

Promotion of Countermeasures in Sewerage against Global Warming

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1. Introduction

In order to promote global warming countermeasures in sewerage, this Division has been studying factual surveys and emission reduction methods for nitrous oxide ("N₂O"), a greenhouse gas ("GHG") emitted from water treatment process.

2. Reduction of GHG emissions from water treatment process

It is known that N₂O gas is generated from biological wastewater treatment systems, but there are still unclear matters concerning the contributing conditions, and sufficient measures have not been taken to control the generation of N₂O gas from water treatment process. Therefore, this Division first conducted a field survey of several sewage treatment systems in municipal sewage treatment plants in order to grasp the actual status of N₂O emissions. Past surveys indicated that treatment with nitrogen removal showed lower emissions than the methods without nitrogen removal. Further, in order to investigate the difference in emission according to treatment methods, we examined changes in N₂O gas emissions using a pilot plant by switching from operation in the conventional process (CAS method) to anaerobic-aerobic process, (AO method) (RUN1), which is advanced treatment, or to pseudo-anaerobic-aerobic process, which is staged advanced treatment, (pseudo AO method) (RUN2). As the result, N₂O gas emissions reduced 80% or more as compared with operation in the CAS method after changing the operation method both in RUN1 and RUN2 (Figure 1). As the result of examining N₂O emissions from each reactor, in the AO method and pseudo-AO method, emissions from the front of the aeration tank were lower than the CAS method (Figure 2). In addition, as compared with the CAS method, pseudo AO method and AO method improved the ratio of the nitrogen removal by approx. 10 percent, which suggests the effect of microorganisms causing nitrogen metabolism on N₂O emissions.

3. Conclusion

The interim results of the study show that N₂O emissions can be reduced by conducting the treatment

method that improves the ratio of nitrogen removal, which also suggests that advanced treatment can lead to reduction of N₂O emissions as well as quality improvement in treated water. Accordingly, introduction of the advanced treatment method is expected to control N₂O emissions.

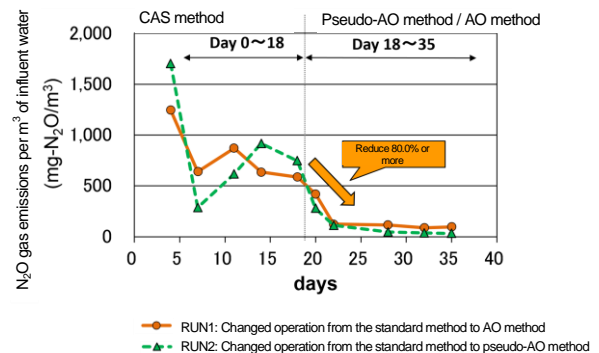


Figure 1. Comparing N₂O Gas Emissions by Changing Treatment Method

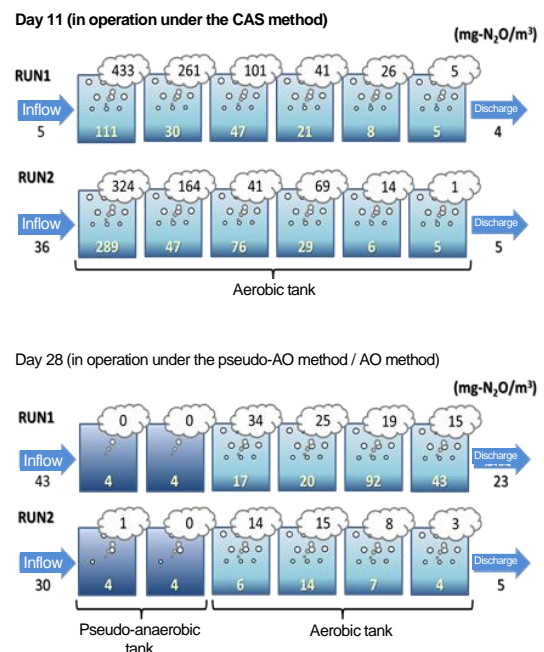


Figure 2. Difference of N₂O Emissions in CAS Method and Pseudo AO Method (Changes in Reactor)