, according to the characteristics of pharmaceutical wastewater, the corresponding pharmaceutical wastewater treatment technology is used to optimize the technology in the production process, which is a measure for the welfare of human health. The wastewater discharged during the production process, especially the pharmaceutical wastewater, is very polluting to the human environment. According to the physicochemical and biochemical and combined process technologies used in pharmaceutical wastewater at home and abroad, new methods are used to improve the treatment methods, and the application of pharmaceutical wastewater with higher difficulty is realized. This paper analyzes the technology and research progress of pharmaceutical wastewater treatment, and hopes to promote the level of chemical treatment and chemical treatment of biochemical treatment.

1.Introduction

The treatment of high-concentration organic sewage and pharmaceutical wastewater in China is difficult to handle. Because of the seriousness of pollution in China, in addition to industrial wastewater, it is the treatment of pharmaceutical wastewater. The characteristics of pharmaceutical wastewater are complex. There are many types of BOD and COD, such as low ratio and large fluctuation, and the fluctuation of water volume is also Brought high concentration characteristics. Chemical atomization and biochemical methods is used widely in current treatment methods for pharmaceutical wastewater.

2.Type, Source, Characteristics of Pharmaceutical Wastewater

Pharmaceutical wastewater: Processes such as washing, cooking, rinsing, preparation, produced in the production workshop; the main pollution indicators are pH, BOD₅, COD, SS, animal and vegetable oil, ammonia nitrogen, TOC, total cyanide content, acute toxicity, etc. Bioengineering pharmaceutical wastewater: It is the wastewater from the animal organs as raw material for the extraction or extraction of plasma and serum antibiotics and insulin gastric enzymes. The main pollution indicators are pH, color, BOD₅, COD and SS, animal and vegetable oil, ammonia nitrogen, TOC, volatile phenol, formaldehyde, acetonitrile, total residual chlorine content, acute toxicity, etc. The pharmaceutical wastewater from mixed preparations comes from the washing wastewater generated during the washing process, the washing water of the production equipment and the flushing water of the

plant floor; the main pollution indicators are pH, BOD₅, COD, SS, TOC content, acute toxicity, etc. [1].

Sources and water quality characteristics of pharmaceutical wastewater: Pharmaceutical wastewater generally includes production wastewater from proprietary Chinese medicines, chemical pharmaceuticals, and biopharmaceuticals. The biopharmaceutical wastewater comes from the process of fermentation, biological reaction, extraction and crystallization. The wastewater component mainly contains microbial metabolite mycelium, and residues of nutrients and organic solvents such as antibiotics remain. Biopharmaceutical wastewater is less biodegradable and has higher toxic and harmful substances, and the organic concentration of the pollutants is higher. The chemical pharmaceutical wastewater contains the higher concentration of inorganic salts in the toxic intermediates. The wastewater mainly comes from the rinsing and cooking of the medicinal materials and various preparation processes. For the production of wastewater from traditional Chinese medicine, there are still a large number of organisms, lignin, sugar, and generally higher color and more types of pollutants. In the progress of pharmaceutical wastewater treatment technology, at present, there are many kinds of wastewater generated in different pharmaceutical enterprises, and there are many methods for selection. The basic methods of conventional wastewater treatment can be generally divided into chemical biological methods and Physical law. Deep processing by preprocessing is called physical method. This method can carry out coagulation and sedimentation, membrane separation, and belongs to the process of advanced treatment, but often through simple physical methods, it cannot meet the discharge standard, it must completely meet the standard, and the reduction of the

concentration is insufficient, which is easy to bring to the subsequent treatment. For the problem of load, a comprehensive process is generally used for the treatment of wastewater. The adsorption method reduces the content of the pollutants by adsorbing the materials, and commonly uses an adsorption resin to corrode the acid activated carbon. The biochemical water treatment in boiling water uses an adsorption enhanced coagulation process. The ceramic adsorption enhanced coagulation advanced treatment technology has a high removal rate for protein replication acid and polysaccharide. The gas attachment method is mainly used for pretreatment of pharmaceutical wastewater, and a combined process such as electrocatalytic flocculation is usually used to treat the fermentation mixed pharmaceutical wastewater. Through the above method, then treat the vitamin pharmaceutical wastewater, the COD concentration of the treated wastewater is reduced from 20,000 mg/L to 8000 mg/L, and the organic matter treatment can reach 60%, which greatly reduces the organic compounding of the subsequent biochemical treatment.

3. Pharmaceutical Wastewater Treatment Method

3.1 Coagulation Sedimentation

Coagulation and sedimentation method is a commonly used pretreatment method for pharmaceutical wastewater. This method uses coagulation and sedimentation to make the stability of colloidal stability in pharmaceutical wastewater affected. Under the action of gravity, for example, ferric chloride polyaluminum chloride, etc., by means of compression diffusion, an interparticle charge, an electric double layer agglomeration is generated, and a coagulation precipitation pretreatment is performed by adding a chemical agent. Because the charge between the particles is adsorbed in the colloid of the boiling water, the colloidal particles are mutually polymerized. Under the action of gravity, the commonly used coagulant effectively reduces the concentration of the contaminant during the treatment of the pharmaceutical wastewater.

The advantages of the coagulation sedimentation method can improve the biodegradation performance of the wastewater and advantageously reduce the concentration of the pollutants, but the disadvantage is that secondary pollution is easily generated. A large number of chemical physics have lower pH and higher salt content. Therefore, in order to remove sediments, the form of electrolyzed gas floating gas and gas-filled air floatation is often used. In the pharmaceutical industry wastewater treatment, the treatment of wastewater such as oxytetracycline, gentamicin and tetracycline is more effective.

3.2 Physical and Chemical Methods

The physicochemical method is a physical chemical method for pharmaceutical wastewater, and the treatment of pharmaceutical wastewater in accordance with the

biological treatment process, and then in the pre-treatment and post-treatment process, the atomization is better for various elements in the pharmaceutical industry wastewater treatment. For example, the adsorption method is a method for recovering pollutants in solid adsorption wastewater, and is purified by using a porous solid, such as activated carbon activated bacteria, humic acid, etc., to help the wastewater to be purified. Among them, vitamin B6 paracetamol and the like. The wastewater produced by the medicament has many advantages in the adsorption method, and the treatment effect is good, but the method is costly.

3.3 Electrolysis

The electrolysis method has an easy-to-operate and efficient method and also has a good biochemical effect. The relative membrane separation technology has the advantages of nanofiltration membrane fiber membrane reverse osmosis, etc., while generating environmental benefits, it can also recycle useful materials, easy to operate, high processing efficiency, and greatly save energy.

3.4 Chemical Method

Chemical methods generally use chemical methods to treat chemicals in the secondary pollution process by using chemicals. For example, the iron-carbon method uses iron and carbon as a treatment method, and the ozonation method is to improve the Bot value of the antibiotic wastewater, and has a good effect on the BOD removal rate. For example, during the treatment by the ozonation process, the COD and pH usage of the wastewater undergoes a large change after being treated. The ferrous salt reagent method can effectively remove refractory organic matter that cannot be removed from wastewater. This method is simple in equipment, easy to use, and has a good market prospect.

3.5 Photocatalytic Oxidation Method

The photocatalytic oxidation method can treat the wastewater after secondary pollution. This method is highly effective and novel after application. It is a very effective pretreatment method. It can quickly remove harmful organic substances in wastewater. After changing the composition, it can also facilitate subsequent biodegradation and reduce microbial toxicity. Biochemical method is one of the methods. Generally, the combination of anaerobic and aerobic methods is used to reduce the concentration of organic matter in the wastewater and achieve a good treatment effect. For example, anaerobic biological treatment can directly treat high-concentration organic pharmaceutical wastewater. After the water is still high, the COD is still high, and the organic pharmaceutical wastewater can be recycled by anaerobic treatment, and the remaining sludge is small.

3.6 Upflow Anaerobic Sludge Bed Method

The upflow anaerobic sludge bed method has short hydraulic retention time and simple structure. The disadvantage is that the management technology is higher when the sludge return device is operated. The filter is a new type of technology, which combines the advantages of the anaerobic filter, and the performance of the reaction is improved. The hydrooxic acid method has a fast reaction speed and can degrade small molecular organic pollutants, and does not need to be sealed and stirred, can reduce the amount of sludge, and does not need to be provided with a three-phase separator, and can effectively perform biological separation. Even when there are many types of organisms and the treatment efficiency is lowered, it can maintain good stability. Aerobic biological treatment is a method of diluting raw water, generally using a common activated sludge method, which can generate a large amount of power in the case of poor wastewater availability. In the pretreatment, multi-stage treatment is often adopted, and the amount of excess sludge is large, and sludge swelling is likely to occur. The effective treatment method, such as microbial fixation technology, improves the treatment effect of wastewater, and the progressive activated sludge method is adopted. Flexible operation, investment saving operation, stable sludge activity, high impact resistance, no need for sludge recirculation, homogenization of water quality, treatment of intermittent discharge of water, large water quality of wastewater, Alpha has been successfully applied in many pharmaceutical industries. In the field, wastewater treatment such as tetracycline and gentamicin. However, this method is difficult to achieve high de-treatment in improving sludge settling and solid-separation performance. High-concentration wastewater can be treated in consideration of the manner in which activated carbon is added to the activated sludge system. Therefore, when the sludge sedimentation mud water is separated, the wastewater treatment method is adopted, so that the water volume is diluted relatively, and the aerobic method consumes a high energy consumption, which can overcome the high operating cost during the conventional treatment.

3.7 Biological Contact Method

The biological contact method can treat the pharmaceutical wastewater after sludge expansion. This method concentrates on the advantages of the activated sludge method and the biofilm method. It is suitable for sewage with large changes in water quality and quantity, and high organic matter, which can generally be used in the combination of conventional activated sludge methods and belongs to ultra-high load activity. Approach. This method can be used to treat pharmaceutical wastewater that causes sludge to swell, and plays a role in toxic substances and pH buffers. Biological activated carbon can effectively remove microorganisms, and the degradation of pollutants is greatly improved. The COD removal rate has a small occupied area of the biological fluidized bed, and combines the advantages of the conventional activated sludge method, and has the advantages of high volume load and fast reaction speed.

On the carrier such as the factory flue ash, the baffled fluidized bed is divided into a process such as reflux precipitation. Compared with SB2, the activated sludge process can effectively remove refractory organic matter. When the SB2 reaction is carried out, the delay length is divided into two parts, all of which are complementary to the biological selection zone, and the reaction zone has strong impact resistance, and the individual can also operate independently. Commonly, there are aerated biological filter, air drive, biological turntable, algae turntable, etc., all have certain digestion and deoxidation functions.

4. Pharmaceutical Wastewater Treatment Combined Process

From the perspective of the effect of investment cost treatment, the combined process has many advantages such as impact resistance, and the formulation of the process of processing the total wastewater of pharmaceutical wastewater, and the anaerobic treatment and individual consumption should be utilized for the case where the pharmaceutical wastewater is freely high in wastewater composition. The treatment method of oxygen degradation is combined to meet the standard discharge. The numerical effect is higher than the single treatment method in the treatment effect. After practice in engineering practice, it is proved that the pharmaceutical wastewater treatment combined process is widely used.

During the process of removing wastewater from the pharmaceutical factory workshop, it was found that PAM was used as a flocculant, and after adding calcium chloride, the enhanced coagulation method was used to remove the pharmaceutical wastewater, and the dosage of the coagulant was found to be 200 mg/liter, pH value. At this time = 5, and combined by chemical methods, including electrolytic oxidation, for example, using Tietong internal electrolysis to pretreat pharmaceutical wastewater. The removal rate of COD can be as high as 90%, and the use of salinomycin and avermectin can be effectively removed. After the anaerobic aerobic treatment, the results show that the COD removal rate of wastewater can be increased to 95%, and the two systems greatly improve the removal effect. In addition, the pharmaceutical wastewater treatment adopts the biological method combined with the decomposition and synthesis of microorganisms, degrades the pollutants in the wastewater, and adopts the pressurized aerated bioreactor treatment process, which can pass the biological pollutant discharge standard of the chemical synthesis pharmaceutical industry. The oxidation reaction cell was filtered to study the mixed preparation wastewater. The average removal rate of ammonia and total phosphorus in organic pollutants in the apartment can reach 80% and 65 to 99%, respectively. The combined process operation is more reliable, can fully meet the comprehensive discharge standard of sewage, remove pollutants from pharmaceutical wastewater, and adopt a combined process. The comprehensive organic matter pollution rate can be removed to 98%, which fully meets the design standard requirements.

5. Conclusion

With the increasingly serious environmental protection situation in the country, people's awareness of environmental protection has gradually increased, and China's medical reform has been further promoted, pharmaceutical wastewater treatment has received more and more attention from environmental protection, and has become a competitive performance of products. Who can produce and who can possess it? The market has therefore enabled the new "Drug Industry Water Pollutant Emission Standards" to be implemented quickly. All enterprises have increased their investment in environmental protection and management, and intensified their efforts to deepen research and development of pharmaceutical wastewater treatment technologies to minimize the reduction of pharmaceutical wastewater. The content of chemical synthetic substances in China, degradation inhibits biochemical substances in wastewater, and strives to purify wastewater as much as possible. Chemical synthetic drugs and antibiotics are widely used in clinical practice. Different pharmaceutical companies have many kinds of pollution on the wastewater components, and the composition is very different. They only rely on a single sewage treatment technology, can not meet the emission standard requirements, optimize the combination according to different method characteristics, and adopt a combined process segmentation design, such as electrolytic advanced oxidation. The technology, the improvement of the effluent water quality, the pretreatment method, combined with the biological treatment process, can achieve the desired effect. Therefore, in the future, pharmaceutical companies should treat wastewater, take biotechnology as the foundation, combine atomization method, advanced oxidation method, etc., and adopt comprehensive treatment process, which is the development trend of pharmaceutical wastewater treatment in the future.

References

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