

(ISOBUTANE, HEPTANE, PENTANE, ISOBUTYLENE, 2,2,4-TRIMETHYL PENTANE, METHYL CYCLOHEXANE WITH CONVERSION CHART)

- ★ 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:

n-Hexane

Measuring Range and Pump Stroke	: 50 - 1400 ppm : 1 pump stroke
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

※ By using conversion charts undermentioned (REFER TO ITEM 4. CONVERSION CHART), following gases can be detected.

Gases to Measured	Measuring Range	Number of pump stroke	Operating Temperature	Detectable Limit
Isobutane	50 - 1200 ppm	1 (100mL)	* 0 - 40 °C (32-104°F)	10 ppm
Heptane	100 - 2000 ppm	1 (100mL)	0 - 40 °C (32-104°F)	—
Pentane	50 - 1000 ppm	1 (100mL)	* 0 - 40 °C (32-104°F)	—
Isobutylene	0.03 - 2.0 %	1 (100mL)	*15 - 25 °C (59 - 77°F)	—
2,2,4-Trimethyl Pentane	100 - 1400 ppm	1 (100mL)	*15 - 25 °C (59 - 77°F)	—
	200 - 4000 ppm	1/2 (50mL)	*15 - 25 °C (59 - 77°F)	—
Methyl Cyclohexane	100 - 1600 ppm	1 (100mL)	*15 - 25 °C (59 - 77°F)	—

*No temperature correction is necessary.

⚠ 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 9. 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 10. USER RESPONSIBILITY.
6. READ THE CONCENTRATION IMMEDIATELY AFTER MEASUREMENT.

2. SAMPLING AND MEASUREMENT:

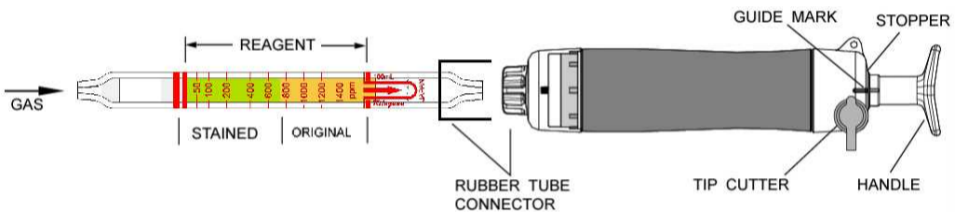


Fig.1

- 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 Just in case of 2,2,4-Trimethyl pentane detection, if the discolouration is over the scale range, a 1/2 pump stroke can be used to determine concentrations of 200 to 4000ppm.
 - 1) Remove the detector tube from the pump.
 - 2) Turn the pump handle right or left by 1/4 (90°), push it toward 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 45 seconds 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) Convert the tube readings by using the Conversion chart. REFER TO ITEM 4. CONVERSION CHART; 2,2,4-Trimethyl Pentane (for 1/2 pump stroke).

- 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 concentration 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.

Temperature Correction Table for n-Hexane					
Tube Reading (ppm)	Corrected Concentration (ppm)				
	0 °C (32°F)	10 °C (50°F)	20 °C (68°F)	30 °C (86°F)	40 °C (104°F)
1400	1630	1530	1400	1270	1180
1200	1400	1320	1200	1090	1010
1000	1170	1100	1000	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

Temperature Correction Table for Heptane					
Tube Reading (ppm)	Corrected Concentration (ppm)				
	0 °C (32°F)	10 °C (50°F)	20 °C (68°F)	30 °C (86°F)	40 °C (104°F)
2000	—	—	2000	1680	1460
1600	—	2000	1600	1380	1200
1200	2000	1480	1200	1040	920
800	1200	940	800	720	660
400	520	460	400	360	320
200	260	230	200	180	160
100	100	100	100	100	100

- ② Humidity; No correction is necessary.

- ③ Atmospheric Pressure;

In case of n-Hexane, Heptane

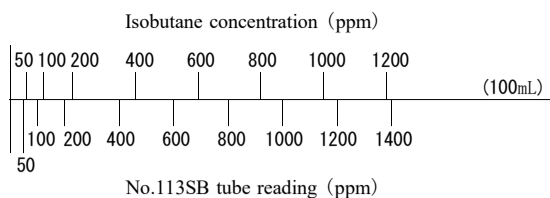
$$\text{True concentration} = \frac{\text{Temperature corrected concentration} \times 1013}{\text{Atmospheric pressure (in hPa)}}$$

In case of Isobutane, Pentane, Isobutylene, 2,2,4-Trimethyl Pentane, Methyl Cyclohexane

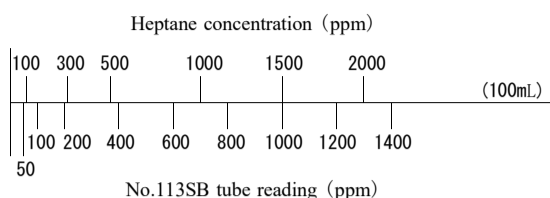
$$\text{True concentration} = \frac{\text{Tube reading} \times 1013}{\text{Atmospheric pressure (in hPa)}}$$

4. CONVERSION CHART:

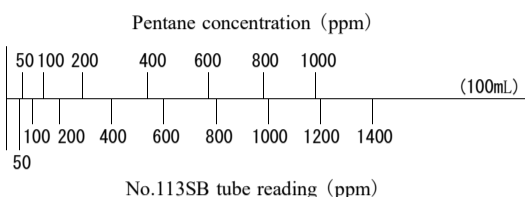
Isobutane



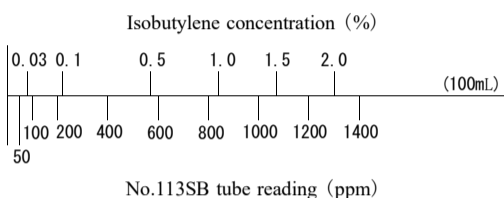
Heptane



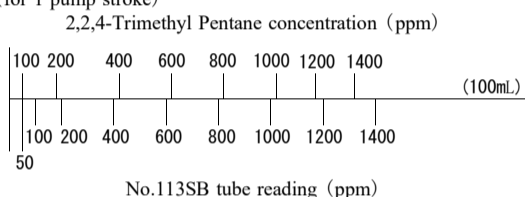
Pentane



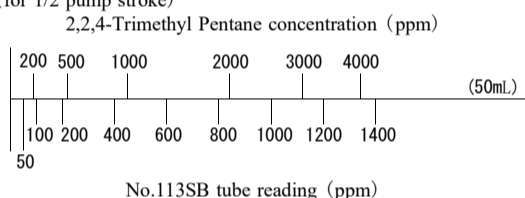
Isobutylene



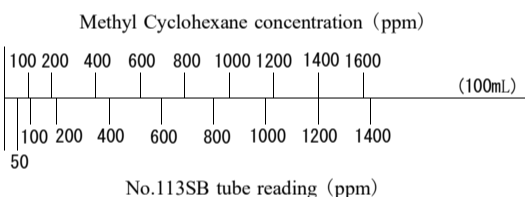
2,2,4-Trimethyl Pentane (for 1 pump stroke)



2,2,4-Trimethyl Pentane (for 1/2 pump stroke)



Methyl Cyclohexane



5. INTERFERENCE:

Alcohols, Esters or Ketones produces a similar stain and coexistence of more than 6% of respectively with n-Hexane gives higher readings. Coexistence of Aromatic hydrocarbons produce a black stain in the bottom of the stained layer and give higher reading. Aliphatic hydrocarbons (more than C₃) produce a similar stain and give higher readings.

6. CHEMICAL REACTION IN THE DETECTOR TUBE:



7. DISPOSAL OF TUBES:

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

8. HAZARDOUS AND DANGEROUS PROPERTIES OF:

n-Hexane	TLV-TWA ◆	50 ppm	Explosion range in air:	1.1-7.5%
Isobutane (Aliphatic hydrocarbon C ₁ -C ₄)	TLV-TWA ◆	1000 ppm	Explosion range in air:	1.8-8.5%
Heptane	TLV-TWA ◆	400 ppm	Explosion range in air:	1.0-6.7%
Pentane	TLV-TWA ◆	600 ppm	Explosion range in air:	1.4-7.8%
Isobutylene	TLV-TWA ◆	- ppm	Explosion range in air:	1.8-9.6%
2,2,4-Trimethyl Pentane	TLV-TWA ◆	- ppm	Explosion range in air:	0.9-6.0%
Methyl Cyclohexane	TLV-TWA ◆	400 ppm	Explosion range in air:	1.1-6.7%

◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2009.

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 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.

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.