Examples and Analysis of Tobacco Wastewater Treatment Engineering

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Abstract: The wastewater was treated by hydrolysis acidification and contact oxidation according to the characteristics of wastewater which produced by cigarette production process. The wastewater produced by cigarette manufacturing department was separate pretreatment using coagulation-air flotation. The results indicate that the coagulation-air floatation process for white glue wastewater pretreatment is feasible and effective. The white glue wastewater was prone to bubbles and had a large influence on the contact oxidation. The main process of Hydrolytic acidification and contact oxidation was running in good condition after white glue wastewater pre-treatment. The removal rate of COD was over 85%. The quality of effluent water is better than integrated wastewater discharge standard (GB8978-1996).

1.Introduction

With the development of the economy of China, the tobacco industry has also been greatly developed. Limited by the scale or affecting the development of the city, some cigarette factories have moved to the suburbs. The Ningbo Cigarette Factory has just implemented a technical transformation in different places. During the implementation of the project, factory actively took the social responsibility of environmental protection and specially built a sewage treatment station with a treatment capacity of 2000 m^3/d. To reduce the environmental burden, the sewage treatment station treats the waste water for recycling and reuse.

2.Water quality and process

2.1 Water quality

The Ningbo Cigarette Factory is a factory specializing in the production of cigarettes. The source of wastewater includes two parts: production wastewater and domestic sewage in the production process. The production wastewater accounts for 50-60% of the total water which mainly comes from the washing water, the cleaning of the silk making equipment and the cleaning of the roll-adhesive equipment. The rest is domestic sewage and miscellaneous water in the plant area. The quality of influent water was tabulated in Table 1.

Table 1. The quality of influent water

CODcr	BOD	NH_3-N	SS	pH
300-400 mg/L	170-250 mg/L	15-25 mg/L	250～450 mg/L	6～8

The cleaning of the roll-adhesive equipment will cause the glue in the production to enter the drainage system. This part of the waste water is usually called white glue wastewater, which is white

and cloudy. This wastewater has three characteristics： the amount of this water is small, only 20 tons per day. At the same time, the discharge time is relatively concentrated. the temperature of this water is relatively high, about 45 ~ 55ºC. the COD is higher, 5000 mg / L or more, and sometimes even 10000 mg / L. The wastewater is poorly biodegradable. Therefore, the impact of this wastewater on the biochemical system of the sewage treatment station cannot be ignored.

2.2 Technological process

Table 1 shows that if the BOD/COD of the sewage >0.5, it is suitable for biological treatment. The sewage of this project adopts combined hydrolysis acidification and bio-contact oxidation system [1]. The quality of effluent water achieved the first-class standard in Table 4 of the Integrated Wastewater Discharge Standard (GB 8978-1996) [2]. The specific process is shown in the flow chart Figure 1.

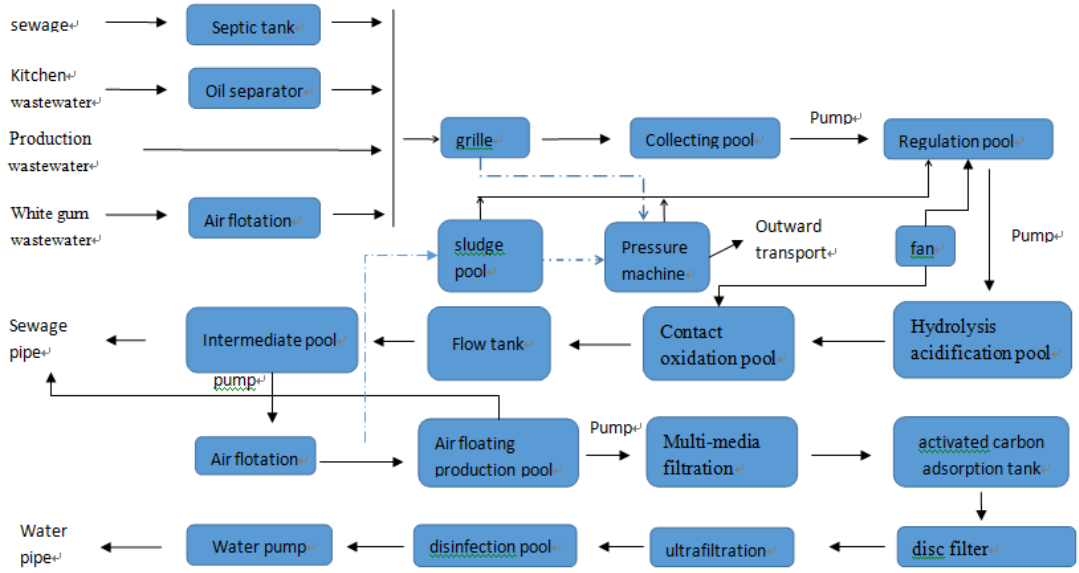

Fig.1 Sewage treatment process flow chart

3. The test and operation

3.1 Preparation

In the initial stage of debugging, the water filling debugging, single-machine debugging and joint adjustment of all the construction and equipment of the sewage treatment station are carried out. To investigate whether there are problems with the structure and equipment, whether they meet the design requirements, whether the operation parameters are normal and whether all the process links can be matched. After the debugging is completed, the cultivation and domestication work in the biochemical stage will be started after the problems are solved

3.2 Inoculating culture

Combined hydrolysis acidification and bio-contact oxidation system inoculated sludge .When sludge was added to the contact oxidation tank, the sludge concentration in the tank was about 1200 mg/L, which was relatively low. However, the sludge is taken from municipal sewage treatment plant, which is in good operation and has good performance. Laying a good foundation for its domestication and rapid growth. During the period of domestication, the water was stopped and the air blower was turned on for aeration culture to ensure that the dissolved oxygen in the water was controlled at 2-4 mg/L [3-5]. During the period of aeration, in order to make the sludge adapt to the new environment and rapid

growth, flour, urea and compound fertilizer were added every day to supplement C, N and P in the contact oxidation tank [6].

A week later, the water began to flow in an incremental manner to ensure that the sludge was in a low-load growth and domestication state. The microorganisms gradually adapted to the environment of the waste water of the cigarette factory. After more than 20 days, the sludge in the contact oxidation tank presented yellow color, and the sludge concentration was increased to 2500 mg/L. The results of microscopy indicated that the activity of camptotheca and reptilus was frequent, the sludge sedimentation performance was good, and the conditions of stable operation were available [7].

3.3 Commissioning of air flotation devices

At the same time, the drug feeding and debugging of the air flotation device was carried out. The polyaluminum chloride (PAC) coagulant and polyacrylamide (PAM) coagulant were added in the mixing area of the device.

3.4 Verification of the impact load of white gum wastewater

After the system debugging and operation is stable, in order to verify the impact load of white gum wastewater on A/O biochemical system. Stop adding PAC and PAM to the white gum wastewater pretreatment device. Observe the operation state of combined hydrolysis acidification and bio-contact oxidation system. Measure the COD of influent and effluent water.

4. Effect analysis

4.1 Debugging results

The COD of influent and effluent water results as shown in figure 2. The result shows that with the development of the debugging, the COD of effluent water is gradually reduced, COD removal rate is rising. The COD of the effluent began to drop dramatically on the 16th day. The COD of effluent decreased to 40 mg/L and the removal rate reached 86% on the 28th day. The COD of effluent was always kept below 50 mg/L since then. After one month's debugging and operation, the system runs stably and the COD of effluent water is better than the design requirements.

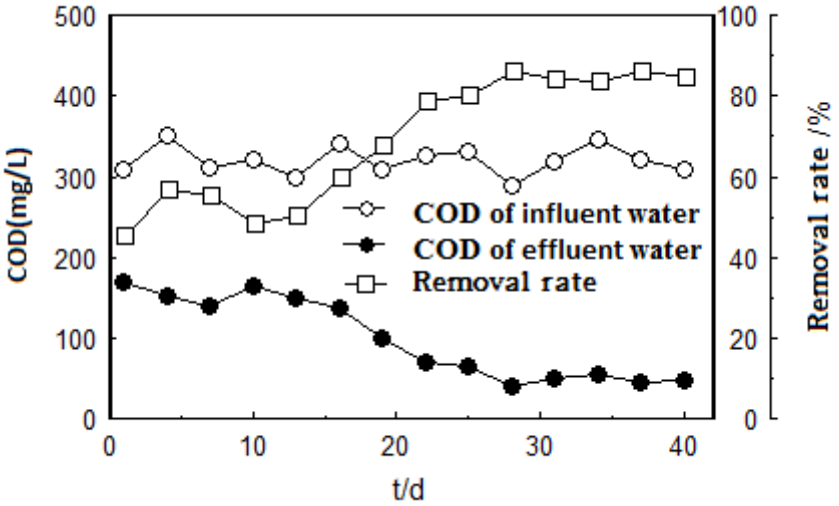

Fig.2 The COD of influent and effluent water during debugging

4.2 Effects of white gum wastewater on biochemical system

The white gum wastewater was directly into A/O biochemical system without pretreatment on the 40th day. The COD of influent water was slightly increased, about 340 mg/L. But the COD of effluent

water showed an upward trend, reaching nearly 100 mg/L on the 53rd day. At this time, a lot of foam appeared on the surface of the biochemical pool. In order to avoid exceeding the standard. On the one hand, the biochemical system was adjusted to eliminate the foam on the surface. On the other hand, the white gum wastewater treatment was started. After 12 days of operation, the biochemical system returned to normal. The COD of effluent was maintained below 50 mg/L.

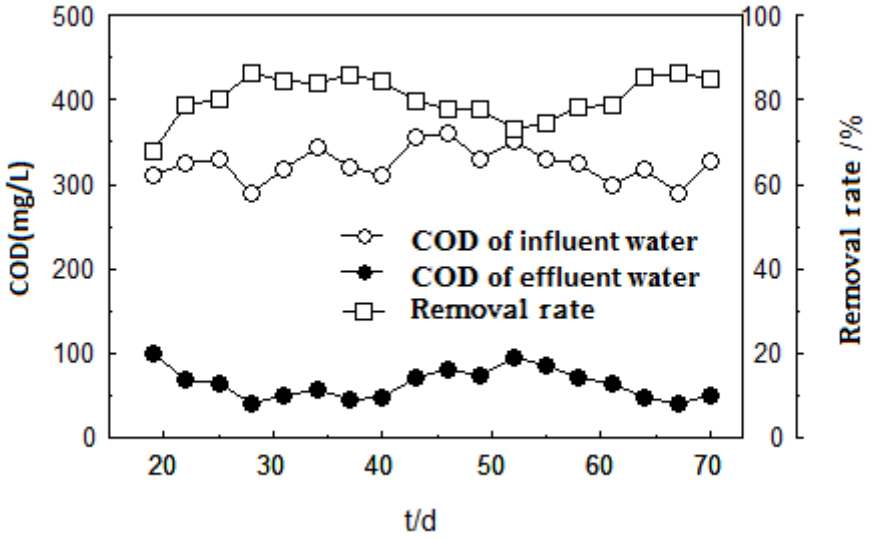

Fig.3 The COD of influent and effluent water during the experiment

5. Economic Analysis

The investment in equipment for this project is 6.11 million RMB. The direct operation cost of water treatment is 3.09 RMB/m^3 . Which includes labor cost , energy charge and medicament expense. Among them, labor cost is 0.81 RMB/m^3, energy charge is 1.55 RMB/m^3, medicament expense is 0.73 RMB/m^3.

6. Conclusion

(1) Combined hydrolysis acidification and bio-contact oxidation system is an effective method for treating tobacco wastewater. The commissioning period is short and it takes only more than one month. At the same time, the operation is stable and reliable and there is no problem of filamentous sludge expansion.

(2) The wastewater of cleaning the roll-adhesive equipment has little effect on the COD of influent water, but has a greater effect on the COD of effluent water . The reason is that the wastewater is prone to foam in the case of aeration, which affects the biochemical effect of the contact oxidation system and causes the deterioration of the quality of effluent water .

(3) Coagulation-air flotation can be used for the pre-treatment of white gum wastewater, which can ensure the treatment effect of hydrolysis acidification and contact oxidation, and make effluent water reach the discharge standard.

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