



Section	Original Colour
A	Orange
B	White
C	Yellow
D	Yellow

## 1. SPECIFICATIONS

- 1) Substances to be detected : Acetaldehyde, Actone, Acetylene, Aniline, Benzene, 1,3-Butadiene, Butane, 1-Butanol, Butyl acetate, Carbon disulphide, Cresol, Ethyl acetate, Ethyl amine, Ethyl benzene, Ethyl cellosolve, Ethylene, Ethylene oxide, Formaldehyde, Gasoline, Heptane, Hexane, Isopropyl alcohol, Kerosine, Methyl alcohol, Methyl ethyl ketone, Methyl isobutyl ketone, Methyl mercaptan, Pentane, Phenol, Propane, Styrene, Tetrachloroethylene, Tetrahydrofuran, Toluene, 1,1,1-Trichloroethane, Trichloroethylene, Vinyl chloride, Xylene, \* Arsine, \* Carbon monoxide and \* Hydrogen sulphide (\* : Inorganic gas)
- 2) Tube per box : 10 tubes (5-time use)
- 3) Pump stroke : 1 (100mℓ) + 1 (100mℓ)
- 4) Sampling time : 30 + 30 seconds
- 5) Shelf life : 2 years
- 6) Operating temperature : 0 ~ 40 °C
- 7) Colour change : Refer to following "3. DISCOLOURATION / QUALITATIVE CHART"
- 8) Non-discolouration confirmed substances : Acetic acid, Carbon tetrachloride, Methane, Methyl bromide and Pyridine

## 2. CHEMICAL REACTION

### SECTION

### CHEMICAL REACTION PRINCIPLES

- A Chromium oxide is reduced.  

$$\text{CH}_3(\text{CH}_2)_4\text{CH}_3 + \text{Cr}^6 + \text{H}_2\text{SO}_4 \rightarrow \text{Cr}^{3+}$$
- B Molybdate is reduced and Molybdeum blue is produced.  

$$\text{H}_2\text{C} = \text{CH}_2 + \text{PdSO}_4 + (\text{NH}_4)_2\text{MoM}_4 \rightarrow \text{Mo}_3\text{O}_8$$
- C Iodine pent-oxide is reduced.  

$$\text{C}_2\text{H}_5\text{CH}_3 + \text{I}_2\text{O}_5 + \text{H}_2\text{SO}_4 \rightarrow \text{I}_2$$
- D Phenol is oxidized and the polymer is produced.  

$$\text{C}_6\text{H}_5\text{OH} + \text{Ce}^{4+} \rightarrow \text{C}_6\text{H}_5\text{O} \cdot \rightarrow (\text{C}_6\text{H}_5\text{O})_n$$

ORGANIC SUBSTANCES	CONC. LEVEL	"A" side sampling		"D" side sampling			
		SECTION		SECTION			
		A (Orange)	A (Orange)	B (White)	C (Yellow)	D (Yellow)	
22) Formaldehyde	H	Greenish brown (I)	___	___	___	___	
	M	Dark brown (III)	___	___	___	___	
	L	Dark brown (III)	___	___	___	___	
23) Kerosene	H	Dark brown (II)	___	___	___	___	
	M	Dark brown (III)	___	___	___	___	
	L	Dark brown (III)	___	___	___	___	
24) Heptane	H	Greenish brown (I)	Greenish brown (I)	___	___	___	
	M	Greenish brown (II)	Greenish brown (II)	___	___	___	
	L	Greenish brown (III)	Greenish brown (III)	___	___	___	
25) Carbon disulphide	H	Greenish brown (I)	Greenish brown (I)	___	___	___	
	M	Greenish brown (II)	Greenish brown (II)	___	___	___	
	L	Greenish brown (III)	___	___	___	___	
26) Methyl mercaptan	M	Greenish brown (III)	___	___	Deep blue (II) Yellowish orange (III)	___	
27) Methyl alcohol	H	Greenish brown (III)	___	___	___	___	
	M	Greenish brown (III)	___	___	___	___	
	L	___	___	___	___	___	
28) 1-Butanol	H	Greenish brown (III)	___	___	___	___	
	M	Greenish brown (III)	___	___	___	___	
	L	___	___	___	___	___	
29) Acetaldehyde	H	Green (II)	___	___	___	___	
	M	Greenish brown (III)	___	___	___	___	
	L	___	___	___	___	___	
30) Methyl isobutyl ketone	H	Greenish brown (III)	___	___	___	___	
	M	Greenish brown (III)	___	___	___	___	
	L	___	___	___	___	___	
31) Ethyl cellosolve	H	Green (III)	___	___	___	___	
	M	Greenish brown (III)	___	___	___	___	
	L	___	___	___	___	___	
32) Tetrahydrofuran	H	Green (III)	___	___	___	___	
	M	Greenish brown (III)	___	___	___	___	
	L	___	___	___	___	___	



**CHART 2. CHART FOR GAS-CONCENTRATION LEVEL AND DISCOLOURATION**

ORGANIC SUBSTANCES	CONC. LEVEL	"A" side sampling			"D" side sampling		
		SECTION A (Orange)			SECTION C (Yellow)		
1) Propane	H	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	M	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	L	___	___	___	___	___	___
2) Butane	H	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	M	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	L	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
3) Pentane	H	Greenish brown (I)	Greenish brown (I)	Greenish brown (I)	___	___	___
	M	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	L	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
4) Hexane	H	Greenish brown (I)	Greenish brown (I)	Greenish brown (I)	___	___	___
	M	Dark brown (II)	Dark brown (II)	Dark brown (II)	___	___	___
	L	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
5) Trichloroethylene	H	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	M	Dark brown (II)	Dark brown (II)	Dark brown (II)	___	___	___
	L	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
6) Tetrachloroethylene	H	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	M	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	L	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
7) Vinyl chloride	H	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	M	Dark brown (II)	Dark brown (II)	Dark brown (II)	___	___	___
	L	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
8) Butadiene	H	Dark brown (II)	Dark brown (II)	Dark brown (II)	___	___	___
	M	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
	L	___	___	___	Yellow orange (I)	Brown (I) White (II)	___
9) Gasoline	H	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	M	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
	L	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
10) Benzene	H	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	M	Dark brown (II)	Dark brown (II)	Dark brown (II)	___	___	___
	L	Dark brown (III)	Dark brown (III)	Dark brown (III)	Pale brown (I) Pale brown (I)	___	___
11) Toluene	H	Dark brown (I)	Dark brown (I)	Dark brown (I)	___	___	___
	M	Dark brown (III)	Dark brown (III)	Dark brown (III)	___	___	___
	L	Dark brown (III)	Dark brown (III)	Dark brown (III)	Brown (I) Pale brown (I)	___	___

“A” side sampling Selection	“D” side sampling Selection				* 1) Substances — * 2 (X) — — * 3 (X/Y) —
	A (Orange)	B (White)	C (Yellow)	D (Yellow)	
Greenish brown	Greenish brown	—	—	—	24) Heptane (10) 25) Carbon disulphide (100)
	—	—	Yellowish orange —	—	26) Methyl mercaptan (100/20) 27) Methyl alcohol (100) 28) 1-Butanol (100) 29) Acetaldehyde (100) 30) Methyl isobutyl Ketone (100) 31) Ethyl cellosolve (100) 32) Tetrahydrofuran (100) 33) 1,1,1-Trichloroethane (1,000)
Green	—	—	Black —	—	34) Hydrogen sulphide (100,10) 35) Arsine (100,20) 36) Isopropyl alcohol (600)
	—	—	Pale blue —	—	37) Carbon monoxide (100)
—	—	—	—	Pale brown	38) Phenol (10) 39) Cresol (20)
				Bluish green	40) Aniline (40)
				Pale blue	41) Ethyl amine (100)

NOTES : —

- (1) —: Undiscoloured
- (2) \* 1 : Item No. for quick reference to details in CHART 2.
- (3) \* 2 (X) : Detectable gas concentration limit of the substance (Unit : ppm)  
\* 3 (X/Y) : “X” means detectable gas concentration limit (Unit : ppm) of “A” side sampling and “Y” means “D” side sampling's one.
- (4) The discolouration length is approx.0.5 to 1.0 mm.
- (5) Substance No.34) ,35) and 37) are inorganic gases.”

### 3. DISCOLOURATION / QUALITATIVE CHART

**CHART 1. ORGANIC GAS QUALITATIVE DETECTION CHART**

“A” side sampling	“D” side sampling				* 1) Substances — * 2 (X) — — * 3 (X/Y) —	
Selection	Selection					
A (Orange)	A (Orange)	B (White)	C (Yellow)	D (Yellow)		
Dark brown	Dark brown	—	—	—	1) Propane (100) 2) Butane (10) 3) Pentane (10) 4) Hexane (10) 5) Trichloroethylene (10) 6) Tetrachloroethylene (100) 7) Vinyl chloride (10)	
		White	—	8) Butadiene (100)		
	Greenish brown	—	Pale blue	—	9) Gasoline (0.1mg/ℓ)	
		Pale brown	—	—	10) Benzene (10/100) 11) Toluene (30/200) 12) Xylene (60/1,000) 13) Ethyl benzene (60/400)	
			—	Pale blue	—	14) Ethylene (10) 15) Acetylene (10,000/100)
		—	—	Yellowish orange	—	16) Styrene (100)
			—	—	—	17) Acetone (600) 18) Methyl ethyl ketone (100) 19) Ethyl acetate (600) 20) Butyl acetate (100) 21) Ethylene oxide (100) 22) Formaldehyde (600) 23) Kerosene (0.1mg/ℓ)

ORGANIC SUBSTANCES	CONC. LEVEL	"A" side sampling		"D" side sampling			
		SECTION A (Orange)	SECTION A (Orange)	A (Orange)	B (White)	C (Yellow)	D (Yellow)
33) 1, 1, 1-Trichloroethane	H	Greenish brown (III)	---	---	---	---	---
	M	---	---	---	---	---	---
34) Hydrogen sulphide (H <sub>2</sub> S)	H	Green (II)	Green (II)	---	---	Black (II)	---
	M	Green (III)	---	---	---	Black (II)	---
	L	---	---	---	---	Black (III)	---
35) Arsine	M	Green (II)	---	---	---	Black (I)	---
	L	---	---	---	---	Black (II)	---
36) Isopropyl alcohol	H	Green (III)	---	---	---	---	---
	M	---	---	---	---	---	---
37) Carbon monoxide (CO)	H	---	---	---	---	Pale blue (II)	---
	M	---	---	---	---	Pale blue (III)	---
	L	---	---	---	---	---	---
38) Phenol	M	---	---	---	---	---	Pale brown (I)
	L	---	---	---	---	---	Pale brown (I)
39) Cresol	M	---	---	---	---	---	Pale brown (I)
	L	---	---	---	---	---	Pale brown (I)
40) Aniline	M	---	---	---	---	---	Bluish green (III)
	L	---	---	---	---	---	Bluish green (III)
41) Ethyl amine	H	---	---	---	---	---	White (I)
	M	---	---	---	---	---	---
	L	---	---	---	---	---	Pale blue (III)

NOTES : ---

1) ---: Undiscoloured

2) CONC. LEVEL (Gas concentration level) : H ; approx. 1,000-5,000 ppm  
M ; approx. 100-500 ppm  
L ; approx. 10-50 ppm

3) Discolouration level : 1 ; The whole layer is discoloured.

2 ; A half layer is discoloured.

3 ; Approx.0.5-2.0 mm of the layer is discoloured.

4) Substance No.34), 35) and 37) are inorganic substances.

#### NON-DISCOLOURATION CONFIRMED SUBSTANCES

- |                         |             |                   |
|-------------------------|-------------|-------------------|
| 1) Carbon tetrachloride | 2) Pyridine | 3) Methyl bromide |
| 4) Acetic acid          | 5) Methane  | 6) Ethane         |