Tube No.
**281S**

# OXYGEN · CARBON DIOXIDE


## 1. PERFORMANCE

1) Measuring range :

| | |
|---|---|
| Oxygen | 2-10 % |
| Carbon dioxide | 1-20 % |
| Number of pump strokes | 1 (100mℓ) |

2) Sampling time : 8 minutes/1 pump stroke
3) Detectable limit : 0.001 %
4) Shelf life : 1.5 years
5) Operating temperature : 0 ~ 40℃
6) Temperature compensation :

| | |
|---|---|
| Oxygen | Necessary (See "Temperature CorrectionTable") |
| Carbon dioxide | No temperature correction is necessary. |

7) Reading : Direct reading from the scale calibrated by 1 pump stroke
8) Colour change :

| | |
|---|---|
| Oxygen | White → Brown |
| Carbon dioxide | Pink → Yellow |

## 2. RELATIVE STANDARD DEVIATION

| | | | |
|---|---|---|---|
| Oxygen | RSD-low : 10 % | RSD-mid. : 10 % | RSD-high : 10 % |
| Carbon dioxide | RSD-low : 10 % | RSD-mid. : 10 % | RSD-high : 10 % |

## 3. CHEMICAL REACTION

Oxygen : Oxygen reacts with alkaline pyrogallol.
Carbon dioxide : $CO_2 + 2KOH \rightarrow K_2CO_3 + H_2O$

## 4. CALIBRATION OF THE TUBE

Oxygen · Carbon dioxide STANDARD GAS CYLINDER METHOD

## 5. INTERFERENCE AND CROSS SENSITIVITY

Ordinary combustion gases do not affect the reading value and discolouration.

## 5. CONCENTRATION CORRECTION

On account of interaction of indication between carbon dioxide and oxygen, the true concentration is calculated by the following equations.

$$CO_2\,\% = (CO_2) - \frac{(O_2) \times (CO_2)}{100} \quad \text{---------- equation (1)}$$

$$O_2\,\% = (O_2) - \frac{(O_2) \times (CO_2)}{100} \quad \text{---------- equation (2)}$$

Where
$(CO_2)$ : indication of carbon (%)
$(O_2)$ : corrected oxygen concentration (%)

[EXANPLE]
At the measuring temperature of 30℃, when oxygen indication is 5 % (temperature corrected value 5.3 %) and carbon dioxide indication is 10 %, each true concentration is calculated as bellow.

$$CO_2\,\% = 10 - \frac{5.3 \times 10}{100} = 10 - 0.53 = 9.47$$

$$O_2\,\% = 5.3 - \frac{5.3 \times 10}{100} = 5.3 - 0.53 = 4.77$$

Accordingly true concentration :
Carbon dioxide 9.47 %
Oxygen 4.77 %

TEMPERATURE CORRECTION TABLE

| Scale Readings (%) | True Oxygen Concentration (%) | | | |
|---|---|---|---|---|
| | 10℃ (50° F) | 20℃ (68° F) | 30℃ (86° F) | 40℃ (104° F) |
| 10.0 | 9.7 | 10.0 | 10.3 | 10.5 |
| 9.0 | 8.7 | 9.0 | 9.3 | 9.5 |
| 8.0 | 7.7 | 8.0 | 8.3 | 8.5 |
| 7.0 | 6.7 | 7.0 | 7.3 | 7.5 |
| 6.0 | 5.7 | 6.0 | 6.3 | 6.5 |
| 5.0 | 4.7 | 5.0 | 5.3 | 5.5 |
| 4.0 | 3.9 | 4.0 | 4.2 | 4.5 |
| 3.0 | 2.9 | 3.0 | 3.1 | 3.3 |
| 2.0 | 2.0 | 2.0 | 2.0 | 2.1 |