

Research on the practical usage of the advanced treatment of modified Bardenpho using media

Whole term

2000.11~2004.3

(Purpose)

In Lake Kasumigaura, water quality deteriorates by eutrophication. Hence, it is necessary to build an advanced treatment process in order to achieve the environmental water quality standard. Recently, Kasumigaura Treatment Center has introduced nitrification and denitrification process using coagulant and nitrogen and phosphorus removal method as anaerobic-anoxic-oxic process that needs a longer HRT compared with the conventional activated sludge. Therefore, there are still unsolved problems like long HRT and waste of energy.

This technology advances the water quality and a high removal rate of nitrogen and phosphorus, site-reduction and energy reduction are expected. Ibaraki Prefecture tested this technology using a pilot plant with the (Japan Institute of Wastewater Engineering Technology) since 1995. We did a joint research to apply this innovative technology into practice. What we checked were examination of the performance, condition of the media, reduction rate of internal return sludge and the methanol dosage in cold weather.

(Results)

1. Water quality

As per the results in 2003, we could obtain the targeted quality by lowering dissolved oxygen in the aeration tank and minimizing the internal return sludge rate. (energy saving)

2. Performance of nitrogen removal

(1) Even though the concentration of the dissolved oxygen in the aeration tank was 1.5 mg/L, nitrification-performance was good. Nitrification did not correlate with the ratio of actual SRT

(2) Necessary SRT when DO in the aeration tank was decreased, was almost the same.

(3) Denitrification rate in the secondary anoxic tank increased when DO in the aeration tank was decreased.

3. Performance of phosphorus removal

(1) Biological phosphorus removal without flocculant was very stable annually.

(2) The correlation between the organic acid loading of the anaerobic tank and phosphorus discharge rate, as well as the correlation between the organic acid loading of the aerobic tank and phosphorus uptake rate were linear, however with low correlation coefficients.

4. Reduction of the power supply

The power consumption was reduced by 20 %, owing to the fact that the correct internal return sludge rate was determined based upon nitrogen removal and lowering dissolved oxygen in the aeration tank.

5. Investigation of the detailed design value

This technology is an advanced nitrogen removal process.

6. Operational method using the activated sludge model

We set up the activated sludge model to support the operational manual. As a result, simulation of this technology was possible. Therefore, seasonal optimum operational conditions were resulted from the model.

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Keywords

Advanced treatment, Bardenpho process, Nitrification media, Activated sludge model