

Application Note

Measurement of gas volume and air content of beer in different containers and volumes (350mL can, 334mL bottle) by Gas volume and air content analyzer

Industry	Food & beverage
Instrument	Gas volume and air content analyzer
Measurement method	Gas volume measurement method
Standards	

1. Scope

Caution

This instrument needs a 6 mol/L sodium hydroxide aqueous solution which may cause blindness when it contacts human eyes. Be sure to wear protective goggles during handling it.

The measurement of the gas volume, air content of beer is an important factor in determining the mouthfeel, taste and flavor, and best-by date. This Application Note introduces an example of measurement of two kinds of beer with different containers and volumes. using a gas volume and air content analyzer. The gas volume is calculated by continuously rotating the sample container and measuring the equilibrium pressure of the gas and the sample temperature. Then, gas in the sample is transferred to the absorbent cylinder and the carbon dioxide gas is absorbed by an absorbent solution (sodium hydroxide solution) filled in the cylinder to measure the air content.

2. Precautions

- Measurements should be conducted within a temperature-controlled laboratory room, and the temperature of the instrument and samples must be equalized to that of the room.
- Either the instrument's onboard air system, or an independent air compressor, (both of which can adjust to pressures between 0.5 and 0.7 MPaG), is required for the piercing and rotation of sample bottles and cans.

3. After measurement

- Samples should be disposed of properly after the measurement is complete, as they may be contaminated with the absorbent solution.
- The measurement instrument should be rinsed properly at the end of the day.

4. Apparatus

Equipment	Gas volume and air content analyzer
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5. Reagents

Absorbent solution	6 mol/L Sodium hydroxide solution
Rinse solution	Pure water

6. Procedure

- 1) Select “gas volume/gas pressure + air content measurement (GV/P+AIR)” on the measurement mode, and enter the following parameters into the measurement conditions.

< Mode >	GV/P+AIR
GV/P Cal.	EBC
DISSOLVE	AUTO
< Method >	
Start Time	0 sec
Rot0 Time	0 sec
Wait Time	0 sec
Snift Press	.999 MPa
MAX Time	180 sec
MIN Time	0 sec
Error Press	.015 MPa
Rot1 Time	70 sec
Trial Press	.010 MPa
max Time	180 sec
Min Time	0 sec
Trial Count	5 times
Skip Press	.015 MPa
Rot2 Time	20 sec
End Press	.015 MPa

Note that the above measurement parameters are an example and optimizing these parameters might be necessary depending on the sample's property.

- 2) Set the sample bottle/can on the sample stage and press the Start button.

7. Example

Table 1 shows the measurement results of beer A (350mL can and 334mL bottle).

Table 1. Measurement results (350mL can and 334mL bottle)*

Sample	n	Air Volume [mL]	Gas Volume [g/kg]	Gas Press [MPa]	Press [MPa]	Temp. [°C]
Beer A 350mL can	1	0.43	5.20	0.229	0.248	22.3
	2	0.44	5.22	0.230	0.249	22.3
	3	0.45	5.23	0.231	0.244	21.7
	4	0.44	5.21	0.230	0.244	22.0
	5	0.48	5.22	0.230	0.246	21.9
	Mean	0.45	5.22	0.230	0.246	22.1
	SD	0.02	0.01	0.001	0.002	0.3
	RSD(%)	4.8	0.2	0.3	0.9	1.2
Beer A 334mL bottle	1	0.51	5.08	0.221	0.240	23.3
	2	0.71	5.10	0.223	0.239	23.0
	3	0.65	5.12	0.224	0.238	22.7
	4	0.58	5.17	0.227	0.241	23.0
	5	0.67	5.10	0.223	0.239	23.2
	Mean	0.62	5.11	0.224	0.239	23.0
	SD	0.08	0.03	0.002	0.001	0.2
	RSD(%)	12.7	0.7	1.0	0.5	1.0

* Measurement items

Air Volume	The volume of gas other the carbon dioxide in the container (mL)
Gas Volume	Carbon dioxide volume (V/V) of 1mL sample volume
Gas Press	Converted pressure in sample bottle/can at 20 °C (MPa)
Press	Measured pressure (MPa)
Temp.	Measured sample temperature (°C)