

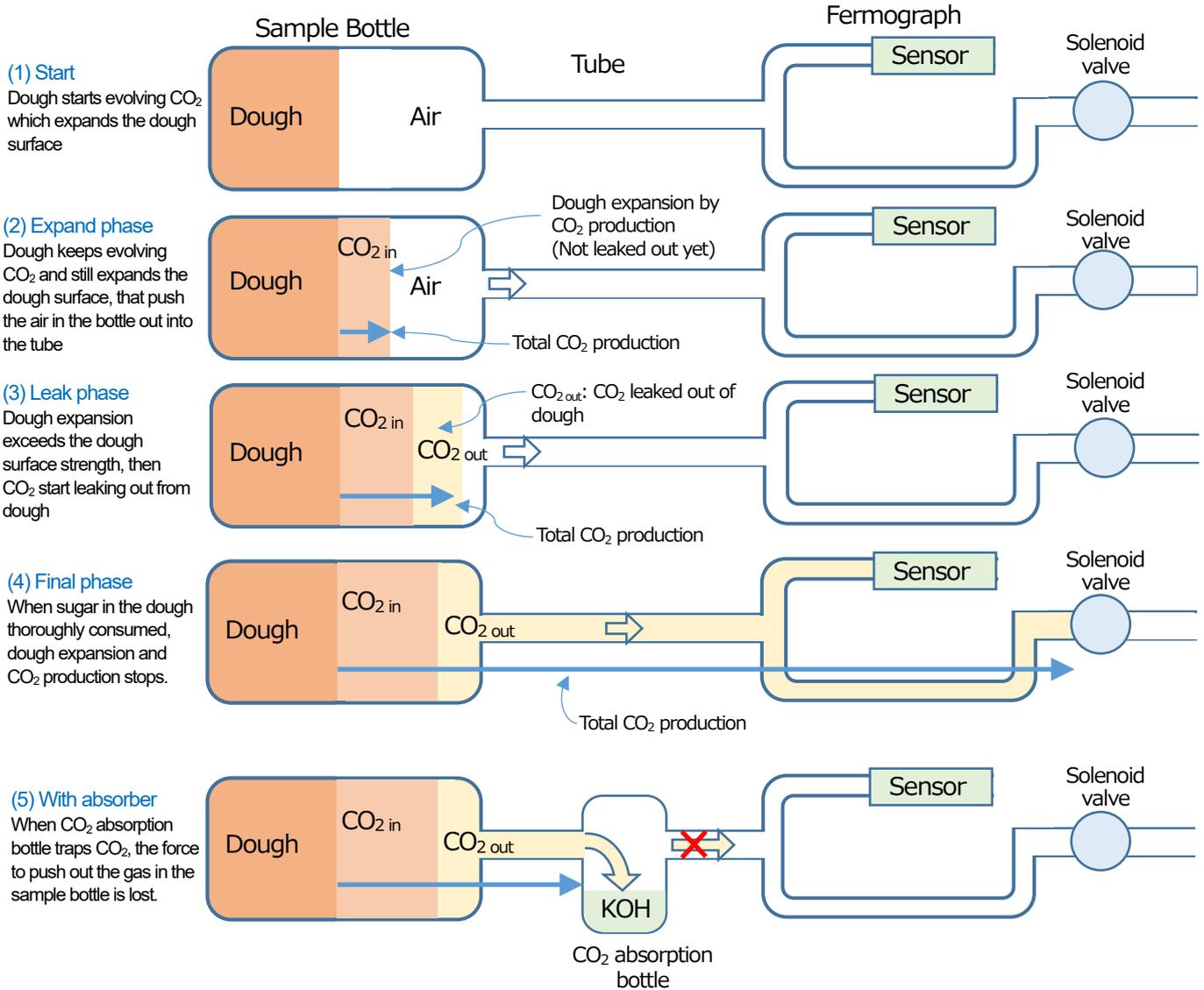
# Brief Guide of Retained Gas Measurement

Gas Flow in the Sample Bottle and Carbon Dioxide Absorption Bottle

Rev. Jan. 5th, 2022

**[Concept of retained and leaked gas measurement: Gas flow in Fermograph system]**

Retained and leaked gas measurement is sometimes a little confusing matter in the bread dough study. Here are some perspectives to illustrate the measurement process for your reference.



In the phase (1) and (2), the dough keeps evolved CO<sub>2</sub> in itself. Evolved CO<sub>2</sub> expands the dough surface and it push the air in the bottle out into the tube leading to the Fermograph. Pushed out air volume equals to the CO<sub>2</sub> gas evolved in the dough.

In the phase (3) and (4), the dough surface breaks and the gas kept in the dough leaks out. When the Gas flow pass through the CO<sub>2</sub> absorption bottle, CO<sub>2</sub> is trapped and the force to push out the gas from the sample bottle is lost. Strictly speaking, the timing of leaking start is rather difficult to determine due to void space in the bottle and the tube. However the timing when the gas through the CO<sub>2</sub> absorption bottle began to apart from the gas volume of normal measurement is supposed to be relatively fair index.

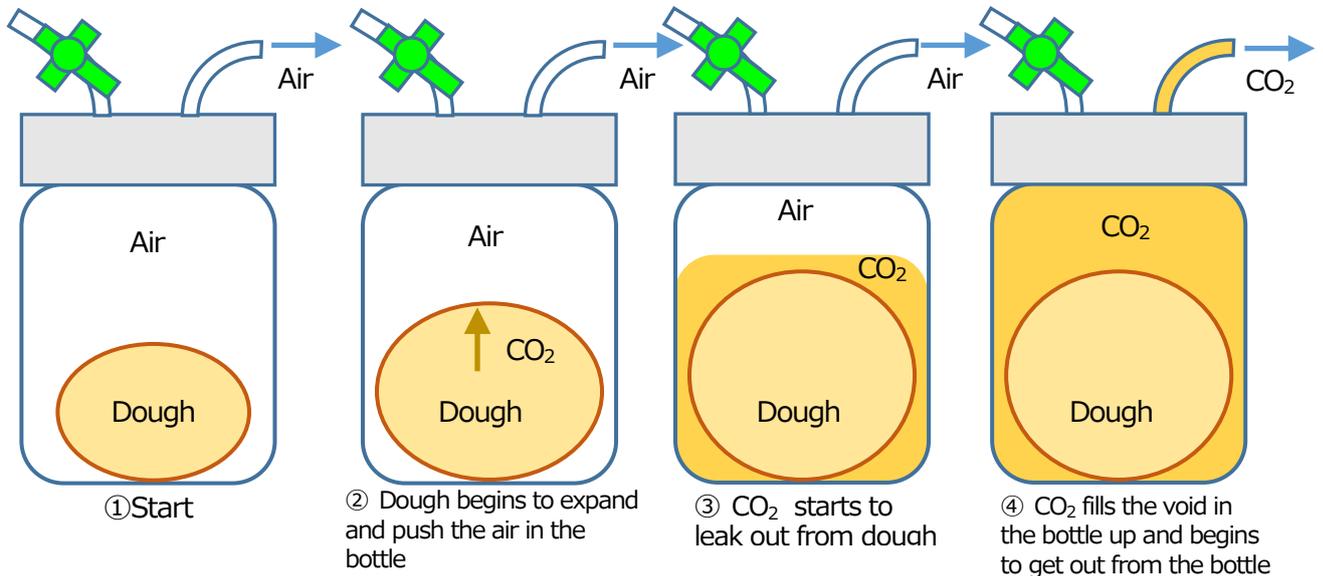
## [Illustrated] Gas Flow in the Sample Bottle and CO<sub>2</sub> Absorption Bottle

### [CO<sub>2</sub> Production in the Sample Bottle]

CO<sub>2</sub> produced by yeast expands the dough and increases the volume (② in Fig. 1)

Evolved CO<sub>2</sub> volume is considered to equal to the increase in the volume of the dough

However, as fermentation proceeds, CO<sub>2</sub> starts to leak out from the dough surface (③ in Fig. 1)



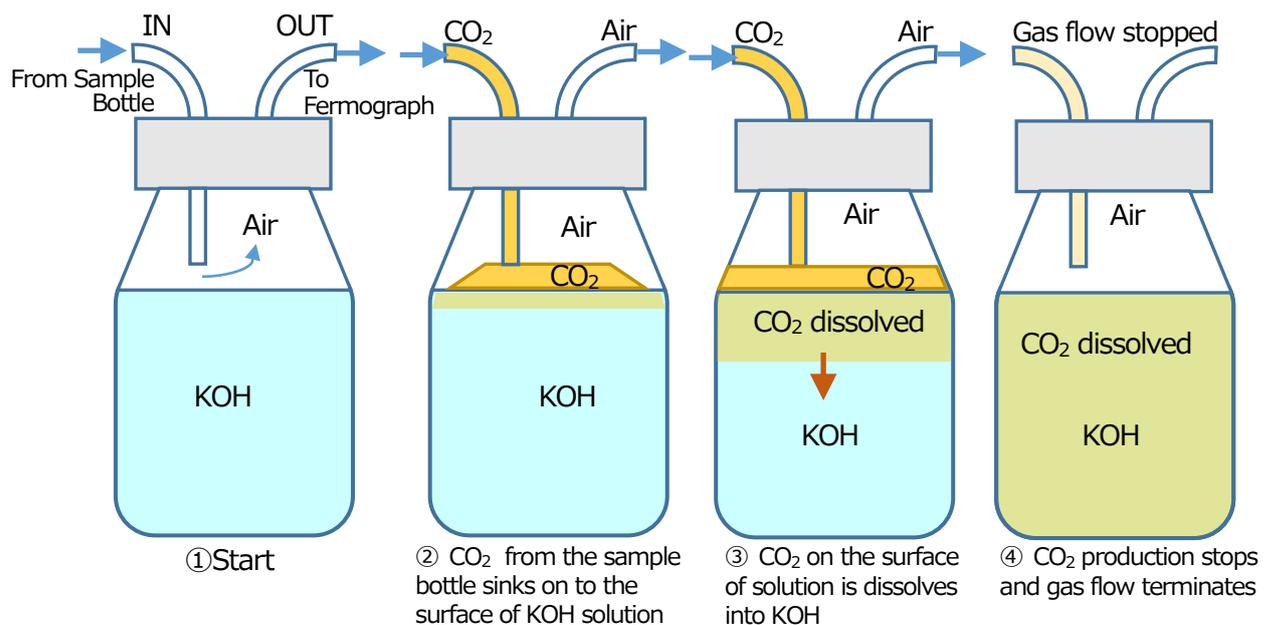
**Fig. 1. CO<sub>2</sub> Production in the Sample Bottle (from Bread Dough)**

After CO<sub>2</sub> begins to leak out of the dough, dough expansion slows down and finally stops to expand. Yet evolving CO<sub>2</sub> keeps push the air out of the bottle.

### [CO<sub>2</sub> Absorption Bottle]

CO<sub>2</sub> leaked out of dough is trapped by KOH solution in the CO<sub>2</sub> Absorption Bottle

Since CO<sub>2</sub> is heavier than air, it sinks in the CO<sub>2</sub> Absorption Bottle. CO<sub>2</sub> is dissolved into KOH.



**Fig. 2. CO<sub>2</sub> dissolving in the CO<sub>2</sub> Absorption Bottle**