

Study on Advanced Wastewater Treatment Technology in Mikasagawa-Nakagawa Regional Sewerage System

Whole term

1994.12 ~ 1995.6

(Purpose)

The population percentage with sewer service in Hakata Bay basin has reached to more than 70% at present. However, eutrophication caused by industrial development, increment of nutrients, pollutants accumulated in the water of the bay has become evident. In the present situation, the environmental water quality standards have not been satisfied throughout the bay.

The primary factors are considered to be nitrogen and phosphorus in the bay water. Therefore, it is necessary to introduce advanced wastewater treatment step by step for their removal.

This study discussed the introduction of the phosphorus removal process, which is an immediate problem to be solved in the Mikasagawa-Nakagawa regional sewerage system.

(Results)

1. Affecting factors on the biological phosphorus removal process

Concentrations of influent substrate (ratio of soluble BOD to soluble P, ratio of T-BOD to T-P), BOD-SS loading, SRT, phosphorus content in activated sludge and DO brought in the anaerobic tank were reported as the affecting factors on the biological phosphorus removal process. However, in this study, the primal factor was considered to be the stormwater influent. At the Mikasagawa treatment plant, it was estimated that, treated water quality of phosphorus concentration less than 0.5mg/l cannot be achieved about 55days a year, including the number of days when the influence of storm water is anticipated, with the biological phosphorus removal process alone.

2. Influence on wastewater and sludge treatment by coagulant addition

Aluminum sulfate, polyaluminum chloride, ferrous sulfate, ferric chloride and polyferric sulfate are mentioned as high performance coagulants both home and abroad. However, in our country, aluminum coagulants are generally used. Ferrous coagulants are also used but only for experimental cases in fear of coloration of treated water and alkaline consumption.

There is sufficient number of reports that, operation with appropriate amount of coagulant addition does not have any significant adverse effects. Influence on anaerobic tanks, melting, composting or resource recovery such as cement is also not given enough consideration. However, there are some reports that, aluminum coagulants deteriorate melting performance while ferrous ones improve it, or that aluminum fixes phosphate as an insoluble compound. Thus, in terms of utilizing sludge for agricultural use aluminum coagulants are not preferable.

3. Optimal operation method

Based on the discussion above, the biological phosphorus removal process was considered to be most suitable for introduction in the Mikasagawa treatment plant considering its influence on sludge treatment through coagulant addition. However, in order to keep the operation stable, a facility for the minimum coagulant addition should be installed as a back-up system.

Ferrous coagulants were considered to be preferable considering their influence on composting. The method of addition was proposed to be, injection control by measurement of phosphorus concentration in treated water and its feedback.

4. Future tasks

This study mainly discussed the advanced wastewater treatment, but further discussion on sludge treatment is also needed considering the close relation between advanced wastewater treatment and sludge treatment. The following items were identified as future tasks.

- (1) Long term operation of current sludge treatment flow (digestion of primary sludge and direct dewatering of excess sludge)
- (2) Problem of phosphorus shift from sludge into exhaust gas at the sludge surface during melting
- (3) Decrease of phosphorus and nitrogen in the return sludge

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Keywords

Biological phosphorus removal process, influence factor, coagulant