

Kitagawa ETHYL CELLOSOLVE/METHYL CELLOSOLVE DETECTOR TUBES

- ★ READ CAREFULLY THIS INSTRUCTION MANUAL AND THE INSTRUCTIONS OF THE ASPIRATING PUMP PRIOR TO USING THIS PRODUCT.
- ★ DON'T DISCARD THIS INSTRUCTION MANUAL UNTIL ALL THE TUBES IN THIS BOX ARE USED UP.

1. PERFORMANCE:

Measuring Range	: Ethyl cellosolve	5 - 500 ppm (Printed scale)
	: Butyl cellosolve	10 - 1000 ppm
	: Isoprene	10 - 16 ppm
	: Ethyl cellosolve acetate	5 - 150 ppm
	: Mesityl oxide	5 - 100 ppm *
	: Diacetone alcohol	0 - 250 ppm
	: 1 - Butanol	5 - 100 ppm
	: Furfural	2 - 60 ppm

Sampling Time : 3 pump strokes, 4.5 minutes
 * : 2 pump strokes, 3.0 minutes Mesityl oxide only

Graduations on the detector tube apply to 3 pump strokes. for Ethyl cellosolve.

Colour Change	: Yellow → Pale blue
Detectable Limit	: 4 ppm Butyl cellosolve (3 pump strokes) : 2 ppm Ethyl cellosolve, Ethyl cellosolve acetate (3 pump strokes) : 1 ppm Mesityl oxide (2 pump strokes), Diacetone alcohol (3 pump strokes) : 0.5 ppm Isoprene, 1 - Butanol, Furfural (3 pump strokes)
Operating temperature	: 10 - 35 °C (50 - 95°F) Ethyl cellosolve, Ethyl cellosolve acetate. Butyl cellosolve : 10 - 40 °C (50 - 104°F) Diacetone alcohol : 0 - 40 °C (32 - 104°F) Isoprene, 1 - Butanol, Furfural, Mesityl oxide (Temperature correction is necessary)
Aspirating Pump	: Model AP-1, AP-1S, 400A or AP-400

- CAUTION**
1. DETECTOR TUBE CONTAINS REAGENTS.
 2. DON'T TOUCH THESE REAGENTS DIRECTLY ONCE TUBES ARE BROKEN.
 3. KEEP THE TUBES OUT OF THE REACH OF CHILDREN.

NOTICE

1. USE ONLY WITH PUMP MODELS AP-1, AP-1S, 400A OR AP-400. OTHERWISE, CONSIDERABLE ERROR IN INDICATION MAY OCCUR.
2. DON'T USE FLOW CONTROL ORIFICE WITH THIS TUBE. (FOR MORE DETAIL, REFER TO THE INSTRUCTIONS OF THE ASPIRATING PUMP.)
3. BEFORE TESTING, CHECK THE ASPIRATING PUMP FOR LEAKS (REF. ITEM 8). ANY PUMPS SHOWING SIGNS OF LEAKAGE SHOULD BE CORRECTED BEFORE USE.
4. DON'T USE THIS TUBE OUTSIDE THE STATED OPERATING TEMPERATURE RANGE.
5. STORE TUBES IN A COOL AND DARK PLACE (0-25 °C/32-77°F), AND USE BEFORE EXPIRATION DATE PRINTED ON TOP OF THE BOX.
6. PRIOR TO USE, READ CAREFULLY ITEM 9 "USER RESPONSIBILITY" .

2. SAMPLING AND MEASUREMENT:

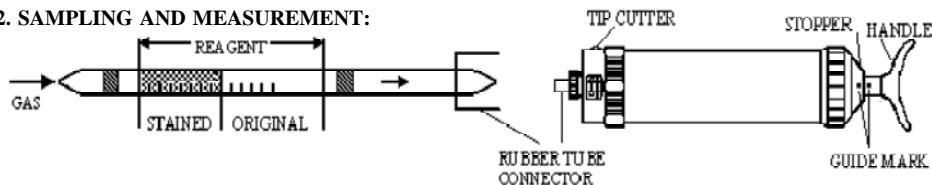


Fig.1

- ① Break both ends of detector tube.
- CAUTION SAFETY GLASSES AND GLOVES SHOULD BE WORN TO PREVENT INJURY FROM SPLINTERING GLASS.**
- ② Insert the detector tube into 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 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 instructions of the pump).
- NOTE:** If using Model AP-400, pull pump handle to full stroke and turn the handle by 1/4 (90°), then wait for 1.5 minutes.
- ⑤ Push the handle without removing the detector tube from the inlet, and air in the pump will be

- ⑥ discharged perfectly. Then repeat the step ④ twice again.
 - ⑥ On completion of sampling, read the scale at the maximum point of the stained layer.
- SPECIAL NOTE:** I. The scale is calibrated at 20 °C (68°F) and 1013hPa. Readings obtained in other circumstances should be corrected (REF. ITEM 3).
 II. When the maximum point of the stained layer is unclear, 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.

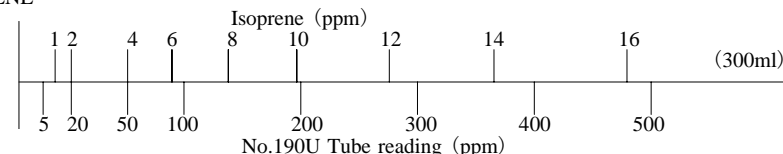
Tube Readings (ppm)	Corrected Concentration (ppm)					
	10 °C (50°F)	15 °C (59°F)	20 °C (68°F)	25 °C (77°F)	30 °C (86°F)	35 °C (95°F)
500	800	620	500	410	340	270
400	620	490	400	330	260	200
300	450	370	300	250	200	150
200	290	250	200	160	130	100
150	220	190	150	120	90	70
100	150	130	100	80	60	50
50	80	70	50	40	30	30
20	30	25	20	15	12	10
5	10	7	5	4	3	2

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

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

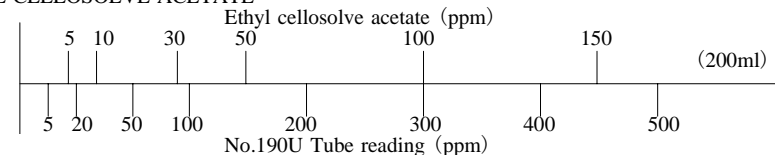
4. CONVERSION CHART AND TEMPERATURE CORRECTION TABLE:

BUTYL CELLOSOLVE
 Multiply the corrected value with Ethyl cellosolve correction table by 2.
ISOPRENE



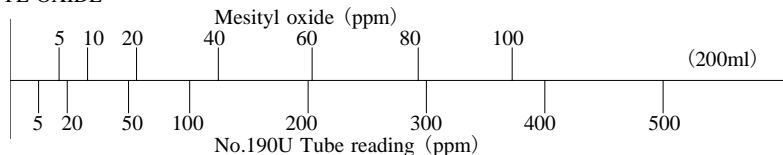
Conver value (ppm)	Corrected Concentration (ppm)				
	0 °C (32°F)	10 °C (50°F)	20 °C (68°F)	30 °C (86°F)	40 °C (104°F)
16	20.5	18.0	16.0	14.5	13.0
14	18.0	15.5	14.0	12.5	11.0
12	15.5	13.5	12.0	10.5	9.5
10	12.5	11.0	10.0	9.5	8.0
8	10.0	9.0	8.0	7.5	6.5
6	7.5	6.5	6.0	6.0	5.0
4	5.0	4.0	4.0	4.0	3.5
2	2.0	2.0	2.0	2.0	2.0
1	1.0	1.0	1.0	1.0	1.0

ETHYL CELLOSOLVE ACETATE



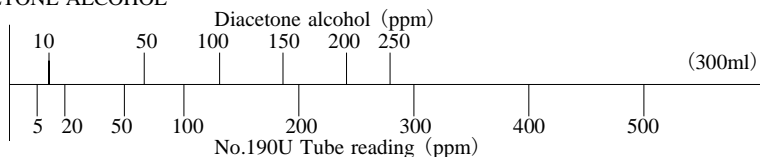
Conver value (ppm)	Corrected Concentration (ppm)					
	0 °C (32°F)	10 °C (50°F)	15 °C (59°F)	20 °C (68°F)	30 °C (86°F)	40 °C (104°F)
150	230	190	150	120	90	75
100	160	130	100	80	70	60
50	80	60	50	40	35	30
20	25	23	20	18	16	14
10	10	10	10	10	8	7
5	5	5	5	5	5	5

MESITYL OXIDE



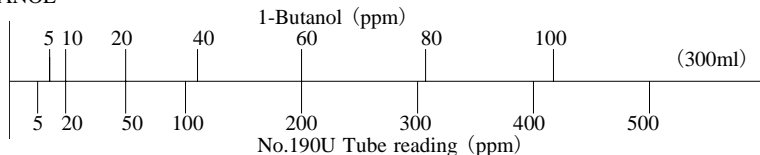
Conver. value (ppm)	Corrected Concentration (ppm)			
	0 °C (32°F)	10 °C (50°F)	20 °C (68°F)	40 °C (104°F)
100	-	-	100	100
80	-	95	80	80
60	100	70	60	60
40	60	45	40	40
20	30	25	20	20
10	15	12	10	10
5	7	6	5	5

DIACETONE ALCOHOL



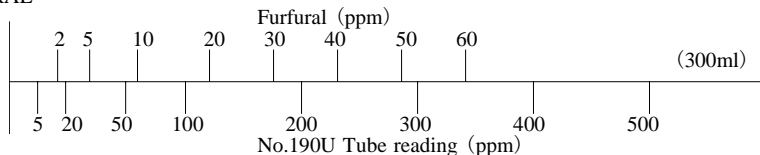
Conver. value (ppm)	Corrected Concentration (ppm)						
	10 °C (50°F)	15 °C (59°F)	20 °C (68°F)	25 °C (77°F)	30 °C (86°F)	35 °C (95°F)	40 °C (104°F)
250	-	380	250	170	130	90	70
200	440	300	200	140	100	80	60
150	330	210	150	110	80	60	50
100	200	130	100	80	60	40	30
50	80	60	50	40	30	20	16
30	50	40	30	23	18	12	8
10	16	14	10	8	6	4	3

1-BUTANOL



Conver. value (ppm)	Corrected Concentration (ppm)				
	0 °C (32°F)	10 °C (50°F)	20 °C (68°F)	30 °C (86°F)	40 °C (104°F)
100	-	-	100	85	77
80	-	-	80	70	63
60	-	80	60	53	50
40	75	50	40	35	33
20	30	23	20	18	16
10	13	11	10	9	8
5	5	5	5	5	5

FURFURAL



Conver. value (ppm)	Corrected Concentration (ppm)				
	0 °C (32°F)	10 °C (50°F)	20 °C (68°F)	30 °C (86°F)	40 °C (104°F)
60	-	-	60	50	45
50	-	71	50	45	40
40	-	53	40	35	35
30	63	35	30	30	30
20	25	22	20	20	20
15	17	15	15	15	15
10	10	10	10	10	10
5	5	5	5	5	5
2	2	2	2	2	2

5. CHEMICAL REACTION IN THE DETECTOR TUBE:

Ethyl cellosolve	C ₂ H ₅ OCH ₂ CH ₂ OH	+Cr ⁶⁺ +H ₂ SO ₄ → Cr ³⁺
Methyl cellosolve	CH ₃ COH:CH ₂ OH	+Cr ⁶⁺ +H ₂ SO ₄ → Cr ³⁺
Butyl cellosolve	C ₄ H ₉ OCH ₂ CH ₂ OH	+Cr ⁶⁺ +H ₂ SO ₄ → Cr ³⁺
Isoprene	CH ₂ =C(CH ₃)CH=CH ₂	+Cr ⁶⁺ +H ₂ SO ₄ → Cr ³⁺
Ethyl cellosolve acetate	C ₂ H ₅ OC ₂ H ₄ OCOCH ₃	+Cr ⁶⁺ +H ₂ SO ₄ → Cr ³⁺
Mesityl alcohol	CH ₃ COCH=C(CH ₃) ₂	+Cr ⁶⁺ +H ₂ SO ₄ → Cr ³⁺
Diacetone alcohol	CH ₃ :C(OH)CH ₂ COCH ₃	+Cr ⁶⁺ +H ₂ SO ₄ → Cr ³⁺
1 - Butanol	CH ₃ (CH ₂) ₃ OH	+Cr ⁶⁺ +H ₂ SO ₄ → Cr ³⁺
furfural	C ₅ H ₄ O ₂	+Cr ⁶⁺ +H ₂ SO ₄ → Cr ³⁺

6. DISPOSAL OF TUBE:

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

7. HAZARDOUS AND DANGEROUS PROPERTIES OF ETHYL CELLOSOLVE/METHYL CELLOSOLVE:

Ethyl cellosolve	T.L.V. ◆: 5 ppm	Explosive range in air: 1.8 - 14.0 %
Methyl cellosolve	T.L.V. ◆: 5 ppm	Explosive range in air: 2.3 - 24.5 %
Butyl cellosolve	T.L.V. ◆: 25 ppm	Explosive range in air: 1.1 - 12.7 %
Isoprene	T.L.V. ◆: —	Explosive range in air: 1.5 - 9.7 %
Ethyl cellosolve acetate	T.L.V. ◆: 5 ppm	Explosive range in air: —
Mesityl alcohol	T.L.V. ◆: 15 ppm	Explosive range in air: —
Diacetone alcohol	T.L.V. ◆: 50 ppm	Explosive range in air: 1.8 - 6.9 %
1 - Butanol	T.L.V. ◆: 50 ppm	Explosive range in air: 1.4 - 12.0 %
furfural	T.L.V. ◆: 2 ppm	Explosive range in air: 2.1 - 19.3 %

◆ Threshold Limit Value established by the American Conference of Governmental Industrial Hygienists, 2000.

8. INSPECTION OF ASPIRATING PUMP:

Checking for leaks;

- ① Insert 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 full stroke and wait for 3 minutes. (If using Model AP-400, turn the handle by 1/4 (90°) to lock it.)
- 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 in the pump instructions to correct the fault.

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-1, AP-1S, 400A or AP-400 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 Distributor shall not be otherwise liable for any incorrect measurement or any damages, whether damages result from negligence or otherwise.