

A study on the diatomaceous earth filtration of recycling basin supernatant in the water treatment plant

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Abstract

This study performed the research about the recycling basin supernatant by pre-coat filtration in the D water treatment plant at Gwangju.

Choice the prompt conditions with diatomaceous earth filtration which makes contaminant reduced in the basin supernatant.

Element disk of candle used in this experiment are pore size 10 μ m(R), 20 μ m(B) and 40 μ m(Y). Diatomaceous earth are cake pore size 3.5 μ m(A), 7 μ m(B) and 17 μ m(C).

The filtrate concentrations were from 0.18 to 0.92 μ g/l of Chlorophyll-a. And then, removal rate percentage were from 78.30 to 95.57(R-A). In addition SS 80%, CODMn32% COD 61%, T-N 10% and T-P 39% on the D water treatment plant.

The R(40 μ m) C(17 μ m) process can be substituted of reusing the recycled water of recycling basin supernatant view of capacity and removal rate of filtrate.

Introduction

The safety of water quality at D-water treatment plant (WTP) in Gwangju has been investigated on reused backwashing water. An amount of Turbidity, Micro-organism, Fe and Mn were included in the backwashed water. They can be affected on the WTP system of treatment and operation efficiency. Prompt treatment, therefore, should be performed.

In the Foreign countries, the Chlorination is needed to add to protect Micro-organism accumulation and remove materials raised taste and odor. Under considering this circumstance, we have tried to experiment prompt treatment as diatomaceous earth filtration.

Materials and Method

1. Materials

1) Element disk and diatomaceous earth

- For convenience, following units were defined. They are element disks used this experiment; Pore size $10\mu\text{m}$ called R, $20\mu\text{m}$ called B and $40\mu\text{m}$ called Y. In addition Diatomaceous earth are composed of following; Cake pore size $3.5\mu\text{m}$ called A, $7\mu\text{m}$ called B and $17\mu\text{m}$ called C.

2) Diatomaceous earth filtration plant

- The diagram of diatomaceous earth filtration plant look like Fig. 1

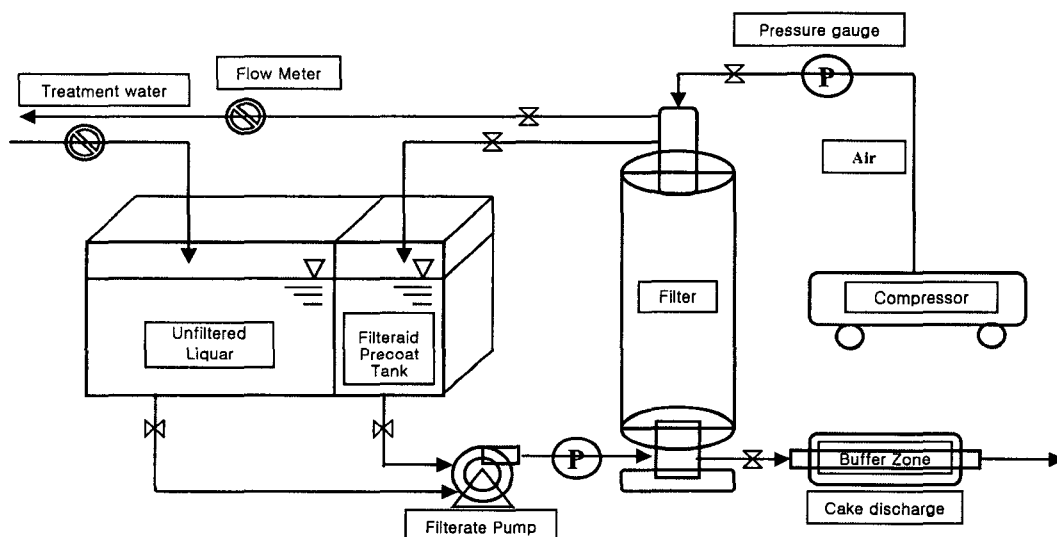


Fig. 1. Schematic diagram of diatomaceous earth filtration plant.

2. Method

- 1) Pick of diatomaceous earth usage for precoat.
- 2) Flux variation in each combination.
- 3) Analysis of recycled basin supernatant and judgment on the propriety of recycled water
- 4) Choice the prompt conditions with diatomaceous earth filtration which make contaminant reduced in the basin supernatant.

Results and Discussion

The quality of raw water in the DWTP can be shown in the Table 1. The water temperature was from 16 to 19°C , pH was from 7.1 to 7.3 , Chlorophyll-a from 2.34 to 3.21 , 5.5NTU was turbidity standard value.

Table 1. The quality of raw water

Item	Quality
Water temperature	16 ~ 19°C
pH	7.1 ~ 7.3
SS	10 ~ 12 mg/ ℓ
COD _{Mn}	16 ~ 20 mg/ ℓ
COD _{Cr}	68 ~ 72 mg/ ℓ
Chlorophyll-a	2.34 ~ 3.21 µg/ ℓ
Turbidity	5.2 ~ 5.7 NTU
T-N	2.15 ~ 2.27 mg/ ℓ
T-P	0.16~0.29 mg/ ℓ

- 1) We have tested to find a prompt operator condition for diatomaceous earth filtration. Fig. 2 show the filtrate and removal rate of Chlorophyll-a in each condition in 60 minutes from operating.
- 2) The filtrate concentrations were from 0.18 to 0.92µg/l of Chlorophyll-a. And then, removal rate were from 78.30 to 95.57(R-A).
- 3) Filtrate of pre-coat filter during 60 min were Y-C 1,916 l/m³, B-C 1,848 l/m³ and R-C 1,722 l/m³

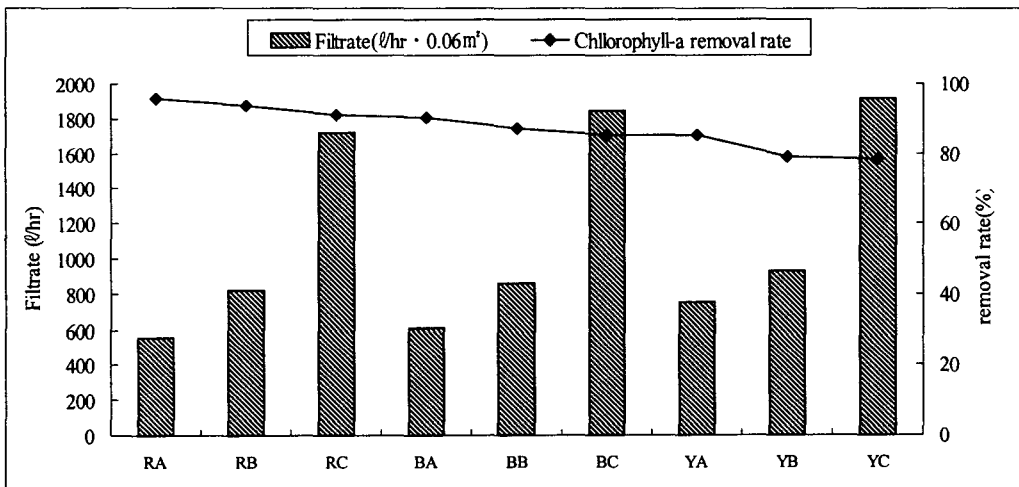


Fig. 2. Filtrate and removal rate of Chlorophyll-a in each condition.

Conclusion

The conclusions are as following;

1. The concentration of Turbidity and Chlorophyll-a have been investigated in water 2.7NTU, 6.6~6.9 $\mu\text{g/l}$ raw + recycled water 6.1 NTU, 6.72 ~ 7.37 $\mu\text{g/l}$ treatment water 0.1NTU, 0.04 ~ 0.14 $\mu\text{g/l}$ recycled water 1.9NTU, 0.27 ~ 0.38 $\mu\text{g/l}$ and recycled water 5.8NTU, 1.64 ~ 2.40 $\mu\text{g/l}$ of the D water treatment plant process.
2. The filtrate quality from the diatomaceous earth filtration of recycling basin supernatant were SS 80%, COD_{Mn} 32% COD_{Cr} 61%, T-N 10% and T-P 39% on the D water treatment plant.
3. The R(40 μm) - C(17 μm) process can be substituted of reusing the recycled water of recycling basin supernatant view of capacity and removal rate of filtrate.
4. The designed device has effective side. This device make contaminant in recycled water decreased through above experiment on WTP.

Reference

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