INSTRUCTION MANUAL
BENZENE DETECTOR TUBE
-IN THE PRESENCE OF OTHER AROMATIC HYDROCARBONS-

No.118SE

★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

Measuring Range and Pump Stroke	: 1-80ppm (*) 1 pump stroke 0.2 - 1 ppm 5 pump strokes (*) Graduations on the detector tube are based on 1 pump stroke.
Sampling Time	: 2 minutes 10 minutes
Colour Change	: White→ Brown
Detectable Limit	: 0.1 ppm (5 pump strokes)
Operating Temperature	: 0 - 40℃ (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 AND PRETREAT TUBE CONTAIN 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℃/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

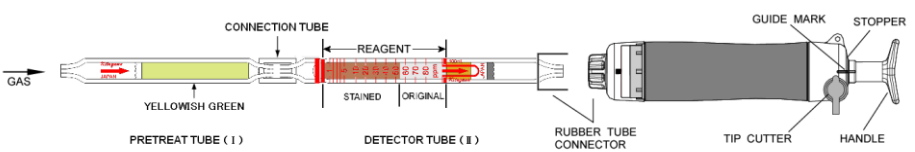

Fig.1

① Break both ends of the pretreat tube (Ⅰ) and detector tube (Ⅱ), and connect each end of the pretreat tube and

detector tube with connecting tube as shown in Fig.1.

⚠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 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.)
⑤ On completion of sampling, read the scale at the maximum point of the stained layer.
⑥ When the concentration is below the scale range, 5 pump strokes can be used to determine concentrations of 0.2 to 1 ppm.
At this point, turn the handle right or left by 1/4 (90^o), push it toward the pump without removing the detector tube from the pump and then repeat step③～④ four times more.
In the case of 5 pump strokes, the following equation is available for true concentration.

True concentration = Reading value ×0.2

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 scale at the centre between the longest and shortest points.

3. CORRECTION FOR AMBIENT CONDITIONS

① Temperature; To correct for temperature, multiply the tube reading by the following factors.

Temperature(℃)	0	1	2	3	4	5	6	7	8	9
Correction Factor	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
Temperature(℃)	10	11	12	13	14	15	16	17	18	19
Correction Factor	0.66	0.70	0.73	0.76	0.79	0.83	0.86	0.89	0.93	0.96
Temperature(℃)	20	21	22	23	24	25	26	27	28	29
Correction Factor	1.00	1.04	1.08	1.11	1.15	1.19	1.23	1.27	1.31	1.35
Temperature(℃)	30	31	32	33	34	35	36	37	38	39
Correction Factor	1.40	1.44	1.48	1.53	1.57	1.62	1.66	1.71	1.71	1.71
Temperature(℃)	40									
Correction Factor	1.71									

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:

In case of 1 pump stroke, each coexistence of more than 1,000 ppm of Toluene, Xylene or Ethyl benzene with Benzene gives higher readings (in case of 5 pump strokes, 200 ppm each). Coexistence of more than 2 ppm of Carbon monoxide or Hexane with Benzene changes the whole reagent to pale brown, produces an unclear stain and gives higher readings. However, coexistence of less than 80 ppm of Hexane with more than 0.2 ppm Benzene does not affect the accuracy of readings.

*If aromatic hydrocarbons such as Toluene, Xylene and Ethyl benzene exist, the pretreat tube will be discoloured to black or dark brown from the bottom of the original yellowish green layer.

5. CHEMICAL REACTION IN THE DETECTOR TUBE:

$C_6H_6 + I_2O_5 + H_2SO_4 \cdot nSO_3 \rightarrow I_2$

6. DISPOSAL OF TUBES:

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

7. HAZARDOUS AND DANGEROUS PROPERTIES OF BENZENE:

TLV - TWA◆ : 0.5 ppm
Explosion range in air : 1.2 - 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.

IME1184/3
Printed in Japan