Research to evaluate the performance of the adsorption and storage technology of the digestion gas		
Whole term	2001. 1~ 2003.3	

(Purpose)

The effective usage of the digestion gas, which has previously been burned and disposed of, is achieved by the adsorption and the storage technology of the digestion gas devise because it compacts the storage facility and improves the dealing features.

It was expected that there would be a reduction of maintenance cost and prevention of green house effect by using effectively as an alternative for several kinds of fuel. The objective of this study was to utilize the adsorption and the storage method of the digestion gas. This study was conducted by Tsuruoka City, Public Works Research Institute and the Japan Institute of Wastewater Engineering Technology during the period from 1986 to 1989. In 1989, the evaluation of the performance was conducted based on the research on utilization carried out during the period from 1986 to 1987 and the construction of the actual plant in 1988.

(Results)

1) Capacity of the adsorption and storage

Nine experiments were executed in summer, autumn, and winter as three experiments in each season. The magnification of adsorption-storage, which indicates the ratio of the storage quantity of digestion gas to the effective volume of the tank (The remaining volume is occupied by the activated carbon), was 20.3 ~ 23.8 at a pressure of 0.75 Mpa in the tank. Therefore, the aim to acquire the magnification of adsorption-storage as 20 could be attained.

2) Outer temperature effect on the inside temperature of the tank

- Result in summer: The temperature variation outside the tank insulator and inside the tank were investigated. Though the temperature outside the tank insulator was rising to 50 $^{\circ}$C, the temperature inside the tank was not influenced by the outer temperature, and the temperature decreased linearly by the endothermic reaction during release.

- Result of the investigation in the winter: The temperature variation outside the tank insulator and inside the tank were investigated. The temperature inside the tank was not related to the outer temperature, however was varied by the behavior of release and adsorption. Also, due to the heater effect, the temperature inside the tank remained at 30 $^{\circ}$C while the gas was stored. As a result, after the release of gas, the temperature did not decrease below 0 $^{\circ}$C even though it was expected whether dew condensation would occur.

3) Investigation on the durability of the dehumidificator and adsorbent for pre-treatment

The existing dehumidificator was about 130 kg in the late January 1990, comparing with the filling quantity of 250kg in the beginning. Considering the test period, the dehumidificator would be used up in 1 year.

4) Economical efficiency

The total cost for the annual construction (The interest rate was calculated as 3 %) of the actual plant (The capacity of the digestion gas-storage was 600 Nm^3) in this study, and the operational activities (dehumidificator, pre-treatment adsorbent, exchange cost for adsorbent and electric power supply to the heater to keep warm) presented in the evaluation of the performance, was calculated as 72 %, compared with the gas holder at a low pressure.

(Future task)

The result of the evaluation of the performance that utilized the actual plant showed that the expected targets in the performance were satisfied. Later, a document on the evaluation of the performance would be worked out and the spreading of this technology would be planned.

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