KITAGAWA
KOMYO RIKAGAKU KOGYO

INSTRUCTION MANUAL
CARBON DIOXIDE DETECTOR TUBE

No.126B

★ READ CAREFULLY THIS INSTRUCTION MANUAL AND THE INSTRUCTIONS OF THE ASPIRATING PUMP PRIOR TO USING THIS PRODUCT.
★ DO NOT DISCARD THIS INSTRUCTION MANUAL UNTIL ALL THE TUBES IN THIS BOX ARE USED UP.

1. PERFORMANCE:

Measuring Range and Pump Strokes	: 0.03 - 0.7% : 1 (100mL)	100 - 1500 ppm 3 (300mL)
Sampling Time	: 5 minutes	15 minutes
Colour Change	: Purplish blue → Pale pink	
Detectable Limit	: 20 ppm (3 pump strokes)	
Operating Temperature	: 0 - 40 ℃ (32-104°F) Temperature correction is necessary.	
Aspirating Pump	: Model AP-20, AP-20S, AP-1 or AP-1S	

⚠CAUTION
1. THE DETECTOR TUBE CONTAINS CHEMICAL REAGENTS.
2. DO NOT TOUCH THESE REAGENTS DIRECTLY ONCE TUBES WERE BROKEN.
3. KEEP THE TUBES OUT OF THE REACH OF CHILDREN.

NOTICE
1. USE ONLY WITH PUMP MODELS AP-20, AP-20S, AP-1 or AP-1S. OTHERWISE, CONSIDERABLE ERROR IN INDICATION MAY OCCUR.
2. BEFORE TESTING, CHECK THE ASPIRATING PUMP FOR LEAKS (**REFER TO ITEM 8. INSPECTION OF ASPIRATING PUMP**). ANY PUMPS SHOWING SIGNS OF LEAKAGE SHOULD BE CORRECTED BEFORE USE.
3. DO NOT USE THIS TUBE OUTSIDE THE STATED OPERATING TEMPERATURE RANGE.
4. STORE TUBES IN A COOL AND DARK PLACE (0-25 ℃/32-77°F), AND USE BEFORE EXPIRATION DATE PRINTED ON THE TOP OF THE BOX.
5. PRIOR TO USE, READ CAREFULLY **ITEM 9. USER RESPONSIBILITY**.
6. READ THE CONCENTRATION IMMEDIATELY AFTER MEASUREMENT.

2. SAMPLING AND MEASUREMENT:

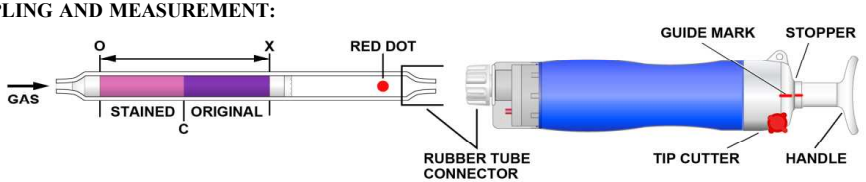

Fig.1

① Break both ends of the detector tube.

⚠CAUTION SAFETY GLASSES AND GLOVES SHOULD BE WORN TO PREVENT INJURY FROM SPLINTERING GLASS.

② Insert the detector tube into the aspirating pump securely as shown in Fig.1.
③ Align the guide marks on the shaft and stopper of the aspirating pump.
④ Pull the pump handle at a full stroke until it locks and wait for 5 minutes or until the completion of sampling is confirmed with the flow indicator of the pump (See descriptions about the flow indicator in the instruction manual of the pump).
⑤ On completion of sampling, remove the detector tube from the pump and read a concentration with the concentration chart in the following way.
・Place the edge of the detecting reagent of the gas inlet side to the 0-0 line on the concentration chart for 1 pump stroke and the other edge to the L-L line respectively to read out a gas concentration at the end of the discoloured layer.
⑥ When the concentration is below the scale range, 3 pump strokes can be used to determine concentrations of 100 to 1500 ppm.
At this point, turn the handle right or left by 1/4 (90°), push back the handle without removing the detector tube from the pump and repeat the steps ③～④ for further 2 times.
⑦ On completion of sampling, remove the detector tube from the pump and read a concentration with the concentration chart for 3 pump strokes.

SPECIAL NOTE: Ⅰ. The scale is calibrated at 20 ℃ (68°F), 50 %R.H. and 1013hPa. Readings obtained in other circumstances should be corrected (**REFER TO ITEM 3. CORRECTION FOR AMBIENT CONDITIONS**).
Ⅱ. When the maximum point of the stained layer is unclear or oblique, read the concentration at the centre between the longest and shortest points.
Ⅲ. The total stain length should be read, even if the stained layer gets muti-color discolouration.

3. CORRECTION FOR AMBIENT CONDITIONS:
① Temperature; Correct the tube reading with enclosed temperature correction table.
② Humidity; No correction is necessary.
③ Atmospheric Pressure;

$$\text{True concentration} = \text{Temperature corrected concentration} \times \frac{1013}{\text{Atmospheric pressure (in hPa)}}$$

4. INTERFERENCE:
More than 100ppm of Sulphur dioxide or more than 20ppm Chlorine produces a white stain, more than 30ppm of Nitrogen dioxide produces a pale yellowish blue stain, but each coexistence with more than 300ppm of Carbon dioxide does not affect the readings. Hydrogen sulphide does not affect the readings. Coexistence of more than 120ppm of Hydrogen cyanide gives higher readings.

5. CHEMICAL REACTION IN THE DETECTOR TUBE:
$CO_2 + 2NaOH \rightarrow Na_2CO_3 + H_2O$

6. DISPOSAL OF TUBES:
USED TUBES SHOULD BE DISPOSED CAREFULLY ACCORDING TO RELEVANT REGULATIONS, IF ANY.

7. HAZARDOUS AND DANGEROUS PROPERTIES OF CARBON DIOXIDE:
TLV-TWA.◆ : 5000 ppm
Explosion range in air : —
◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2022.

8. INSPECTION OF ASPIRATING PUMP:
Checking for leaks;
① Insert a sealed, unbroken detector tube into the pump.
② Align the guide marks on the shaft and stopper of the pump.
③ Pull the handle to a full stroke and wait for 1 minute.
④ Unlock the handle and allow it to return slowly into the pump by holding the cylinder and handle securely.
⚠CAUTION HANDLE WILL TEND TO SNAP BACK INTO THE PUMP QUICKLY.
⑤ If the handle returns completely to the original position, the performance is satisfactory. Otherwise, refer to maintenance procedures shown in the instruction manual of the pump to correct the leakage.

9. USER RESPONSIBILITY:
It is the sole responsibility of the user of this equipment to ensure that the equipment is operated, maintained, and repaired in strict accordance with these instructions and the instructions provided with each Model AP-20, AP-20S, AP-1 or AP-1S aspirating pump, and that detector tubes are not used which are either beyond their expiration date or have a colour change different to that stated in the Performance specifications.
The Manufacturer and Manufacturer's Distributors shall not be otherwise liable for any incorrect measurement or any damages, whether damages result from negligence or otherwise.

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