KITAGAWA
KOMYO RIKAGAKU KOGYO

INSTRUCTION MANUAL
DIMETHYL SULPHIDE DETECTOR TUBE

No. 250S

★ 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	: 2.1 - 100 ppm	1 - 40 ppm (*)	0.21 - 7.9 ppm
and Pump Stroke	: 1/2 pump stroke	1 pump stroke	4 pump strokes

(*) Graduations on the detector tube are based on 1 pump stroke.

Sampling Time	: 1.5 minutes	3 minutes	12 minutes
Colour Change	: Pink → Pale yellow		
Detectable Limit	: 0.1 ppm (4 pump strokes)		
Operating Temperature	: 0 - 40 ℃ (32-104°F) (Temperature correction is necessary.)		
Operating Humidity	: 0 - 90 %R.H. for both 1 pump stroke and a 1/2 pump stroke at 0 - 40 ℃ 0 - 90 %R.H. for 4 pump strokes at 0 - 30 ℃ 0 - 50 %R.H. for 4 pump strokes at 30 - 40 ℃ (No correction is necessary with regard to the operating humidity.)		
Aspirating Pump	: Model AP-20, AP-20S, AP-1 or AP-1S		

By using printed scale, following gases can be detected.

Gases to be Detected	: Dimethyl disulphide
Measuring Range	: 0.12 - 1.2 ppm (Tube reading × 0.12)
and Pump Stroke	: 5 pump strokes
Sampling Time	: 15 minutes
Operating Temperature	: 15 − 30 ℃ (59-86°F) (No temperature correction is necessary.) (Incorrect readings may be given in other temperature range of above-mentioned.)
Operating Humidity	: 0 - 90 %R.H. for 5 pump strokes at 15 - 25 ℃ 0 - 80 %R.H. for 5 pump strokes at 25 - 30 ℃ (No correction is necessary with regard to the operating humidity.)

⚠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, 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 **ITEM 9. USER RESPONSIBILITY** CAREFULLY.
6. READ THE CONCENTRATION IMMEDIATELY AFTER DRAWING THE SAMPLE.

2. SAMPLING AND MEASUREMENT:

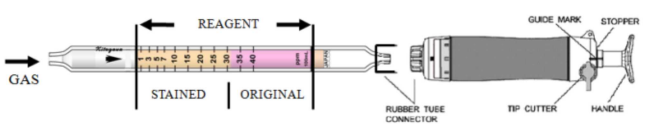

Fig.1

① Break both ends of the 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 3 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 over the upper limit of the scale range, the following procedure for a 1/2 pump stroke can be used.
1) Insert a new tube to the pump inlet.
2) Pull the pump handle at a 1/2 pump stroke lock position (to 50mL line), and it will be automatically locked. Leave it for 90 seconds to complete the sampling.
3) On completion of sampling, read the scale at the maximum point of the stained layer. The tube reading value should be converted to the corrected value by the Temperature Correction Table.
⑦ When the concentration is below the lower limit of the scale range, the following procedure for 4 pump strokes can be used.
1) Insert a new tube to the pump inlet.
2) Pull the pump handle at a full stroke until it locks and wait for 3 minutes or until the completion of sampling is confirmed with the flow indicator of the pump.
3) Push back the handle without removing the detector tube from the rubber tube connector.
4) Repeat the step 2 ~ 3 three times.
5) On completion of sampling, read the scale at the maximum point of the stained layer. The tube reading value should be converted to the corrected value by the Temperature Correction Table.
⑧ In the case of **Dimethyl disulphide** measurement, after step ④, turn the handle right or left by 1/4 (90°), push in toward the pump without removing the detector tube from the pump and repeat step ③～④ four times more.
The following equation is available for true concentration.
True concentration = Temperature corrected concentration × 0.12

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 AND PUMP STROKE.)**
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 AND PUMP STROKE:

① Temperature; Correct the tube reading by the following temperature correction table for 1 pump stroke.
In case of a 1/2 pump stroke and 4 pump strokes, correct the tube reading by the following correction tables for a 1/2 pump stroke and 4 pump strokes, respectively. (Note that the correction tables for a 1/2 pump stroke and 4 pump strokes contain temperature correction.)

Temperature Correction Tables for Dimethyl sulphide

Temperature Correction Table (**for 1 pump stroke**)			
Tube Readings (ppm)	Corrected Concentration (ppm)		
	0 ℃ (32°F)	10 ℃ (50°F)	20 to 40 ℃ (68 to 104°F)
40	61	49	40
35	52	42	35
30	43	35	30
25	34	28	25
20	26	22	20
15	18.5	16	15
10	11.8	10.5	10
7	7.7	7.1	7
5	5.3	5	5
3	3	3	3
1	1	1	1

Temperature Correction Table (**for 1/2 pump stroke**)					
Tube Readings (ppm)	Corrected Concentration (ppm)				
	0 ℃ (32°F)	10 ℃ (50°F)	20 ℃ (68°F)	30 ℃ (86°F)	40 ℃ (104°F)
40	182	130	100	90	82
35	152	110	87	78	72
30	123	91	74	66	62
25	96	72	60	54	51
20	72	55	47	43	41
15	49	39	34	32	31
10	29	24	22	21	20.5
7	18.6	15.7	15.2	14.7	14.3
5	12.3	10.8	10.7	10.4	10.2
3	6.3	6.3	6.3	6.2	6.1
1	2.1	2.1	2.1	2.05	2

Temperature Correction Table (**for 4 pump strokes**)			
Tube Readings (ppm)	Corrected Concentration (ppm)		
	0 ℃ (32°F)	10 ℃ (50°F)	20 to 40 ℃ (68 to 104°F)
40	9.4	8.4	7.9
35	8.2	7.4	7
30	6.9	6.3	6.1
25	5.7	5.3	5.2
20	4.5	4.2	4.2
15	3.3	3.2	3.2
10	2.2	2.1	2.1
7	1.52	1.47	1.47
5	1.07	1.05	1.05
3	0.64	0.63	0.63
1	0.21	0.21	0.21

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:

More than 0.6 ppm of Mercaptans produce a similar stain and give higher readings. Isobutane produces a similar stain and gives higher readings. With an absolute humidity of more than 3 mg/L, H_2S (Hydrogen sulphide) does not affect the readings; otherwise H_2S produces a similar stain and gives higher readings. Propane does not affect the readings if the concentration is less than 0.8 %.

5. CHEMICAL REACTION IN THE DETECTOR TUBE:

$(CH_3)_2S + KMnO_4 \rightarrow$ Pale yellow reaction products

6. DISPOSAL OF TUBES:

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

7. HAZARDOUS AND DANGEROUS PROPERTIES OF DIMETHYL SULPHIDE:

Dimethyl sulphide TLV-TWA ◆: 10 ppm Explosion range in air: 2.2 - 19.7 %.
Dimethyl disulphide TLV-TWA ◆: 0.5 ppm Explosion range in air: 1.1 - 16 %.
◆ Threshold Limit Value established by American Conference of Governmental Industrial Hygienists, 2023.

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 procedure 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, AP-1 or AP-1S 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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