KITAGAWA
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INSTRUCTION MANUAL
VINYL CHLORIDE DETECTOR TUBE

BENZYL CHLORIDE, o-CHLOROTOLUENE, m-CHLOROTOLUENE, p-CHLOROTOLUENE
TRICHLOROTOLUENE, 1,1-DICHLOROETHYLENE, ALLYL CHLORIDE, 1,3-DICHLOROPROPENE

No.132SC

★ 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:

Measuring Range and Pump Stroke	: 0.44 - 13.2 ppm : 1 pump stroke	0.2 - 6.0 ppm(*) 2 pump strokes	0.09 - 2.7 ppm 4 pump strokes
(*)Graduations on the detector tube are based on 2 pump strokes.			
Sampling Time	: 1.5 minutes	3 minutes	6 minutes
Colour Change	: Yellowish green → Pink		
Detectable Limit	: 0.05 ppm (4 pump strokes)		
Operating Temperature	: 0 - 40 ℃ (32-104°F) Temperature correction is necessary.		
Aspirating Pump	: Model AP-20, AP-20S, AP-1 or AP-1S		

By using conversion chart shown at **ITEM 4. CONVERSION CHART**, following gases can be detected.

Gases to be Detected	Measuring Range	Number of pump stroke	Sampling Time
Benzyl chloride	0.5 - 14 ppm (Conversion chart)	1(100mL)	1.5 minutes
o-Chlorotoluene	2 - 100 ppm (Conversion chart)	1(100mL)	1.5 minutes
m-Chlorotoluene	0.5 - 8 ppm (Conversion chart)	2(200mL)	3 minutes
p-Chlorotoluene	0.5 - 35 ppm (Conversion chart)	2(200mL)	3 minutes
Trichlorotoluene	0.2 - 4 ppm (Conversion chart)	1(100mL)	1.5 minutes
1,1-Dichloroethylene	1 - 22 ppm (Conversion chart)	1/2(50mL)	1 minutes
Allyl chloride	1 - 35 ppm (Conversion chart)	3(300mL)	4.5 minutes
1,3-Dichloropropene	1 - 10 ppm (Conversion chart)	1(100mL)	1.5 minutes
Operating Temperature	: 15 - 25 ℃ (59 - 77°F) (No temperature correction is necessary.) (Incorrect readings may be given in other temperature range of above-mentioned.)		

⚠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, AP-1 OR AP-1S. 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 CAREFULLY **ITEM 10. USER RESPONSIBILITY**.
6. READ THE CONCENTRATION IMMEDIATELY AFTER MEASUREMENT.

2. SAMPLING AND MEASUREMENT:

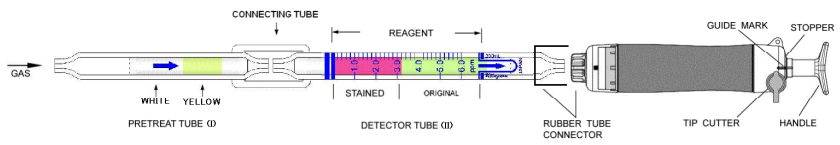


Fig.1

① Break both ends of the detector tube(II) and pretreat tube(I), and connect each end of the detector tube(II) and pretreat tube(I) 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(II) 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 Turn the handle right or left by 1/4 (90°), push back the handle without removing the detector tube from the pump and then repeat the steps ③～④ once again.
⑥ On completion of sampling, read the scale at the maximum point of the stained layer.
⑦ When the concentrations are below the scale range, 4 pump strokes can be used to determine these lower concentrations.
⑧ When the concentrations are over the scale range, 1 pump stroke can be used to determine these higher concentrations.

In case of 1 or 4 pump strokes, the following equation is available to obtain a true concentration.
4 pump strokes: True concentration = Temperature corrected concentration × 0.45
1 pump stroke: True concentration = Corrected value by conversion table

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;
In case of 2 and 4 pump strokes, correct the tube reading by following temperature correction table.

Tube Readings (ppm)	Corrected Concentration (ppm) 0 ℃ (32°F)	10 ℃ (50°F)	20 ℃ (68°F)	30 ℃ (86°F)	40 ℃ (104°F)
6.0	8.1	6.6	6.0	5.8	5.6
5.0	6.5	5.4	5.0	4.7	4.6
4.0	5.0	4.2	4.0	3.8	3.5
3.0	3.6	3.1	3.0	2.8	2.6
2.0	2.3	2.1	2.0	1.8	1.6
1.0	1.13	1.03	1.00	0.80	0.70
0.8	0.90	0.82	0.80	0.64	0.57
0.6	0.68	0.62	0.60	0.47	0.46
0.4	0.45	0.41	0.40	0.35	0.32
0.2	0.23	0.21	0.20	0.20	0.20

Note: Temperature correction procedure
Example 1 : When the tube reading is 5.0 ppm at 10 ℃, the concentration is 5.4 ppm.

Tube Readings (ppm)	Corrected Concentration (ppm) 0 ℃ (32°F)	10 ℃ (50°F)	20 ℃ (68°F)	30 ℃ (86°F)	40 ℃ (104°F)
6.0	8.1	6.6	6.0	5.8	5.6
5.0	6.5	5.4	5.0	4.7	4.6
4.0	5.0	4.2	4.0	3.8	3.5
3.0	3.6	3.1	3.0	2.8	2.6

Example 2 : When the tube reading is 4.5 ppm at 5 ℃, the true concentration is 5.28 ppm which is found by proportional allotment of each concentration and temperature as shown below.

Tube Readings (ppm)	Corrected Concentration (ppm) 0 ℃ (32°F)	10 ℃ (50°F)	20 ℃ (68°F)	30 ℃ (86°F)	40 ℃ (104°F)
6.0	8.1	6.6	6.0	5.8	5.6
5.0	6.5	5.4	5.0	4.7	4.6
4.0	5.0	4.2	4.0	3.8	3.5
3.0	3.6	3.1	3.0	2.8	2.6

(ppm)	0 ℃	5 ℃	10 ℃
5.0	6.5	(5.15)	5.4
(4.5)	(5.75)	(5.28)	(4.80)
4.0	5.0	(4.60)	4.2

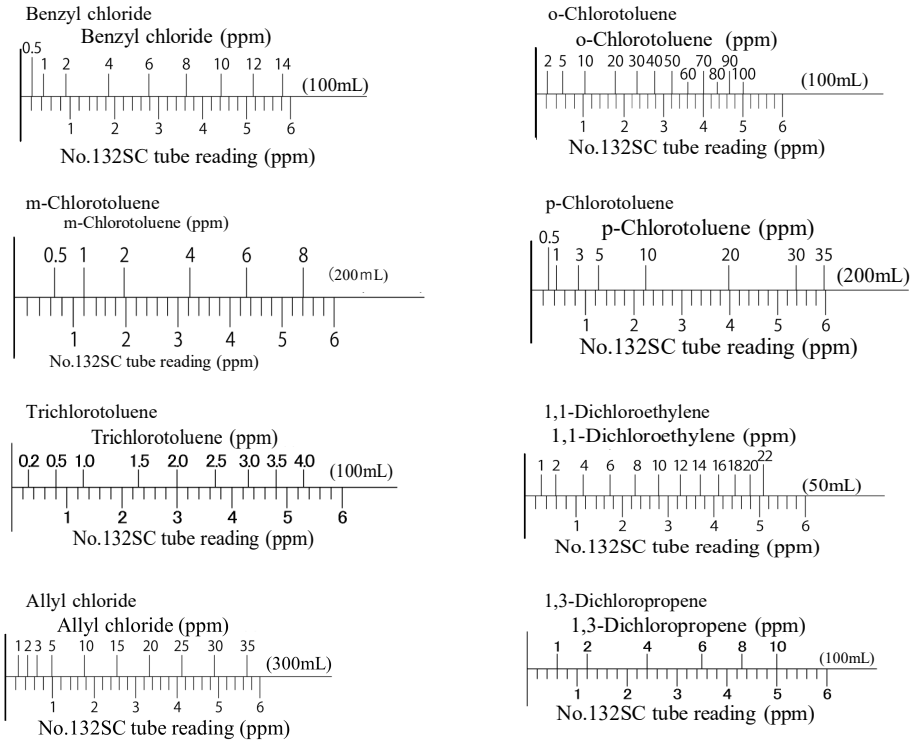
Numerals in parentheses are determined by proportional allotment.

In case of 1 pump stroke, correct the tube reading by following conversion table including temperature correction.

Tube Readings (ppm)	Corrected Concentration (ppm) 0 ℃ (32°F)	10 ℃ (50°F)	20 ℃ (68°F)	30 ℃ (86°F)	40 ℃ (104°F)
6.0	24.1	17.4	13.2	13.2	13.2
5.0	19.4	13.8	11.0	11.0	11.0
4.0	15.1	10.6	8.8	8.7	8.5
3.0	10.8	7.6	6.6	6.4	6.1
2.0	6.8	4.7	4.4	4.3	4.1
1.0	3.18	2.2	2.20	2.10	2.00
0.8	2.47	1.76	1.76	1.66	1.55
0.6	1.83	1.32	1.32	1.24	1.16
0.4	1.25	0.88	0.88	0.83	0.77
0.2	0.58	0.44	0.44	0.42	0.40

② Humidity; No correction is necessary.
③ Atmospheric Pressure;
True concentration = Temperature corrected concentration × $\frac{1013}{\text{Atmospheric pressure (in hPa)}}$

4. CONVERSION CHART:



5. INTERFERENCE:

Coexistence of more than 3% of Acetylene or more than 200 ppm of Ethylene gives lower readings. Less than 500 ppm of hydrogen chloride or 50 ppm of Chlorine does not affect the readings.

6. CHEMICAL REACTION IN THE DETECTOR TUBE:

$CH_2=CHCl + CrO_3 + H_2SO_4 \rightarrow HCl$

7. DISPOSAL OF TUBES:

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

8. HAZARDOUS AND DANGEROUS PROPERTIES :

Vinyl chloride	TLV-TWA ◆: 1 ppm	Explosion range in air: 3.6-33%
Benzyl chloride	TLV-TWA ◆: 1 ppm	Explosion range in air: 1.1-7.1%
o-Chlorotoluene	TLV-TWA ◆: 50 ppm	Explosion range in air: 1.0-12.6%
m-Chlorotoluene	TLV-TWA ◆: －	Explosion range in air: 1.3-8.3%
p-Chlorotoluene	TLV-TWA ◆: －	Explosion range in air: 0.7-12.2%
Trichlorotoluene	TLV-STEL ◆: C 0.1 ppm	Explosion range in air: 2.1-6.5%(160 ℃)
1,1-Dichloroethylene	TLV-TWA ◆: 5 ppm	Explosion range in air: 6.5-15.5%
Allyl chloride	TLV-TWA ◆: 1 ppm	Explosion range in air: 2.9-11.2%
1,3-Dichloropropene	TLV-TWA ◆: 1 ppm	Explosion range in air: 5.3-14.5%

◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2023.

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, AP-1 OR AP-1S 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.

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