KITAGAWA
KOMYO RIKAGAKU KOGYO

INSTRUCTION MANUAL
ETHYL ACETATE DETECTOR TUBE

No.111U

（ISOPROPYL ACETATE, 1,2,4-/1.3,5-TRIMETHYL BENZENE, CUMENE, DIETHYL BENZENE, CYCLOHEXENE, BUTYL ETHER, ISOPROPYL ETHER, n-DECANE, n-NONANE, tert-BUTYL METHYL ETHER, ETHYL ETHACRYLATE, BUTYL METHACRYLATE, n-UNDECANE, tert-BUTANOL, DECAHYDRONAPHTHALENE WITH CONVERSION CHART）

★ 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	: 10 - 1000 ppm : 1 pump stroke
Sampling Time	: 1.5 minutes /100mL
Colour Change	: Yellow → Brown
Detectable Limit	: 5 ppm
Operating Temperature	: 10 - 40 ℃ (50-104°F) (Temperature correction is necessary.)
Aspirating Pump	: Model AP-20, AP-20S, 400B,

※ By using conversion charts undermentioned（refer to **ITEM 4. CONVERSION CHART**）, following gases can be detected.
※ Isopropyl acetate can be detected by using the same graduations for Ethyl acetate.

Gases to Measured	Measuring Range	Number of pump strokes	Operating Temperature
Isopropyl acetate	10 - 1000 ppm	1 (100mL)	* 10 - 40 ℃ (50-104°F)
1, 2, 4-Trimethyl benzene	10 - 180 ppm	1 (100mL)	** 0 - 40 ℃ (32-104°F)
1, 3, 5-Trimethyl benzene	10 - 180 ppm	1 (100mL)	** 0 - 40 ℃ (32-104°F)
Cumene	20 - 140 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
Diethyl benzene	10 - 180 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
Cyclohexene	20 - 300 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
Butyl ether	10 - 1200 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
Isopropyl ether	30 - 800 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
n-Decane	5 - 90 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
n-Nonane	5 - 80 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
	10 - 160 ppm	0.5 (50mL)	**15 - 25 ℃ (59-77°F)
tert-Butyl methyl ether	25 - 500 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
Ethyl methacrylate	20 - 500 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
Butyl methacrylate	20 - 1000 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
n-Undecane	10 - 140 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
tert-Butanol	20 - 500 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)
Decahydronaphthalene	20 - 200 ppm	1 (100mL)	**15 - 25 ℃ (59-77°F)

*Temperature correction is necessary. **No temperature correction is necessary.
Detectable limit : Isopropyl acetate 5ppm
1, 2, 4- / 1,3,5- Trimethyl benzene 1ppm

⚠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. 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 ℃/32-77°F), AND USE BEFORE EXPIRATION DATE PRINTED ON THE TOP OF THE BOX.
5. PRIOR TO USE, READ **ITEM 10. USER RESPONSIBILITY** CAREFULLY.
6. READ THE CONCENTRATION IMMEDIATELY AFTER DRAWING THE SAMPLE.

2. SAMPLING AND MEASUREMENT:

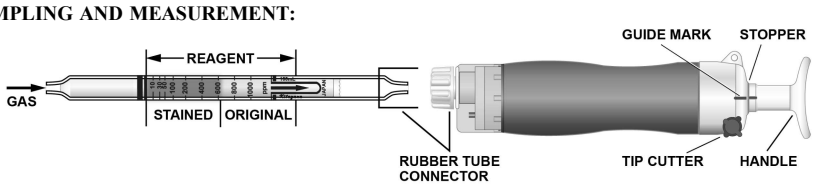


Fig.1

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.

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; The scale is calibrated based on the temperature of 20 ℃ (68°F). Readings obtained in other temperature circumstances should be corrected with the following temperature correction table.

Table of the coefficient for temperature correction (based on 20 ℃)

Tube Readings (ppm)	Correction Coefficient						
	10 ℃ (50°F)	15 ℃ (59°F)	20 ℃ (68°F)	25 ℃ (77°F)	30 ℃ (86°F)	35 ℃ (95°F)	40 ℃ (104°F)
1000	1.33	1.17	1.00	0.87	0.74	0.64	0.53
800	1.38	1.19	1.00	0.86	0.73	0.63	0.53
600	1.40	1.20	1.00	0.86	0.72	0.63	0.53
400	1.40	1.20	1.00	0.85	0.70	0.58	0.46
200	1.40	1.20	1.00	0.84	0.68	0.55	0.42
100	1.50	1.25	1.00	0.81	0.62	0.48	0.33
50	1.50	1.25	1.00	0.77	0.54	0.43	0.32
30	1.50	1.25	1.00	0.77	0.53	0.42	0.30
10	1.50	1.25	1.00	0.75	0.50	0.40	0.30

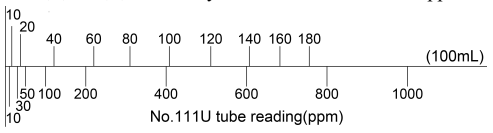
Procedure of temperature correction: True concentration can be obtained by multiplying the readings of tubes by coefficient for temperature correction shown in the above. Therefore,
True concentration (ppm) = Readings (ppm) × Coefficient for temperature correction

② Humidity; No corrections are necessary.
③ Atmospheric Pressure;

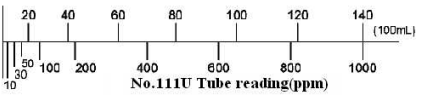
$$\text{True concentration} = \text{Temperature corrected concentration} \times \frac{1013}{\text{Atmospheric pressure (in hPa)}}$$

4. CONVERSION CHART

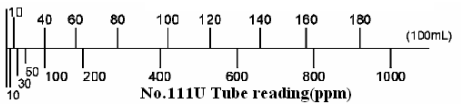
○ 1,2,4- / 1,3,5- Trirmethyl benzene
1,2,4-/ 1,3,5-Trimethyl benzene concentration（ppm）



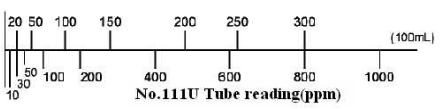
○ Cumene
Cumene concentration（ppm）



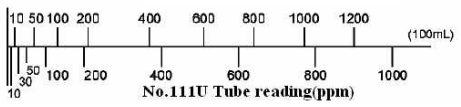
○ Diethyl benzene
Diethyl benzene concentration（ppm）



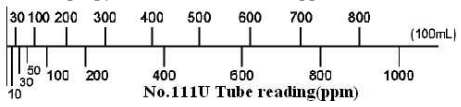
○ Cyclohexene
Cyclohexene concentration（ppm）



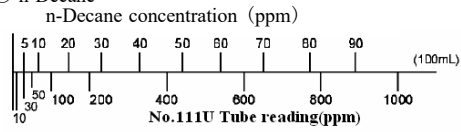
○ Butyl ether
Butyl ether concentration（ppm）



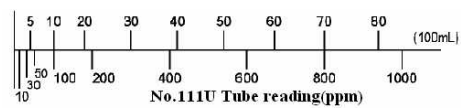
○ Isopropyl ether
Isopropyl ether concentration（ppm）



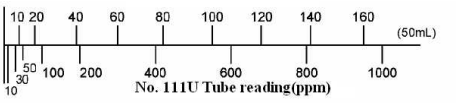
○ n-Decane
n-Decane concentration（ppm）



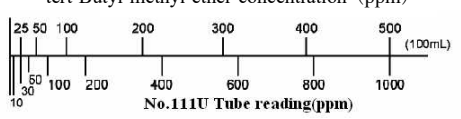
○ n-Nonane （100mL）
n-Nonane concentration（ppm）



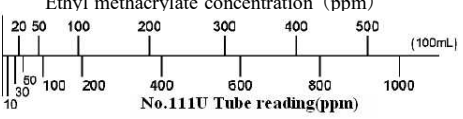
○ n-Nonane（50mL）
n-Nonane concentration（ppm）



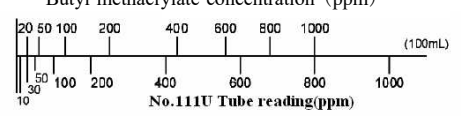
○ tert-Butyl methyl ether
tert-Butyl methyl ether concentration（ppm）



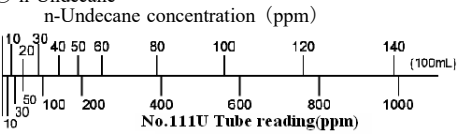
○ Ethyl methacrylate
Ethyl methacrylate concentration（ppm）



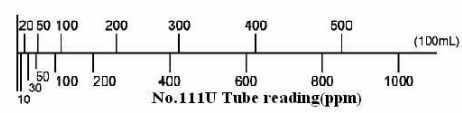
○ Butyl methacrylate
Butyl methacrylate concentration（ppm）



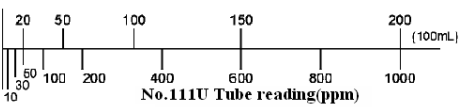
○ n-Undecane
n-Undecane concentration（ppm）



○ tert-Butanol
tert-Butanol concentration（ppm）



○ Decahydronaphthalene
Decahydronaphthalene concentration（ppm）



5. INTERFERENCE:

Alcohols, Esters, Ketones or Aromatic hydrocarbons produce a similar or brown stains and coexistence of them give higher readings. Although coexistence of Aliphatic or Halogenated hydrocarbons change the whole reagent to pale brown but the reading can be obtained if the top of maximum point of stained layer is clear.

6. CHEMICAL REACTION IN THE DETECTOR TUBE:

Chromium oxide is reduced. $CH_3CO_2C_2H_5 + Cr^{6+} + H_2SO_4 \rightarrow Cr^{3+}$ (Ethyl acetate)

7. DISPOSAL OF TUBES:

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

8. HAZARDOUS AND DANGEROUS PROPERTIES OF :

Name of gas	TLV-TWA ◆	Explosion range in air:	Name of gas	TLV-TWA ◆	Explosion range in air:
Ethyl acetate	400 ppm	2.1 - 11.5 %	n-Decane	-	0.7 - 5.4%
Isopropyl acetate	100 ppm	1.8 - 8.0 %	n-Nonane	200 ppm	0.8 - 2.9%
Trimethyl benzene	25 ppm	1.1 - 7.0 %	tert-Butyl methyl ether	50 ppm	1.6 - 15.1 %
Cumene	50 ppm	0.8 - 6.5 %	Ethyl methacrylate	-	More than 1.8%
Diethyl benzene	-	More than 0.8%	Butyl methacrylate	-	2.0 - 8.0 %
Cyclohexene	20 ppm	1.2 - 8.5%	n-Undecane	-	0.7 - 5.5 %
Butyl ether	-	1.5 - 7.6 %	tert-Butanol	100 ppm	2.4 - 8.0 %
Isopropyl ether	250 ppm	1.4 - 7.9 %	Decahydronaphthalene	-	-

◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2020.

9. INSPECTION OF ASPIRATING PUMP:

Checking for leaks;

① Insert a sealed and 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 as it is.
④ Unlock the handle and allow it to return slowly into the pump with 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 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.

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