

- ★ 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 OF THE TUBES IN THIS BOX ARE USED UP.

1. PERFORMANCE:

Measuring Range	: 50 - 1000ppm (*)	130 - 2600ppm
and Pump Strokes	: 1 (100mL)	1/2 (50mL)
(*) Graduations on the detector tube are based on 1 pump stroke.		
Sampling Time	: 1.5 minutes	1 minute
Colour Change	: Yellow → Pale Blue	
Detectable Limit	: 10ppm (1 pump stroke)	
Operating Temperature	: 10 - 40 °C (50-104°F)	(Temperature correction is necessary.)
Operating Humidity	: 10 - 100%RH	
Aspirating Pump	: Model AP-20, AP-20S, 400B, AP-1, AP-1S or 400A	

⚠ CAUTION

1. THE DETECTOR TUBE CONTAINS CHEMICAL REAGENTS.
2. DO NOT TOUCH THE 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, 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 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 °C/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:

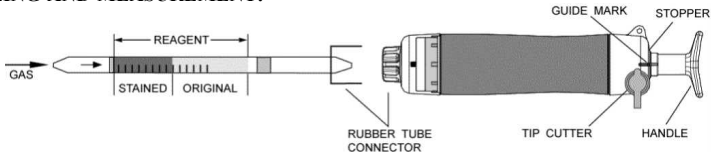


Fig.1

- 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 (Arrow mark shall point to the pump.)
- 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 1.5 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, read the scale at the maximum point of the stained layer.
- ⑥ When the concentration is over the scale range, a 1/2 pump stroke can be used to determine concentrations of 130 - 2600ppm.
 - 1) Remove the detector tube from the pump.
 - 2) Turn the pump handle right or left by 1/4 (90°), push back the handle to the pump.
 - 3) Insert the new tube into the aspirating pump.
 - 4) Pull the pump handle at a 1/2 stroke until it locks and wait for 1 minute or until the completion of sampling is confirmed with the flow indicator of the pump.

- 5) On completion of sampling, read the scale at the maximum point of the stained layer.
- 6) Then multiply the reading value by 2.6.

- SPECIAL NOTE:**
- I . The scale is calibrated at 20 °C (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 scale at the centre between the longest and shortest points.

3. CORRECTION FOR AMBIENT CONDITIONS:

- ① Temperature: Correct the tube reading by following temperature correction table.

Tube Readings (ppm)	Temperature Correction Table						
	Corrected Concentration (ppm)						
	10 °C (50°F)	15 °C (59°F)	20 °C (68°F)	25 °C (77°F)	30 °C (86°F)	35 °C (95°F)	40 °C (104°F)
1000	980	990	1000	1080	1180	1350	1570
800	780	790	800	880	970	1130	1310
600	550	575	600	670	750	880	1050
400	330	360	400	460	520	650	790
200	150	175	200	240	280	330	430
100	85	85	100	115	120	140	170
50	45	45	50	50	55	60	70

※ In case of a 1/2 pump stroke, no temperature correction is necessary at less than 20 °C.

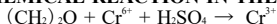
- ② Humidity; No correction is necessary at more than 10%RH.
- ③ Atmospheric Pressure ;

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

4. INTERFERENCES:

Alcohols, Esters, Ethers, Ketones or Aromatic hydrocarbons, Aliphatic hydrocarbons (more than C₃) or Halogenated hydrocarbons produce a similar stain and give higher readings.

5. CHEMICAL REACTION IN THE DETECTOR TUBE:



6. DISPOSAL OF TUBES:

USED TUBES SHOULD BE DISPOSED CAREFULLY ACCORDING TO RELEVANT REGULATIONS, IF ANY.

7. HAZARDOUS AND DANGEROUS PROPERTIES OF ETHYLENE OXIDE:

- TLV-TWA ◆ : 1 ppm
- Explosion range in air : 3.0 - 100 %
- ◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2007.

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, 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.