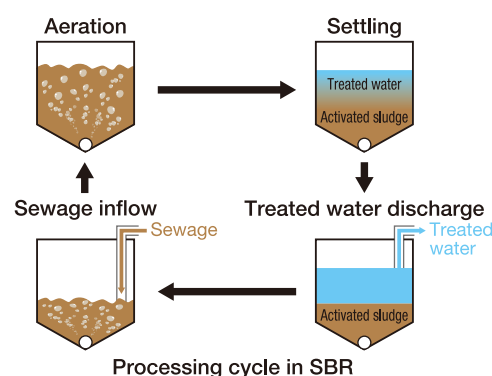


## Ammonia-nitrogen sensor, suitable for SBR that requires fast response and level measurement in low concentration

### 1 Monitoring of Ammonia-Nitrogen Concentration ( $\text{NH}_4\text{-N}$ ) in SBR

One of the treatment methods in the wastewater treatment process is SBR. This wastewater treatment method is to repeat aeration and precipitation of activated sludge in a single tank. Unlike the standard activated sludge method, this treatment can be completed in a single tank and the aeration time and the settling time can be freely designed according to the amount and characteristics of the inflowing sewage. However, since the water qualities change frequently and rapidly, it is important to grasp the change accurately. Especially the monitoring of  $\text{NH}_4\text{-N}$  concentration has attracted attention from the viewpoint of environmental and energy conservation.



### 2 Issues

As described above, in an environment where the concentration changes drastically, on-line continuous measurement is important. Then the methods to measure  $\text{NH}_4\text{-N}$  concentrations can be classified into (1) serial measurements using sensors such as ISEs (Ion Selective Electrode) and (2) batch measurements using analytical instruments. Both methods have good and bad points and the adoption in SBR which requires efficient processing is limited. For example, in the case of (1), immersion in the sample provides immediate measurement results, but some sensor manufacturers do not recommend to use the sensors in low-concentration environments ( $\text{NH}_4\text{-N}$  concentrations is 1 mg/L or less) or for wide-range measurement purposes. In the case of (2), it is necessary to collect sample water and prepare, which takes time to complete the analysis.

### 3 Proposed Measurements Using HORIBA's Ammonia-Nitrogen Meter (HC-200NH · AM-2000)

HORIBA developed an ammonia-nitrogen meter capable of measuring broad-range of  $\text{NH}_4\text{-N}$  concentrations (from 0 mg/L to 1,000 mg/L) and responding rapidly, and conducted evaluative measurements in the Clear Lake Sanitary District (CLSD), Iowa, USA with this instrument. The wastewater to be measured was treated in one of four treatment tanks designed by Aqua Aerobic Systems, Inc. (AASI) (Figs. 1 and 2). Fig. 3 compares on-line measurement data using a HORIBA ammonium-nitrogen meter with manual analysis data using a HORIBA ammonium-nitrogen meter for one day. Measurements were taken by CLSD personnel on a regular basis to collect and analyze sampled water. The correlations between the two data are good, and it can be seen that HORIBA sensor firmly grasps the water quality change. Fig. 4 is a correlation of both data after two-month trial. The results showed a good correlation at both low and high concentrations. During the one-year evaluation period, there was no need to replace the sensor and no sign of drift was observed. As the result AASI expressed the view that the requirements for on-line control and the accuracy of measurements of HORIBA ammonia-nitrogen meter in SBR were satisfied.



Fig. 1 CLSD with 4 Aqua SBR\*<sup>1</sup> basins  
(<http://clearlakesd.org/>)

\*<sup>1</sup> SBR is a trademark of Aqua Aerobic Systems, Inc



Fig. 2 Installation\*<sup>2</sup>

\*<sup>2</sup> An ultrasonic cleaner was installed with the ammonia nitrogen meter to minimize microbial adhesion to the sensor.

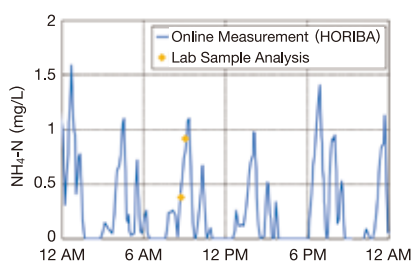


Fig. 3 Measurement data

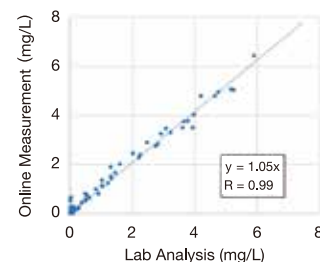
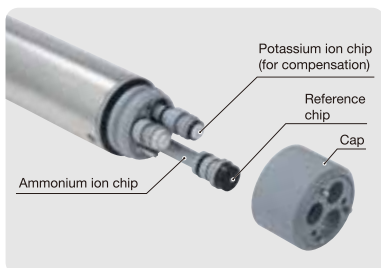


Fig. 4 Correlation with Sample Analysis

## 4 HORIBA Ammonia-Nitrogen Meter, HC-200NH • AM-2000

HORIBA ammonia-nitrogen meter adopts an ion-selective electrodetype suitable for controlling the nitrification process of sewage and wastewater treatment. It is useful for energy efficiency improvement and appropriate control of sewage and wastewater treatment. It is recommended to combine it with the new ultrasonic cleaner UH-16A series when used. UH-16A series adopt burst oscillation method and makes it possible to clean mildly without damaging the sensor and to prevent long-term adhesion of dirt.



Ammonia-nitrogen sensor, AM-2000



Ammonia-nitrogen meter, HC-200NH

### ● Ammonia-nitrogen meter specifications

Model	HC-200NH
Combination sensor unit model	AM-2000
Measurement Range	NH <sub>4</sub> -N: 0 - 1000 mg/L (display range: 0 to 2000 mg/L) Temperature: 0-40°C (display range: -10 to 110°C)
Sample Condition	pH: 4.0-8.5 [Na <sup>+</sup> ]: 0-100 times of [NH <sub>4</sub> -N]
Repeatability	NH <sub>4</sub> -N: Larger value between 3% ±1 digit of measured value or 0.2 mg/L ±1 digit (with standard solution) Temperature: ±0.3°C
Potassium ion compensation	Compensation range: Potassium ion concentration is not more than 10 times the ammonium ion concentration and under 1000 mg/L Compensation error: ±20% (measured value)



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