

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

### 1. PERFORMANCE:

Gases to be measured	: Isobutane · Pentane · n-Hexane · Heptane · Octane · Cyclohexane · Kerosene · Mineral turpentine (Mineral spirits)
Measuring Range and Pump Stroke	: 50 - 1,400 ppm (Graduations on the detector tube are based on n-Hexane.) : 1 pump stroke for Isobutane, Pentane, n-Hexane, Heptane, Octane, Cyclohexane : 2 pump strokes for Kerosene, Mineral turpentine
Sampling Time	: 1.5 minutes / 100mL
Colour Change	: Orange → Yellowish green
Detectable Limit	: 5 ppm
Operating Temperature	: 0 - 40 °C (32 - 104°F) (Temperature correction is necessary.)
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 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, 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 ITEM 9. USER RESPONSIBILITY CAREFULLY.
6. READ THE CONCENTRATION IMMEDIATELY AFTER DRAWING THE SAMPLE.

### 2. SAMPLING AND MEASUREMENT:

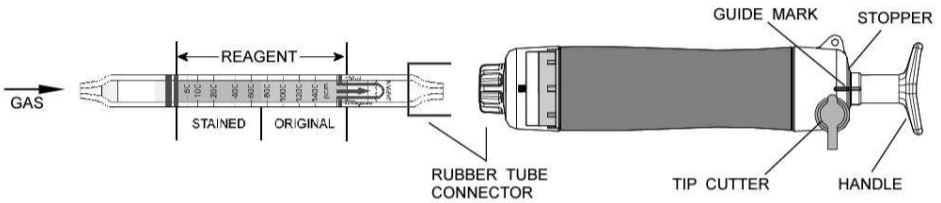


Fig.1

- ① Break both ends of the detector tube.

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

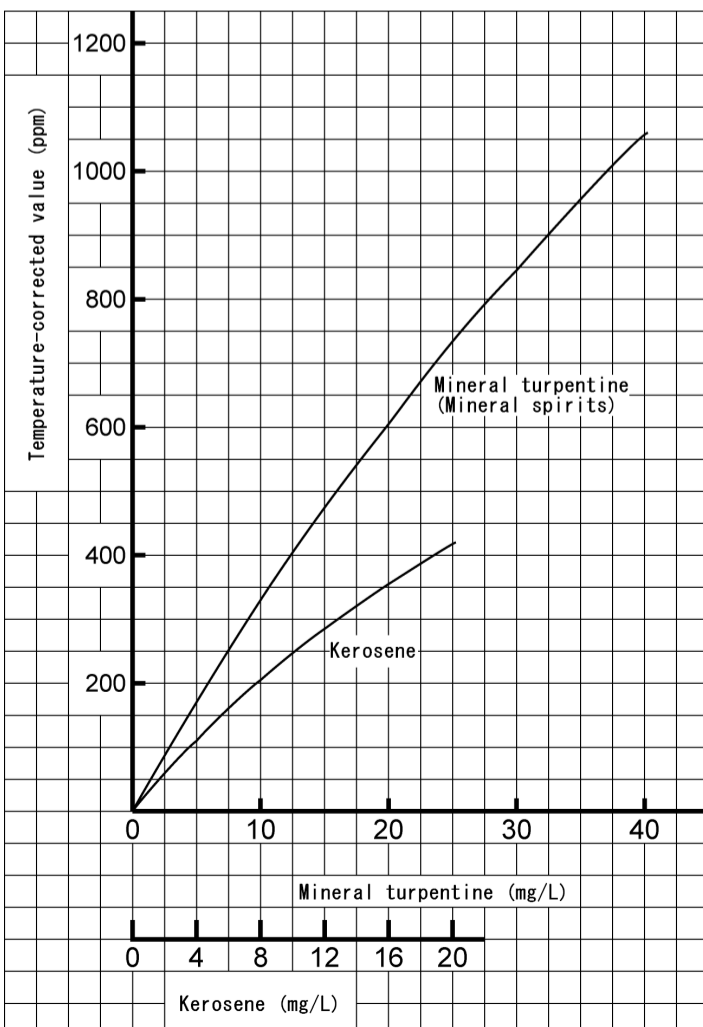
- ② Insert the detector tube into the aspirating pump securely as shown in Fig.1. (Arrow mark shall point to the pump.)
- ③ Align the guide marks on the handle and stopper of the aspirating pump.
- ④ Pull the pump handle at a full stroke until it locks and wait for 1.5 minutes or until the completion 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 Determine the concentration of Isobutane, Pentane, n-Hexane, Heptane, Octane and Cyclohexane with the following equation.

$$\text{Concentration} = \text{Temperature corrected value (*)} \times \text{Conversion coefficient}$$

(\*) REFER TO ITEM 3. CORRECTION FOR AMBIENT CONDITIONS.  
(No temperature correction is necessary as for Isobutane and Pentane.)

Conversion Coefficient Table			
Name of gas	Coefficient	Name of gas	Coefficient
Isobutane	0.8	Heptane	1.5
Pentane	0.8	Octane	2.0
n-Hexane	1.0	Cyclohexane	1.0

- ⑦ In the case of Kerosene or Mineral turpentine, turn the handle right or left by 1/4 (90°), push it toward the pump without removing the detector tube from the pump and then repeat step ③~④ once more.
- ⑧ On completion of sampling, read the scale at the maximum point of the stained layer and correct the tube reading with temperature correction table (REFER TO ITEM 3. CORRECTION FOR AMBIENT CONDITIONS).
- ⑨ Determine the concentration with the conversion graph shown in Graph 1.



Graph 1. Conversion graph

- 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.
  - III. As for Kerosene and Mineral turpentine, different results may be given by difference of compositions.

**3. CORRECTION FOR AMBIENT CONDITIONS:**

- ① Temperature; Correct the tube reading by following temperature correction table. Note that no temperature correction is necessary as for Isobutane and Pentane.

Tube Readings (ppm)	Temperature Correction Table				
	Corrected Concentration (ppm)				
	0 °C (32°F)	10 °C (50°F)	20 °C (68°F)	30 °C (86°F)	40 °C (104°F)
1,400	1,630	1,530	1,400	1,270	1,180
1,200	1,400	1,320	1,200	1,090	1,010
1,000	1,170	1,100	1,000	910	840
800	930	870	800	720	670
600	700	660	600	550	500
400	460	430	400	360	330
200	220	210	200	180	170
100	100	100	100	100	100

- ② Humidity; No corrections is necessary.

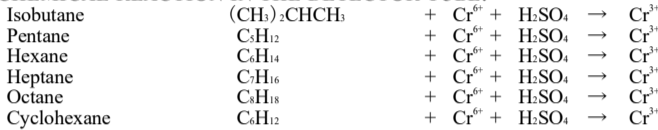
- ③ Atmospheric Pressure;

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

**4. INTERFERENCES:**

More than 6% of Alcohols, Esters or Ketons gives higher readings. If Aromatic hydrocarbons are existing, the reagent is discoloured to black from the zero end of the detecting reagent (inlet side of the tube) 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 :**

Isobutane	TLV-TWA ◆: 1000 ppm	Explosion range in air: 1.8 - 8.4 %
Pentane	TLV-TWA ◆: 600 ppm	Explosion range in air: 1.4 - 7.8 %
Hexane	TLV-TWA ◆: 50 ppm	Explosion range in air: 1.1 - 7.5 %
Heptane	TLV-TWA ◆: 400 ppm	Explosion range in air: 1.0 - 6.7 %
Octane	TLV-TWA ◆: 300 ppm	Explosion range in air: 0.8 - 6.5 %
Cyclohexane	TLV-TWA ◆: 100 ppm	Explosion range in air: 1.2 - 8.4 %
Kerosene	TLV-TWA ◆:	Explosion range in air: 0.7 - 5.0 %
Mineral turpentine	TLV-TWA ◆:	Explosion range in air: 0.6 - 8.0 %

- ◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2012.

**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 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.

※ Product specifications are subject to change without any prior notice.