

Study on the utilization of an improved technology for treatment capacity by ozone addition

Whole term

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(Purpose)

Recently, there is a problem of solid-liquid separation due to an abnormal foaming, which is assumed to be caused by Actinomyces, one of the soil germs, in the aeration tank, and the scum in the final settling tank which has been rising.

Todoroki Environmental Center at Kawasaki City which started the operation in November 1982, has had a difficulty in the treatment performance because of an abnormal occurrence of scum due to the increase of the inflow.

As a solution to this problem, Kawasaki City has had a research on ozone addition to the aeration tank on both bench and pilot scales.

(Results)

1. Investigation on the improvement of the effective treatment capacity

① The amount of ozone addition for scum control was concluded as to be over 1.2 mg per a liter of raw water

② A sample from the aeration tank with ozone addition showed a less number of Actinomyces than that of a comparative sample.

2. Investigation on side-effects

① The settlement of sludge was improved. Especially, MLSS and MLRSS concentration reached 4,000 mg/L which was the targeted value for Todoroki Environmental Center when the dosage to the raw water was 3 mg/L.

② The excess sludge production per BOD removal by ozone addition was reduced by 13~17 % in comparison with that of the control.

③ SRT increased and the digestion accelerated as the sludge settlement was improved with the ozone addition.

3. Influence on the treatment capacity

① BOD and COD concentrations in the experiment and the control showed no difference though the SS concentration in the experiment was higher than that of the control.

② As per the result of the experiments on the bench scale plant, the upper limit of the amount of ozone dosage with no influence over the treated water was decided to be approximately 7.5 mg/L.

4. Examination on the scum control

① The scum control due to the addition of ozone was found to rest on the sludge.

② The reason why the scum was controlled with the addition of ozone was the decomposition of hydrophobic matters which had resulted in bubble stabilization and a constraint on the Actinomyces multiplication.

5. Investigation on the optimal operational condition

① For intermittent operation, the amount of ozone addition and the suspended time of addition should be 3 mg/L-raw sewage and less than 3 hours, respectively.

② The results of ozone addition to the return sludge in the pilot plant proved that the ozone addition of 1.5 mg/L-raw sewage with a contact time of 1.5 minutes was enough for the scum control.

6. Investigation on the optimal design method

① For the prevention of ozone leakage, a resin mortar was applied on the opening slab of the aeration tank and ozone monitoring was performed with a limit of 0.05 ppm, and there was no leakage observed.

② The ozone concentration at the third step of the gas phase was observed to be zero with an ozone dosage of 3 mg/L-raw sewage, even for the variation of the inflow. Therefore, the ozone treatment-facility was not considered necessary in the principle.

7. Investigation on the prevention of corrosion

The result of the acceleration test with a sample injection in the aeration tank for ozone showed no effect on the corrosion and the neutralization of concrete.

8. Investigation on the economy

The treatment cost per unit sewage discharge was estimated to be 0.42~1.11 yen/m³ for an ozone dosage of 2 mg/L-raw sewage.

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Keywords

Difficulty in the treatment performance, Ozone, Actinomyces