

Study on the improvement of the combined sewage systems by high-rate fiber filtration and the technology of fabric-filter treatment

Whole term

(Purpose)

The combined sewerage system, which collects wastewater and runoff together in the same pipe-way, can prevent flooding and improve the surrounding environment. However, in case of rain, the capacity and economy do not allow handling the wastewater and runoff together, thus some of the wastewater is discharged as overflow by the regulator and pumped to public water systems in a very short time. The mixing of overflow results in public water to get contaminated by SS and organic matters (BOD, COD), and makes public water a potential source for sanitary problems due to coliforms. Chlorine used as a disinfectant not only leaves ammonium ion that causes decrease in disinfection efficiency, but also activated chlorine itself causes adverse effects on the environment.

In this study, it was hard to make reactions of amine compounds. Bromate disinfection, which does not remain for long time, together with a high-rate filtration by fabric media remove SS and virus. So, the objective of the research was an effective disinfection with low SS loading. Then the treatment-performance, design, operation, and manual on the maintenance were examined, and technological data were organized.

(Results)

In this year, the results of the study on continuous experiments and disinfection by-products were reorganized as technological data for practical applications.

Figure 1 depicts the flowchart of the test.

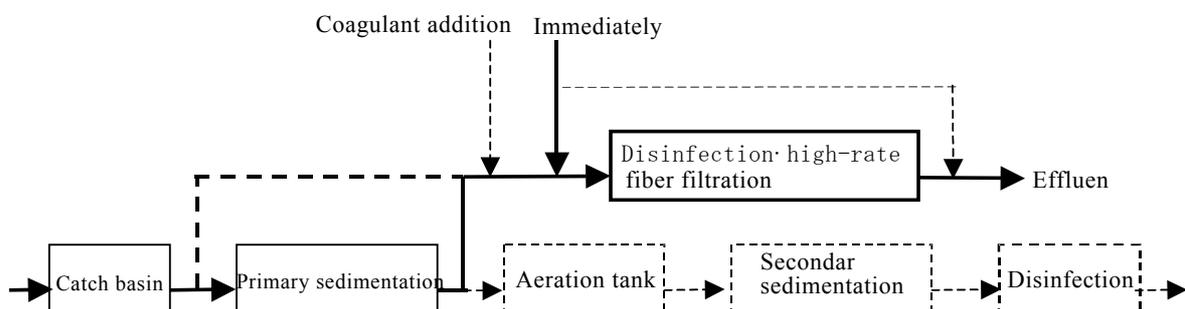


Figure 1. Flowchart of the experiment

(1) Result of the disinfection test

- As free residual increased, total coliforms tended to decrease. Hence, the free residual chlorine might be able to be used in estimating the disinfection effect
- It is obvious that bromate and free residual chlorine are effective on quick treatment of water in case of rain.
- Disinfectant of 2 mg/L with a contact time of 2 minutes before filtration and 1 minute after it, made total coliforms less than 3,000 /mL. It was considered that the bromate disinfection was more efficient due to the reduction of SS by filtration.

For the same concentration of bromate disinfectant, the longer the contact time was, the lesser the concentration of total coliforms was.

(2) Results of the test on filtration

The head loss in the filter was less than 1.5m. It was relatively a constant-rate filtration from 5-12 h. As suspended solids were in high concentration, the filtering time became shorter.

Based on this result, if the concentration of suspended solids is set, the filtering time can be

assumed.

- Removal rate of suspended solids was 60~70% at first, then it gradually reduced. The average was about 60%. The average removal efficiency of BOD was 25% while that of COD was 14%.

(3) The results of the test on the disinfection by-products

- For bromate disinfectant of 11 mg/L, THM was 100 µg/L which is the tap water standards. And 2mg/L of bromate disinfectant was needed for disinfection which is only one fifth of the above value.
- After 1 hour the trihalomethane vaporization caused the reduction of concentration of THM.

(4) Organization of the technological data

- With the results of the test, technological data were reorganized.

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Keywords

Improvement of CSOs, Bromate disinfection technology, High-rate fiber filtering technology