

Joint Research on Excess Sludge Reduction Technology Using Oxidants (Conventional Activated Sludge Process)

Period of Research

2011 to 2013

Establishment of energy and resource recycling

(Purpose)

In 2008, the Manual on Excess Sludge Reduction Technology Using Oxidants (March 2009) was released, but although this manual describes the OD process and the extended aeration process, it does not deal with the conventional activated sludge process which is frequently used for medium and large-scale plants. Reducing sludge is also a serious problem at treatment plants which use the conventional activated sludge process, and where effective reduction technologies are required.

This study was conducted in the Matsuoka Water Resources Reclamation Center in Oita City to demonstrate the effectiveness of sludge reduction when oxidants are applied to the excess sludge in the conventional activated sludge process. Laboratory experiments were also conducted to study the effectiveness of the excess sludge in other treatment plants. The purpose of this study is to evaluate the effectiveness of the technology based on experimental results, and organize the sections relating to planning, construction, operation and maintenance of this technology to create a technical manual.

(Results)

(1) Results of laboratory experiments

- [1]The SS solubilization rate tends to increase proportionally with the reaction temperature and concentration of chemical additives.
- [2]The excess sludge of the conventional activated sludge process showed a high solubilization rate compared to that of OD processes.
- [3]When the excess sludge after the solubilization process and the primary sludge were mixed, the settling property of the mixture was similar to that of primary sludge.
- [4]When only the solubilization process was performed, the dewaterability did not improve. However, the dewaterability seemed to improve as the proportion of primary sludge increased.
- [5]Similar trends were observed for the excess sludge in other treatment plants.

(2) Results of verification tests

(1) Process flow

This technology solubilizes excess sludge produced by the final settling tank and returns the solubilized excess sludge to the primary settling tank. The system also performs aerobic treatment by feeding part of the solubilized excess sludge to the gravity thickening tank as primary sludge, and feeding the remainder to the reactor as primary effluent.

(2) Operating conditions

The process was carried out with a sludge throughput of 30 m³/day (sludge feed 47%) and chemical additives concentration of 2,000 mg/L.

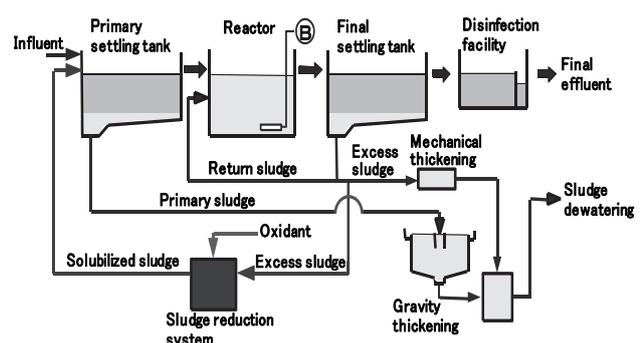


Figure 1. Process flow of sludge reduction technology

(3) Findings

[1]For each ton of influent SS, sludge generation was reduced by about 12% in winter as compared to the period prior to the introduction of sludge reduction technology. (The study on the reduction effectiveness will be continued.)

[2]The T-COD_{Mn} concentration of the reactor influent after the introduction of sludge reduction technology was increased by about 5% compared to that before the introduction, and the S-CODMn concentration in the reactor influent was lower than the influent concentration. These results suggest that the impact of the sludge reduction technology on the water treatment facility is relatively small.

(Future subject)

In 2013, operating data will continue to be accumulated from the previous year, and the obtained data will be organized and verified. A technology manual will be also prepared.

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Key words

Excess sludge reduction, conventional activated sludge process, oxidant, solubilization