

Promotion of Water Treatment Technology Considering Energy / Resource Optimization and Risk Control

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1. Introduction

Sewerage greatly contributes to conservation of good water environment by treating / removing organic matter, nutrients, pathogenic microorganisms, etc. in sewage, while it is urgently required to reduce a large consumption of electricity used for sewerage. Since discussion on the revision of the items in the effluent water quality standards is going on, it is also required to study the risk assessment of sewage treatment water.

2. Energy optimization in treatment process

Since specific and actual power consumption in each treatment process in sewage treatment facilities has not been sufficiently grasped. And we organized the specifications, operational condition, etc. of individual equipment and provisionally calculated per-unit power consumption of individual equipment and power consumption of the entire treatment facilities in several cases where treatment processes, plant scales, and combination of equipment are different. Figure 1 provides the result of provisional calculation of per-unit power consumption for each equipment assuming a sewage treatment facility where average daily flow is 40,000 m³ and conventional activated sludge process is adopted. The result showed about 30% reduction of per-unit power consumption by shifting from the basic type (case of setting a model with the maximum number of operating units for each equipment) to the energy-saving type (case of using the basic type principally and assuming the installation of an energy-saving type for reaction tank diffuser). Based on this result, we examined energy balance, etc. further considering sludge utilization for energy etc.

3. Evaluation of hygienic risk control technology for treated water

In accordance with the ongoing discussion about changing an item of the environmental water-quality standards from the coliform group to coliform, it is necessary to change the coliform group-, one of the items of the effluent quality standards for sewage treatment facilities. In addition, since an international standards for water reuse of treated water is under consideration, it is necessary to check domestic applicability of the standards. Accordingly, we examined the microorganism removal rate, etc. that could be indicators for hygienic risk control in sewage treatment facilities and the behavior of

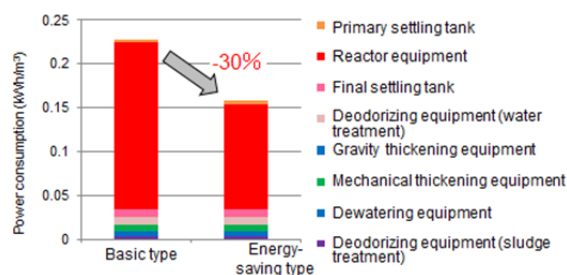


Figure 1: Result of provisional calculation of the reduction of power consumption by introducing energy-saving equipment (conventional activated sludge process)

coliform by disinfection has a similar trend to the coliform group and have been examining the behavior throughout the year.

4. Effective use of ammonia

In recent years, ammonia is attracting attention as a hydrogen carrier. In sewage treatment facilities, high concentration ammonia is included in the liquid separated by dewatering anaerobically digested sludge but is not generally used as a resource. For this reason, basic examination was conducted in this study focusing on ammonia stripping, which recovers evaporated ammonia. It was confirmed in the laboratory scale experiment (Figure 2) that the ammonia recovery rate is the highest (approx. 94%) under the operating conditions of high temperature and high pH (70°C, pH: 12). We examined the method of effective use considering as well the needs and seeds of producers and consumers, including the use as denitration agent, and recognized feasibility.

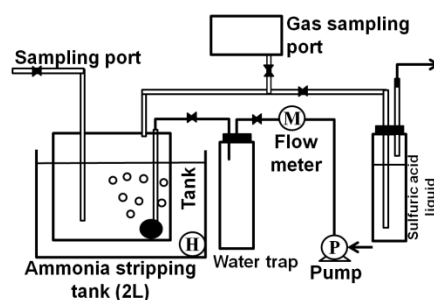


Figure 2: Outline of ammonia stripping equipment