

# Invention produced in JOGMEC-TRC Lab

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## Method and apparatus for measurement of gas solubility in aqueous solution of high pressure state

### Introduction

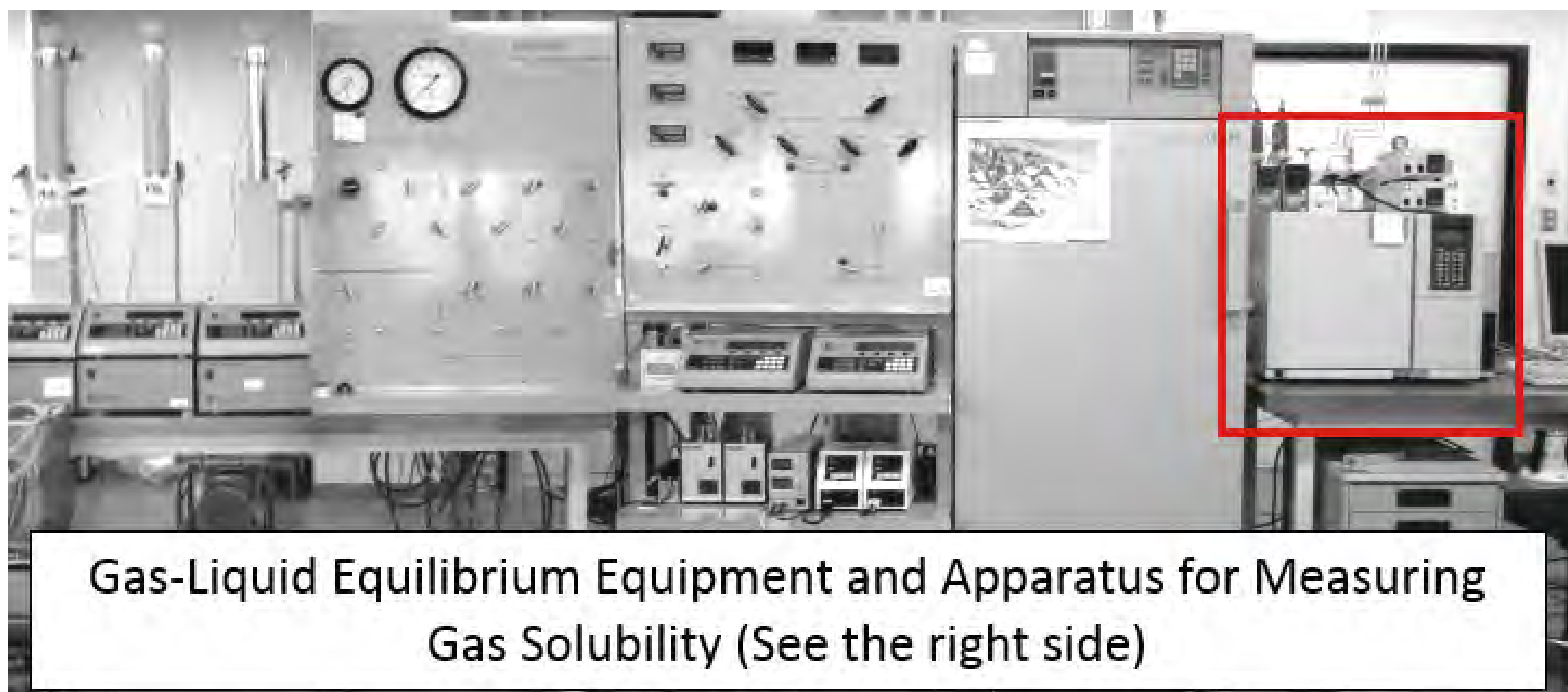
Solubility of methane and carbon dioxide in high pressure water is fundamental and important data set when conducting R&D of technologies surrounding oil and gas development such as a prediction of oil production, a Carbon dioxide Capture and Storage (CCS) and an underground storage of natural gas in an aquifer. JOGEM-TRC Lab developed a new method for monitoring the gas solubility in water under high pressure condition, which is a simpler and quicker method than conventional ones.

### Technology Field of application of Invention

This invention is applicable not only for technologies related to oil and gas development but also for measuring various gas solubility including that of an artificially-obtained carbonated spring and of a carbonated drink.

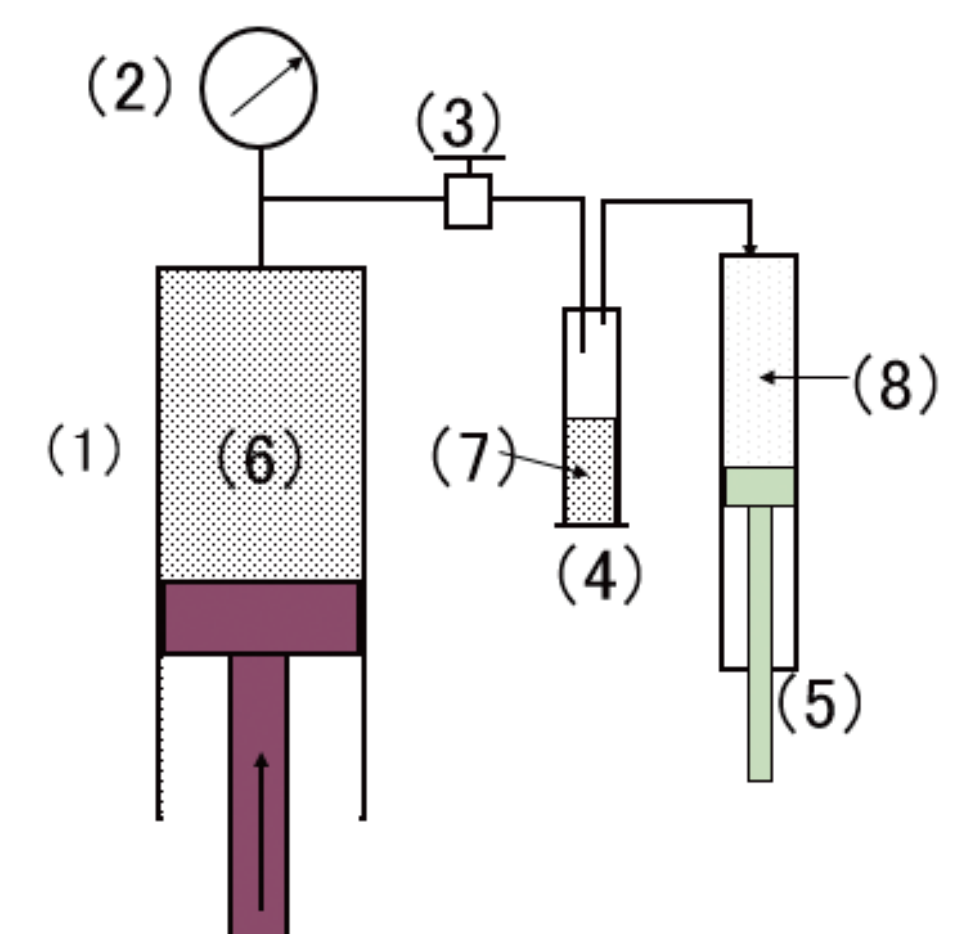
### Problem to be solved

A conventionally known Flush method requires a large amount of sample and includes steps which require substantial human intervention. Further a method to analyze gas solubility in water using a gas chromatograph has also been acknowledged. However, this method is not intended to measure gas solubility by considering the accurate quantity of the high pressure water.



Gas-Liquid Equilibrium Equipment and Apparatus for Measuring Gas Solubility (See the right side)

### Flush Method (Conventional Method)



(1)PVT cell (2)Pressure gauge (3)Valve (4)Separator (5)Gasmeter (6)High-pressure water sample (7)Flashed water (8)Flashed gas

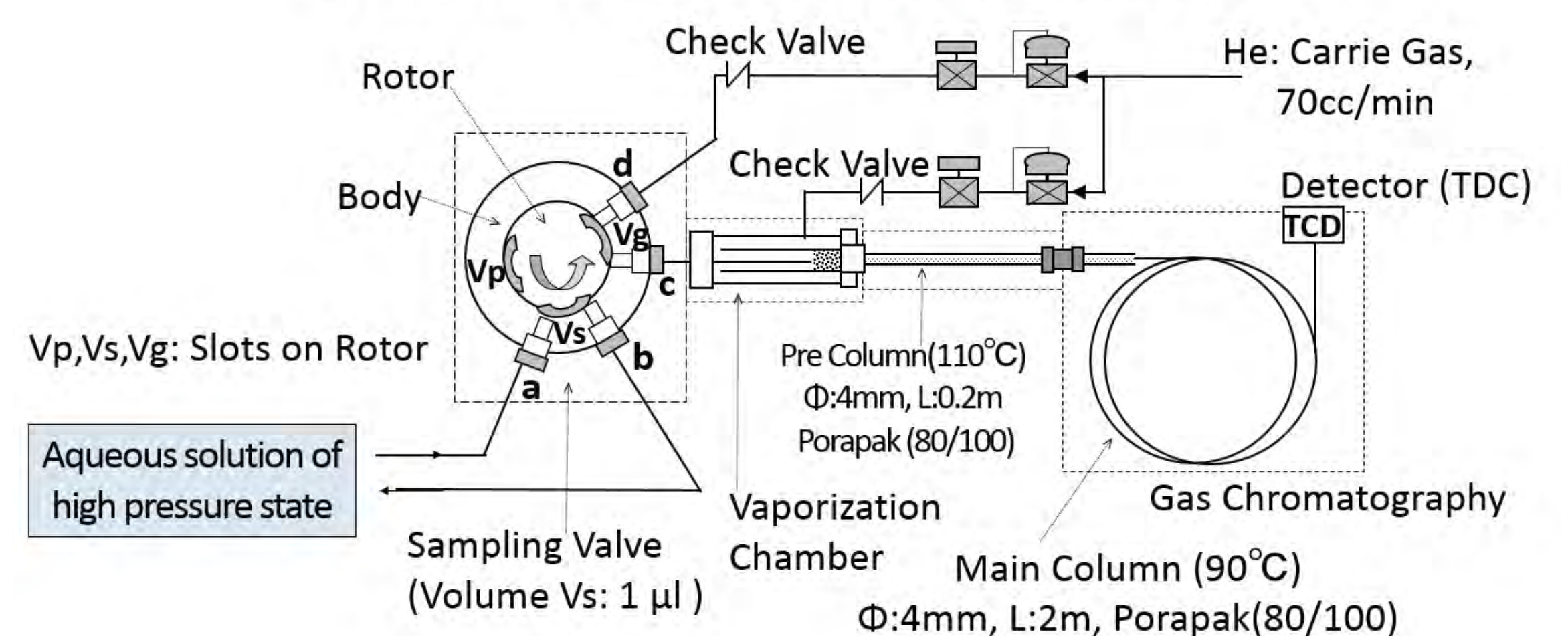
### Patented Claim

[Claim 1] A method for measuring solubility of gas in aqueous solution sample under high pressure condition with an apparatus to measure the solubility of gas using a gas chromatograph comprising following steps:

introducing the aqueous solution sample under high pressure condition;

heating and vaporizing the gas dissolved in the aqueous solution sample and water contained in the sample; separating the gas and the water using a column; detecting the quantity of the gas and quantity of the water; calculating the solubility of the gas with respect to the water based on the gas chromatograph outputted by the said detecting step.

### Schematic diagram of Patented Invention (Apparatus for Measuring Gas Solubility)



### Technical Features

- Heating and vaporizing solution sample, and measuring the quantity of gas and that of water (water vapor) simultaneously and directly
- Reducing a necessary quantity of sample for measuring to 0.1-10  $\mu$ l
- Improving accuracy by using a check-valve to prevent back-flow of a carrier gas