KITAGAWA
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INSTRUCTION MANUAL
ACETONE DETECTOR TUBE

No.102SA

(TETRAHYDROFURAN 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.

I. PERFORMANCE:

Measuring Range and Pump Stroke	: 0.1 - 2.0% (*) : 1 pump stroke	1.0 - 5.0% 1/2 pump stroke
	(*) Graduations on the detector tube are based on 1 pump stroke.	
Sampling Time	: 1.5 minute	45 seconds
Colour Change	: Orange →	Dark brown
Detectable Limit	: 200 ppm (1 pump stroke)	
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	

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

Gase to Measured	Measuring Range	Pump Stroke	Operating Temperature	Detectable Limit
Tetrahydrofuran	0.2 - 3.0%	1 (100mL)	0 - 40 ℃ (32-104°F) ※	20ppm
	1.0 - 5.0%	1/2 (50mL)	0 - 40 ℃ (32-104°F) ※	

※ 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 THE 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:

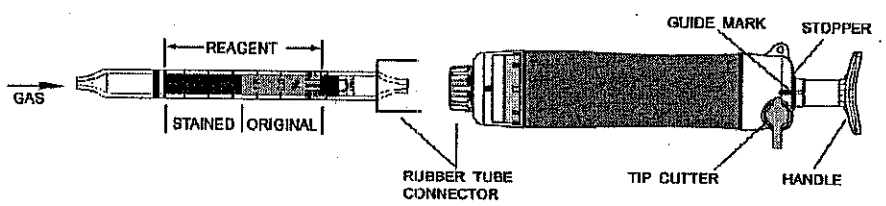


Fig.1

① Break both ends of the detector tube.
⚠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 When the concentrations are over the scale range, a 1/2 pump stroke can be used to determine concentrations of 1.0 to 5.0%.
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) Correct the reading value with Temperature Correction Table for Acetone **(REFER TO ITEM 3. CORRECTION FOR AMBIENT CONDITIONS)**
7) Convert the Temperature corrected concentration by using the Conversion chart I.

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; Correct the tube reading by following temperature correction table.

Tube Readings (ppm)	Temperature Correction Table for Acetone — Corrected Concentration (ppm)				
	0 ℃ (32°F)	10 ℃ (50°F)	20 ℃ (68°F)	30 ℃ (86°F)	40 ℃ (104°F)
2.0	-	2.38	2.00	1.78	1.60
1.5	2.20	1.76	1.50	1.30	1.16
1.0	1.44	1.18	1.00	0.86	0.76
0.5	0.72	0.60	0.50	0.42	0.36
0.2	0.30	0.25	0.20	0.16	0.14
0.1	0.16	0.12	0.10	0.08	0.08

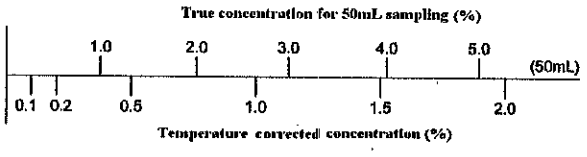
② Humidity; No corrections is necessary.
③ Atmospheric Pressure;

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

4. CONVERSION CHART AND TEMPERATURE CORRECTION TABLE

ACETONE

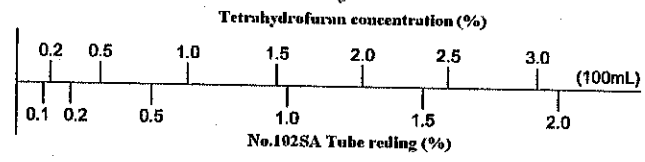
CONVERTION CHART I



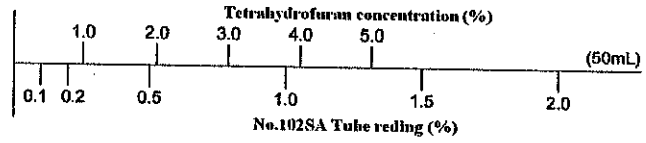
TETRAHYDROFURAN

Tube Readings (ppm)	Temperature Correction Table for Tetrahydrofuran — Corrected Concentration (ppm)				
	0 ℃ (32°F)	10 ℃ (50°F)	20 ℃ (68°F)	30 ℃ (86°F)	40 ℃ (104°F)
5.0	6.0	5.3	5.0	4.8	4.5
4.0	4.8	4.3	4.0	3.8	3.6
3.0	3.6	3.2	3.0	2.9	2.7
2.5	3.0	2.7	2.5	2.4	2.3
2.0	2.4	2.1	2.0	1.9	1.8
1.5	1.8	1.6	1.5	1.4	1.4
1.0	1.1	1.1	1.0	1.0	0.9
0.5	0.6	0.5	0.5	0.5	0.5

CONVERTION CHART II: For 1 pump stroke (100mL)



CONVERTION CHART III: For 1/2 pump stroke (50mL)



5. INTERFERENCES:

Alcohols, Esters, Ketones or Aromatic hydrocarbons produce similar stains and give higher readings. Halogenated hydrocarbons change the colour of the whole reagent to pale brown and coexistence of more than 0.5% of them give higher readings.

6. CHEMICAL REACTION IN THE DETECTOR TUBE:

Acetone	: CH_3COCH_3	$+Cr^{6+} + H_2SO_4 \rightarrow Cr^{3+}$
Tetrahydrofuran	: $(CH_2)_4O$	$+Cr^{6+} + H_2SO_4 \rightarrow Cr^{3+}$

7. DISPOSAL OF TUBES:

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

8. HAZARDOUS AND DANGEROUS PROPERTIES OF :

Acetone	TLV-TWA ◆: 500 ppm	Explosion range in air:	2.1 - 13.0 %
Tetrahydrofuran	TLV-TWA ◆: 50 ppm	Explosion range in air:	2.0 - 11.8 %

◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2008.

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.

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