

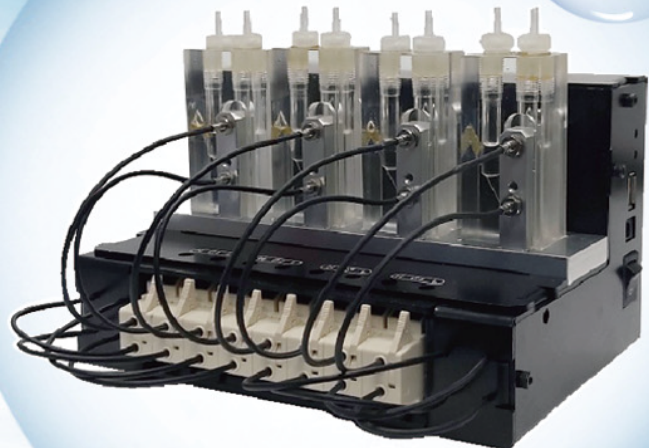
# Biological Respirometric System

## - Biogas Respirometer / BMP Analyzer -

Model I BRS-110, BRS-200, BRS-800

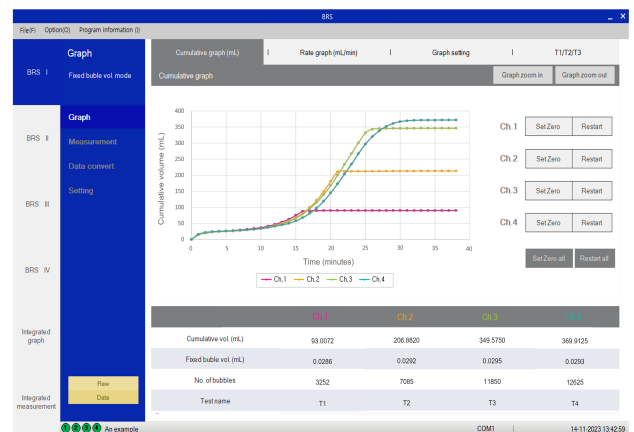
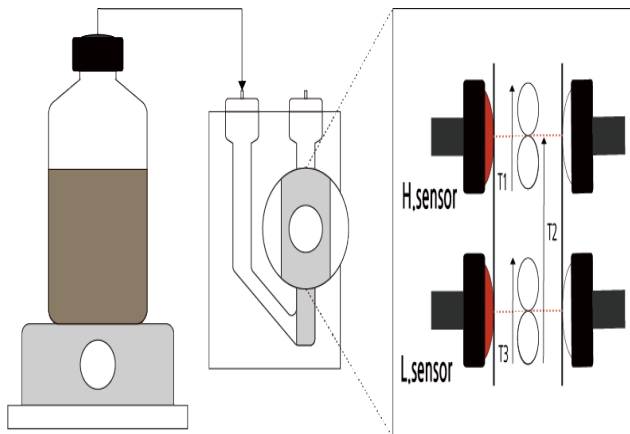
### What is the respirometer?

A respirometer is a device used to measure the rate of respiration of living organisms including microorganisms by measuring their rates of consumption of oxygen or production of biomethane or biohydrogen. Generally since the rate of respiration is very slow, the respirometer should be sensitive and accurate.



### Theory

- The gas that is finely generated from a reactor will turn into a bubble shape in a BRS cell which is filled with oil.
- Cumulative volume of gas generated is measured in two ways.
  - 1) calculating the total amount of gas by fixing the bubble volume and multiplying by the number of bubbles. (BRS-110, BRS-200 and BRS-800)
  - 2) calculating the total amount of gas by adding the volumes of each generated bubble, which is calculated using the time (T1, T2) taken by each bubble to pass through low and high sensor. (BRS-110 and BRS-200)



### Applicable International Standards

Anaerobic Biodegradability : ISO 14853, ISO 13975, ISO 15985, ISO 11734, ASTM D5511, ASTM D5210, ASTM D5526, OECD 311  
Aerobic Biodegradability : ISO 14851, ISO 17556, ISO 18830, ISO 22404, ISO 19679, ISO 14852, ISO23977-1, ISO23977-2, OECD 301  
Compostability : ISO 14855-1, AS 5810



## Features

- The device can be used for biogas production, biomethane potential (BMP) analysis, or green energy studies (CH<sub>4</sub>, H<sub>2</sub> and N<sub>2</sub>).
- The device can be also used for both aerobic and anaerobic operations for wastewater studies.
- Up to four devices can be connected to a common computer, supporting up to 16~32 channels.
- The device uses temperature-based calibration to ensure accurate gas measurement.
- After measurements, the time interval of gas production/consumption volume data can be changed by changing Cumulative Time in Data Convert.
- An incubator or a water bath having magnetic stir plate can be used to maintain water temperature (0~65°C).
- Measuring resolution (bubble volume) is very small (0.03 mL for BRS-110 and BRS-800, 0.15 mL for BRS-200).
- Bioreactors having volumes of 125, 250, 500, 1000 mL (BRS-100 and BRS-800), and 2~10 L (BRS-200) can be used.

	BRS-110	BRS-200	BRS-800
No. of channels	4 channels (expandable 16 channels in a computer)	4 channels (expandable 16 channels in a computer)	8 channels (expandable 32 channels in a computer)
Flow rate	0~1 mL/min	1~5 mL/min	0~0.2 mL/min
Measuring resolution	Approx.0.03 mL	Approx.0.15 mL	Approx.0.03 mL
Measuring interval	1 sec~10 hours(changeable)		
Gases	O <sub>2</sub> (OUR), CH <sub>4</sub> , H <sub>2</sub> , and N <sub>2</sub>		
Calibration error	≤ 1%		
Data output	USB		
Power input	DC 12V, 3.5A		
Weight	1.5 kg	1.9 kg	1.7 kg
Size	190(W)*130(D)*110(H), mm	200(W)*140(D)*120(H), mm	200(W)*140(D)*120(H), mm
Temperature	0~65°C		
Humidity	≤ 95%		
Material	Aluminum and acrylic		

Installations : Qatar University, Penn State University, KAIST, UNIST, Korea Institute of Energy Research, Kwangwoon University, Korea Institute of Ceramic Engineering and Technology, Pusan National University, Gyeongsang National University, etc.



## BRS-110, BRS-200, BRS-800, Accessories

### BRS-110



- measurable flow rate 0~1 mL/min

### BRS-200



- measurable flow rate 1~5 mL/min

### BRS-800



- measurable flow rate 0~0.02 mL/min

### Flow measuring cell



- generated biogas is emitted in the form of bubbles as it passes through the oil filled in the measuring cell

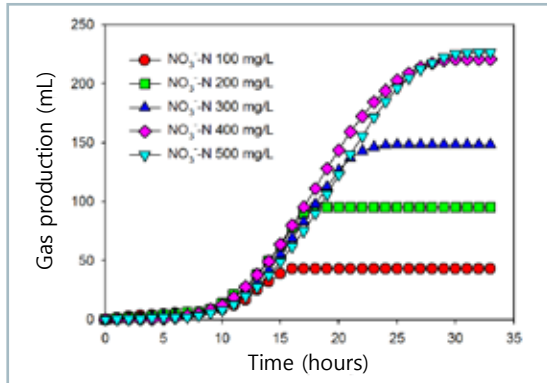
### CO<sub>2</sub> trap



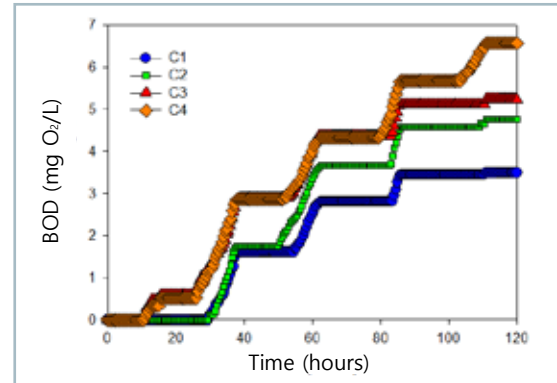
- remove CO<sub>2</sub>

- Measurement of oxygen consumption
- Oxygen uptake rate (OUR)
- Toxicity screening
- Biodegradation test
- Treatability assessment
- Laboratory respiration studies
- Soil and compost respiration
- Biogas production
- Repiration of plants/animals
- BMP test
- Biochemical hydrogen potential
- Green energy studies

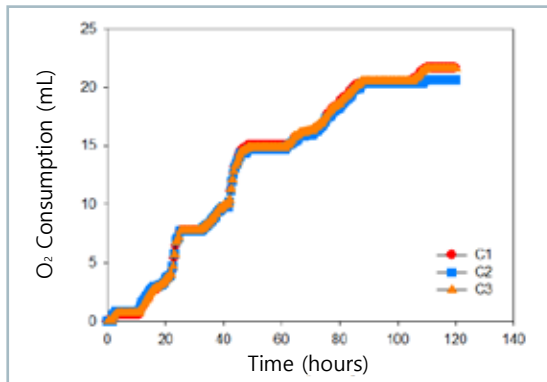
## Denitrification



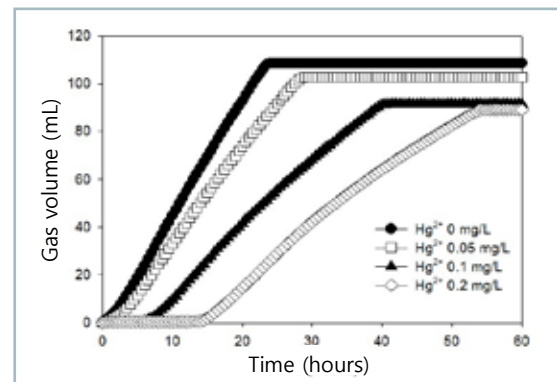
## Biochemical oxygen demand (BOD)



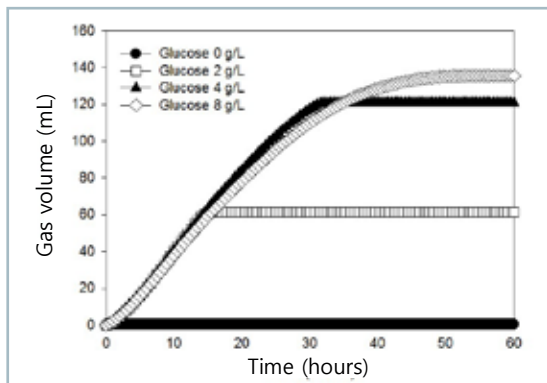
## $\text{O}_2$ consumption (Triplicate)



## Toxicity test with sporeforming bacteria



## Hydrogen gas production



## Toxicity test with algae

