KITAGAWA
KOMYO RIKAGAKU KOGYO

INSTRUCTION MANUAL
OXYGEN DETECTOR TUBES

No.159SA,159SB

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

1. PERFORMANCE:

Measuring Range :2-24%(*)
and Sampling Time :2 minutes
(*)Graduations on the detector tube are based on 1/2 pump strokes.

Number of pump strokes	:1/2 (50mL)
Colour Change:	:White → Brown
Operating temperature	:0 - 40 ℃ (32-104°F) (No temperature correction is necessary.)
Aspirating Pump	:Model AP-20, AP-20S, 400B, AP-1, AP-1S or 400A

■CAUTION
1. DETECTOR TUBE CONTAINS REAGENTS (MERCURY).
2. DON'T TOUCH THESE REAGENTS DIRECTLY ONCE TUBES ARE BROKEN.
3. KEEP THE TUBES OUT OF THE REACH OF CHILDREN.

NOTICE
1. USE ONLY PUMP MODELS AP-20, AP-20S, 400B, AP-1, AP-1S OR 400A. OTHERWISE, CONSIDERABLE ERROR IN INDICATION MAY OCCUR.
2. BEFORE TESTING, CHECK THE ASPIRATING PUMP FOR LEAKS (**REFER TO ITEM 9. INSPECTION OF ASPIRATING PUMP**). ANY PUMPS SHOWING SIGNS OF LEAKAGE SHOULD BE CORRECTED BEFORE USE.
3. DO NOT USE THIS TUBE BEYOND 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 TOP OF THE BOX.
5. PRIOR TO USE, READ CAREFULLY **ITEM 10. USER RESPONSIBILITY**.
6. READ THE CONCENTRATION IMMEDIATELY AFTER MEASUREMENT.

1. SAMPLING AND MEASUREMENT:

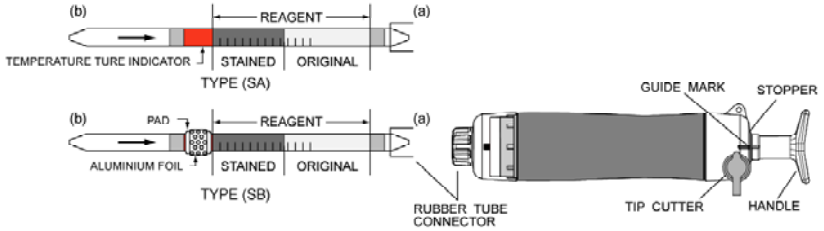


Fig.1

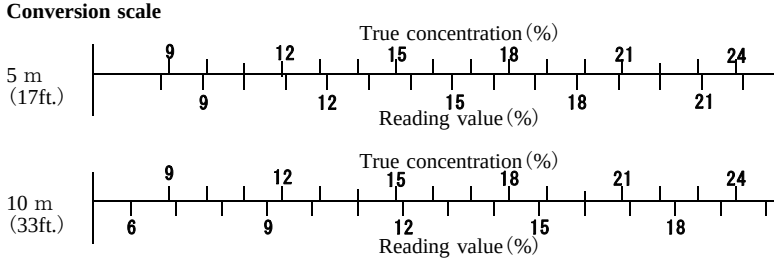
① 159SA; Heat the temperature indicator of the tube with a match or cigarette lighter until the indicator is changed to purple from red.
159SB; Drop several drops of green solution in a small plastic bag, which is supplied with the tubes, over the aluminium foil, so that the pad under the aluminium foil is saturated with the solution and that the original colour of the aluminium foil is discoloured to dark brown.
② Break end (a) at first and end (b) secondly of the detector tube.

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

③ Insert the detector tube into aspirating pump securely as shown in Fig.1. (Arrow mark shall point to the pump.)
④ Align the guide marks on the handle and stopper of the aspirating pump.
⑤ Pull the pump handle at 1/2 stroke (to 50mL line) locked position and wait for 2 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).
⑥ On completion of sampling, read the scale at the maximum point of the stained layer.

NOTICE:
In case of using the rubber extension hose, wait for 3 minutes instead of 2 minutes in the above procedure ⑤ after the above procedures ① to ④, and convert the reading value with the following conversion scale to determine true concentration.

Conversion scale



3. CORRECTION FOR AMBIENT CONDITIONS:

① Temperature; No correction is necessary.
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:

Hydrogen sulphide or Nitrogen dioxide does not change the reagent by itself and each coexistence of more than 2%, 2% respectively with Oxygen will give higher readings. Carbon dioxide or Sulphur dioxide produces a similar stain and each coexistence of more than 5%, 2% respectively with Oxygen will give higher readings. If more than 5% of Carbon dioxide coexists, the readings must be corrected with the correction table below to determine true concentration.

CO_2 Correction Table

Scale Readings (%)	True Concentration (%)			
	CO_2 5%	CO_2 10%	CO_2 15%	CO_2 20%
2	2.0	-	-	-
6	6.0	2.5	-	-
9	9.0	6.4	-	-
12	12.0	10.0	7.0	6.0
15	15.0	12.8	10.0	7.8
18	18.0	16.0	14.0	12.1
21	21.0	19.0	16.6	14.4
24	24.0	21.2	19.6	17.9

5. CHEMICAL REACTION IN THE DETECTOR TUBE:

Alkaline Pyrogallol reacts Oxygen.

6. DISPOSAL OF TUBE:

USED TUBES SHOULD BE DISPOSED CAREFULLY IN ACCORDANCE WITH RELEVANT REGULATIONS, IF ANY.

7. REMARKS:

When there are any danger of gas explosion in the measuring place, 159SB should be recommended for the measurement, particularly where any combustible gases such as Methane, Ethane might coexist.

8. OXYGEN DEFICIENCY: Less than 18%

9. 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 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.

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 obliquely, read the scale at the centre between the longest and shortest points.

⑤ If the handle returns completely to the original position, the performance is satisfactory. Otherwise, refer to maintenance procedure in the instruction manual of the pump to correct the leakage.

10. 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, 400B, AP-1, AP-1S, or 400A 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.

IME1590/1

Printed in Japan