KITAGAWA

GAS DETECTOR TUBE SYSTEM

KITAGAWA
KOMYO RIKAGAKU KOGYO

Accurate reading in minutes
Portable, safe, easy to use
No power supply or calibration required
Low cost analysis for your gas detection needs

KITAGAWA HISTORY IS A HISTORY OF DETECTOR TUBES

KITAGAWA GAS DETECTOR TUBE SYSTEM started with a H2S tube for quality control in year 1947 and has led a path in a field of gas analysis.

KITAGAWA GAS DETECTOR TUBE SYSTEM COMPRISES OF 「DETECTOR TUBES」 AND 「SAMPLING PUMP」

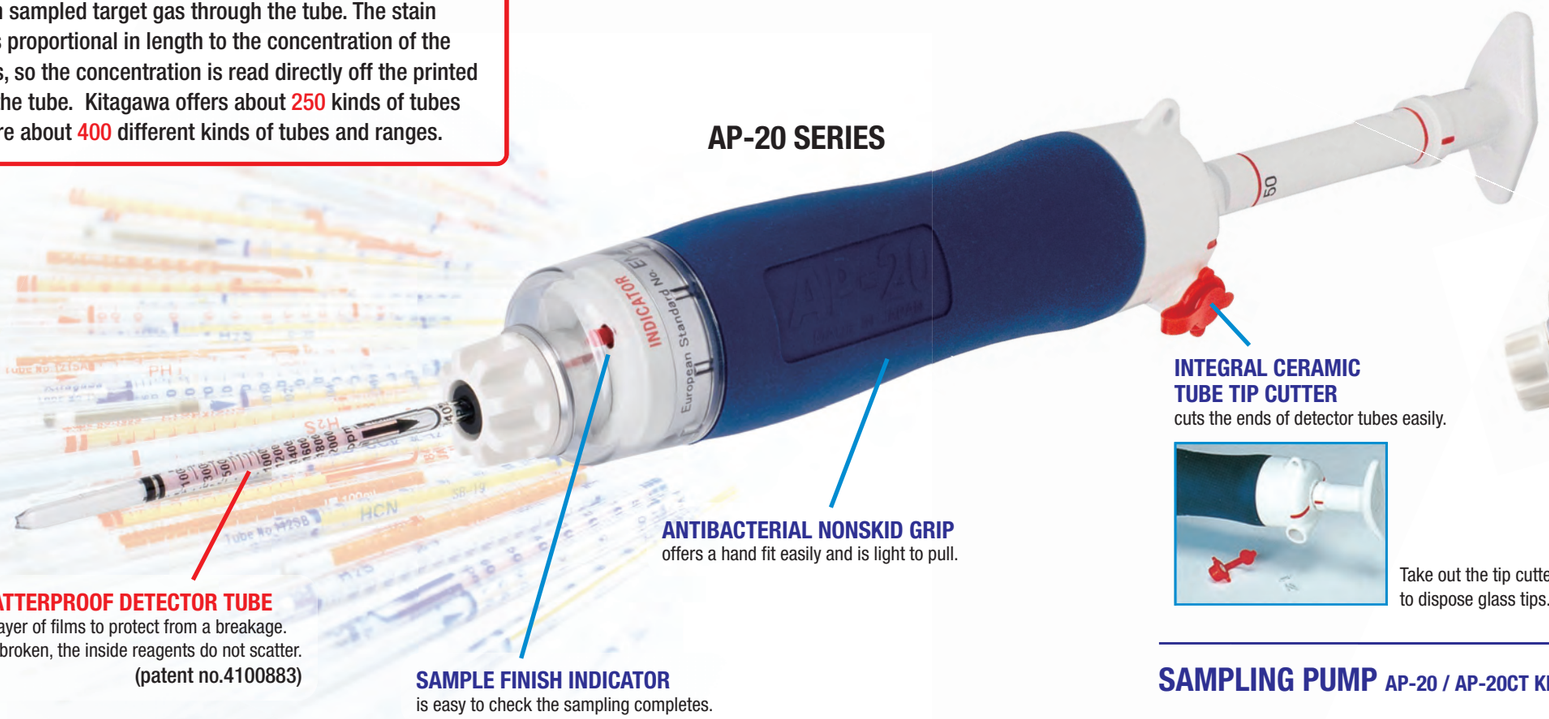
GAS DETECTOR TUBES

change colours when chemical reagnets filled in a glass tube react with sampled target gas through the tube. The stain created is proportional in length to the concentration of the target gas, so the concentration is read directly off the printed scale on the tube. Kitagawa offers about 250 kinds of tubes to measure about 400 different kinds of tubes and ranges.

SAMPLING PUMP

A portable sampling pump to suction a constant amount of target gas into the detector tubes. Safe, light and easy to use. No power supply is required. Accurate toxic gas measurement in minutes. A sampling pump with a counter unit is useful where multiple pump strokes are applicable.

AP-20 SERIES



A SHATTERPROOF DETECTOR TUBE
has 2-layer of films to protect from a breakage. Even if broken, the inside reagents do not scatter.
(patent no.4100883)

SAMPLE FINISH INDICATOR
is easy to check the sampling completes.

ANTIBACTERIAL NONSKID GRIP
offers a hand fit easily and is light to pull.

INTEGRAL CERAMIC TUBE TIP CUTTER
cuts the ends of detector tubes easily.

Take out the tip cutter to dispose glass tips.

LED COUNTER UNIT
N.B.) The counter unit cannot be used in the harzardous locations.

MODEL AP-20CT

TIP CUTTER UNIT
The counter unit is pre-assembled and replaceable with the tip cutter unit provided.

- Designed and manufactured at certified factory by ISO9001(Quality management system) and ISO14001(Environmental Management System)
- Certified to SEI(Safety Equipment institute)
- Certified to European standard EN1231
- Japan design registration No.1131898
- United States Design Patent No.US D467, 334 S

SAMPLING PUMP AP-20 / AP-20CT KIT INCLUDES;

SPECIFICATION

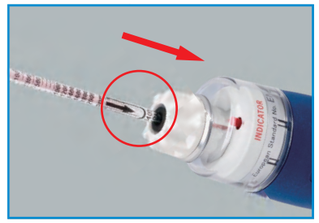
MODEL:AP-20
INNER VOLUME:100mL
WEIGHT:APPROX.290g
LENGTH:APPROX.240mm

- The AP-20 Series Pump is available in four different colours.

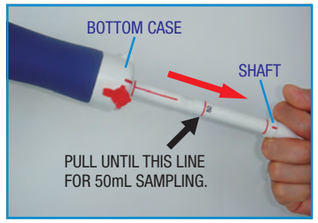
HOW TO USE GAS DETECTOR TUBES

Read the instruction manual for each detector tubes and sampling pump before use.
Check our webiste for the usage at http://www.komyokk.co.jp/english/.
Use the detector tube by the expiration date printed on top of the tube box.

①Scroll both ends of tube with a tip cutter to open the tube.

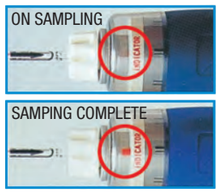


②Insert the tube into the inlet of the pump with an arrow mark pointing to the pump.

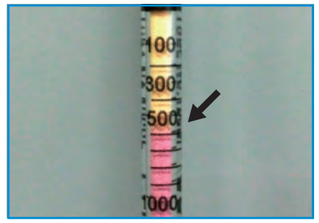


③Align the red lines on the shaft and the bottom case and pull the handle until full to lock.

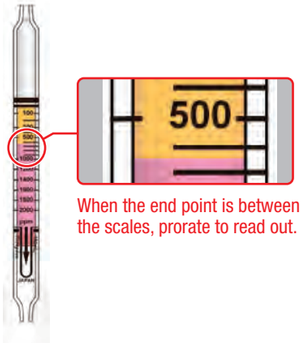
Wait until sampling completes
※Sampling time varies on tubes.
Read the instruction manual for each tubes for the sampling time.



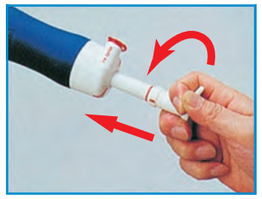
④Take the sample.
(Wait for 5 seconds after the indicator pops up.)



⑤Take out the tube and read out the end point of discolouration layer to know the concentration.



When the end point is between the scales, prorate to read out.



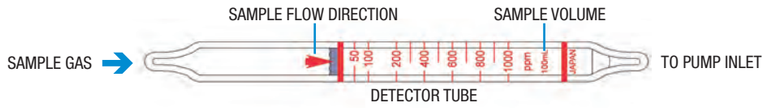
●For more than 200mL sampling, return the handle and repeat procedure ③ and ④.

『Temperature correction for tubes』 enables temperature correction easily.

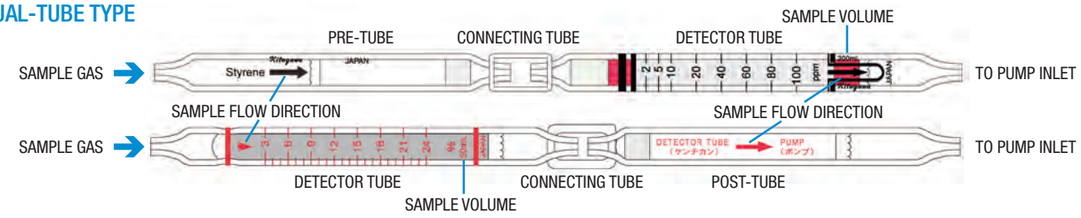
①Enter Tube no.
②Select sampling volume where applicable
③Enter temperature
④Hit correct to confirm the corrected value

Website: **http://www.komyokk.co.jp/english/**

GAS DETECTOR TUBE DESCRIPTION



DUAL-TUBE TYPE



※The connecting tube is packed in the tube box of a dual-tube type.

Useful options for Kitagawa gas detector tube system

Rubber Extension Hose SH-5N/SH-10N SH-20N/SH-20C

For remote sampling to draw samples from hazardous or confined spaces such as tanks, manholes, ship holds, etc.

Length : 5m(SH-5N)
10m(SH-10N)
20m(SH-20N/SH-20C)
SH-20C is for a dual-tube type.

Extension Sampling Rod SR-200R

To enable gas detection vertically and horizontally at hazardous areas or confined spaces where workers cannot enter or unreachable places.

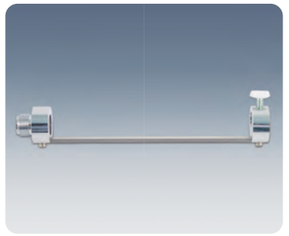
Maximum length : Approx.2.2m

Hot Air Probe SF-40

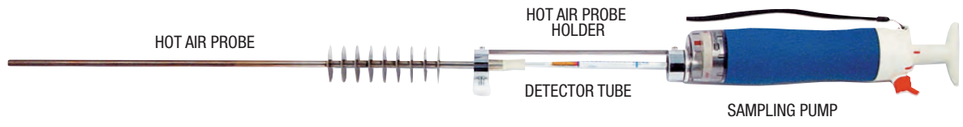
For sampling high temperature gas such as emission gas from gas fittings or automobiles.

Length : 40cm
Operating temp. : Below 600°C

Hot Air Probe Holder SFH-01



To provide a stable connection of sampling pump and hot air probe.



Remove the connector holder of the sampling pump and connect the hot air probe holder and the sampling pump. Break both ends of the detector tube and connect to the hot air probe. Open the screw knob and insert the detector tube into the hot air probe holder. Insert the detector tube into the rubber tube connector of the sampling pump, then close the screw knob.

Glass Syringe SS-100/SS-200

For sampling high temperature gas, momentary concentration or diluting high concentration gas.

Volume : 100mL(SS-100)
1200mL(SS-200)

Sampling Probe for gases in Soil SPG-1/SPG-1N

For simple check of chlorinated organic solvents contamination in soil.
Length : 1m

SPG-1N is for a dual-tube type.

A boring bar is required to dig a hole into the soil.

Tip Cutter B-191

To break the ends of detector tubes and prevent scattering of glass fragments. Transparent container easily lets you know the amount of fragments.

Detector Scope DS-110W

To magnify the scale of the tube by lighting when inserting the tube into the slot.

LED x 2 pieces
Weight : 115g
Run time : 70 minutes
Power : AA size alkaline dry battery×2

HOW TO READ LIST OF KITAGAWA PRECISION GAS DETECTOR TUBES

Gas to be measured
The concentration of the target gas is read directly off the printed scale or by using a concentration chart packed in a tube box.

Tube No.
Tube numbers are listed in descending order of high concentration.
©after tube no. means the concentration is read by using a conversion chart.

Measuring range & No. of Pump Strokes
In case where multiple measuring ranges apply, ○ mark indicates the scale printed on the tube.
Example:Tube No.126SF Measuring range(ppm) No. of Pump Strokes
200~4,000 1/2
[100~2,000] ①

Shelf life(year)
The shelf life starts from the date manufacturing started.

Q'ty of tubes/box
Most tubes come in a box of 10 tubes to make 10 times measurement per box.
2 x 5 or 3 x 5 tubes come in a box of 5 detector tubes and 5/10 pre or post tubes to makes 5 times measurement per box.

Threshold limit value
TLV(J):Occupational Exposure Limits(OELs) recommended in Journal of Occupational Health issued by The Japan Society for Occupational Health (2016-2017).
( ):provisional value *:Maximum Allowable Concentration
TLV(A):TLV-TWA. Threshold Limit Values for Chemical Substances in the Work Environment adopted by ACGIH(American Conference of Governmental Industrial Hygienists).
( ):intended changes for 2017 C:TLV-C(ceiling value)
STEL:TLV-STEL(short-term exposure limit(15 minutes reference period))
TLV(B):Workplace Exposure Limits(WELs) listed on guidance Note EH40/2011 from HSE(Health and Safety Executive) in U.K.

Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
Acetaldehyde CH_3CHO Concentration chart method	133A ‡	0.004~ 1.0%	1	Yellow	Pink	Mfg. synthetic rubber, plastics, various organics, perfume, flavors, fragrances	1	10	Acetone (1,400), Acrolein (35), Methyl ethyl ketone (900), Methyl isobutyl ketone (2,900), SO_2 (10)	50* (J) C25 (A) 20 (B)
Acetaldehyde CH_3CHO	133SB ‡	5~140	1	Yellow	Pink	Mfg. synthetic rubber, plastics, various organics	2	10	Other aldehydes, Ethanol	
Acetic acid CH_3COOH	216S	1.25 ~125 [0.5~50]	1/2 ①	Pale pink	Yellow	Mfg. cellulose acetate rayon, vinyl acetate, a seasoning	3	10	SO_2 (1/20 × Acetic acid *), NO_2 (10), HCL (2 × Acetic acid *), Cl_2 (5)	10 (J.A.B)
Acetic anhydride $(CH_3CO)_2O$	216S©	1~15	1	Pale pink	Yellow	Acetylating agent	3	10	SO_2 (1/20 × Acetic acid *), NO_2 (10), HCl(2 × Acetic acid *), Cl_2 (5)	5* (J) 1 (A) 0.5 (B)
Acetone CH_3COCH_3	102SA	1.0~ 5.0% [0.1~ 2.0%]	1/2 ①	Orange	Dark brown	Leakage & file hazard detection in acetate rayon industry, paints industry & pharmaceutical industry	3	10	Alcohols, Other Ketones, Aromatic hydrocarbons, Esters, Halogenated hydrocarbons (0.5%)	
	102SC ‡	0.01~ 4.0%	1	Yellow	Pink		1	10	Acetaldehyde (30), Acrolein (20), Methy ethyl ketone (150), Methyl isobutyl ketone (400)	200 (J) 250 (A) 500 (B)
	102SD	125~ 5,000 [50~ 2,000] 20~800	1/2 ① 2	Yellow	Dark brown	Industrial hygiene for both plant and laboratory	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	

‡ This tube must be stored in a refrigerated place (0-10°C/32-50°F).
* Interfered by coexistence more than parenthesized rate.

Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
Acetylene $HC\equiv CH$	101S	50~ 1,000	1	Pale yellow	Brownish blue	Process control & leakage detection in synthetic ammonia plant, cuprammonium rayon process	3	10	Oleffins (10), H_2S (10), CO (50), NH_3, Butadiene (25), HCH, Cl_2, NO_2, CS_2, Benzene	
Acetylene・Ethylene -separation measurement $HC\equiv CH$, $H_2C=CH_2$	280S †	$HC\equiv CH$; 20~300	1	Yellow	Dark brown		1	2 × 5	Tube for $HC\equiv CH$; CO (10), H_2 (5,000), Ethylene (2,000) Tube for $H_2C=CH_2$; CO (1,350), Acetylene (370), Propylene (20)	
		$H_2C=CH_2$ 200~ 2,000		Pale yellow	Blue					
Acrolein (Acryl aldehyde) $CH_2=CHCHO$ Concentration chart method	136 ‡	0.005~ 1.8%	1	Yellow	Pink	Leakage & fire hazard detection in plastics industry	1	10	Acetylene (20), Acetaldehyde (70), Methyl ethyl ketone (60), Methy isobutyl ketone (500)	0.1 (J.B) C0.1 (A)
Acrylic acid $CH_2=CHCOOH$	216S©	1~50	1	Pale pink	Yellow	Material of acrylic resin	3	10	SO_2 (1/20 × Acetic acid *), NO_2 (10), HCl (2 × Acetic acid *), Cl_2 (5)	2 (A)
Acrylonitrile (Vinyl cyanide) $CH_2=CHCN$	128SA	0.1~ 3.5%	1	Orange	Dark green	Leakage & fire hazard detection in synthetic rubber & plastics industry	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapours except Halogenated hydrocarbons (50)	
	128SB	10~500	1	Yellow	Pale blue or Brown	Leakage detection	2	10		
	128SC ‡	1~120	2	Yellow	Pink	Industrial hygiene (suspected human carcinogen)	1	2 × 5	Methyl ethyl ketone (600), Styrene (250), HCN (2), Butadiene (200)	2 (J.A.B)
	128SD ‡	[1~20] 0.5~10 0.25~5 0.2~4	① 2 4 5	Yellow	Red		1	2 × 5	HCN	
Allyl alcohol $CH_2=CHCH_2OH$	184S©	20~500	1	Yellow	Pale blue	Leakage detection	2	10	Esters, Ketones, Alcohols, Aromatic hydrocarbons, Halogenated hydrocarbons	1 (J) 0.5 (A) 2 (B)
Ammonia NH_3	105SH	0.5~ 30%	1	Pink	Blue or Brownish green	Process control & leakage detection in synthetic ammonia plant, cuprammonium rayon process, fertilizer mfg.	3	10	H_2S (3,000)	25 (J.A.B)
	105SA	0.5~ 10%	1	Pink	Grey or Yellow		3	10	Amines	
	105SM	0.1~ 1.0%	1	Pale purple	Pale yellow	Process control	2	10	Amines	
	105SB	50~900	1	Pale purple	Pale yellow		3	10	SO_2 (1/4 × NH_3 *), Cl_2 (2), Amines	
	105SC	[10~260] 5~130	① 2	Pale purple	Pale yellow	Synthetic ammonia plant, leakage detection of refrigerant in ice plant, industrial hygiene	3	10	SO_2 (1/5 × NH_3 *), Cl_2 (2), Amines	
	105SE	10~200 [5~100] 1~20	1/2 ① 5	Pale purple	Pale yellow		3	10	Sulphur dioxide, Chlorine, Amines	
	105SD	[1~20] 0.5~10 0.2~4	① 2 5	Pale purple	Pale yellow		3	10	Amines	
Aniline (Aminobenzene) $C_6H_5NH_2$	181S	[2~30] 1~15	① 2	White	Yellow	Industrial hygiene	3	10	Toluidine (1/3 × Aniline *), NH_3, Aliphatic amines or Aromatic amines (the same conc. of Aniline)	1 (J.B) 2 (A)

‡ This tube must be stored in a refrigerated place (0-10°C/32-50°F).
† Air flow control orifice is required.
* Interfered by coexistence more than parenthesized rate.

Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
Arsine AsH_3	140SA	5~160	1	White	Dark brown	Doping gas analysis in semiconductor industry, waste gas analysis in metal refinery	2	10	H_2S (5), Hydrogen selenide (5), Phosphine (5)	0.01 (J) 0.005 (A) 0.05 (B)
	121U	[0.1~2.0] 0.05~1.0	① 2	Pale yellow	Pink	Industrial hygiene, semiconductor mfg. process	2	10	Hydrogen selenide, Mercaptans, H_2S, HCN, SO_2	
Benzene- in the presence of Gasoline and/or other Aromatic hydrocarbons C_6H_6	118SB	5~300	1	White	Greenish brown	Industrial hygiene (suspected human carcinogen)	2	2 × 5	Toluene (over 150), Hexane (200), Xylene (over 300)	1 (J.B) 0.5 (A)
	118SE	[1~80] 0.2~1	① 5	White	Brown		2	2 × 5	Toluene (1,000), Xylene (1,000), Ethyl benzene (1,000), CO (2), Hexane (2)	
Benzene C_6H_6	118SC	4~100 [2~50] 1~25	1 ② 4	White	Greenish brown		2	10	Toluene, Xylene, CO (50), Hexane (100)	
	118SD	1~75 [0.2~15] 0.1~7.5	1 ⑤ 10	White	Greenish brown		2	2 × 5	Toluene, Xylene, CO (2.0), Hexane (2.0)	
Bromine Br_2 Concentration chart method	114	1~20	1	White	Orange	Industrial hygiene	2	10	Cl_2 (1), ClO_2 , NO_2	0.1 (J.A.B)
Bromochloromethane CH_2BrCl	157SB© ‡	[2~80] 20~400	① 1/2	White	Yellow		3	2 × 5		200 (A)
Bromoform $CHBr_3$	157SB© ‡	[1~20] 0.5~9	① 2	White	Yellow		3	2 × 5		1 (J) 0.5 (A)
1-Bromopropane $CH_3CH_2CH_2Br$	157SB© ‡	5~80	1	White	Yellow		3	2 × 5		0.5 (J) 0.1 (A)
2-Bromopropane $(CH_3)_2CHBr$	157SB© ‡	5~80	1	White	Yellow		3	2 × 5		1 (J)
1,3-Butadiene $CH_2=CHCH=CH_2$	168SA	0.03~2.6%	1	Brownish orange	Dark brown	Process control & fire hazard detection in synthetic rubber industry, mfg. synthetic rubber	3	10	Other organic gases or vapours except Halogenated hydrocarbons (50), Propane (0.2%), Acetylene (3%)	2 (A) 10 (B)
	168SB	30~600	1	Pale yellow	White	Leakage detection in synthetic rubber industry	3	10	CO, Butane, Pentane, Ethylene, Propylene, Butylene, H_2S, Benzene, NH_3, HCN	
	168SC	[5~100] 2.5~50	① 2	Pale yellow	Pale blue		1	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	
	168SE	0.5~10.0 [0.1~2.0]	1 ④	Pink	White		3	2 × 5	H_2S, Isobutylene, NH_3	
n-Butane $CH_3(CH_2)_2CH_3$	221SA	0.05~0.6%	1	Orange	Brown	Combustible gas detection	3	10	Toluene, Hexane, Trichloroethylene	500 (J) (STEL1,000) (A) 600 (B)
1-Butanol (n-Butyl alcohol) $CH_3CH_2CH_2CH_2OH$	190U©	5~100	3	Yellow	Pale blue	Mfg. flotation reagent, stabilizer for solvent, industrial hygiene	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	50* (J) 20 (A)
2-Butanol (sec-Butyl alcohol) $CH_3CH_2CH(OH)CH_3$	189U	[10~300] 4~120	② 4	Yellow	Pale blue	Organic solvent treating, industrial hygiene	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	100 (J.A.B)
tert-Butanol $(CH_3)_3COH$	111U©	20~500	1	Yellow	Brown	Organic solvent treating, industrial hygiene	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	50 (J) 100 (A)

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Butyl acetate $CH_3CO_2C_4H_9$	139SB©	0.01~1.0%	2	Orange	Brownish green	Leakage & fire hazard detection in paints industry & painting, printing inks, artificial leather synthetic dyes, drugs & perfumes	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapours except Halogenated hydrocarbons (50)	100 (J) 50 (A) 150 (B)
	138U	10~400	1	Pale yellow	Pale blue	Industrial hygiene	1	10	Other organic gases or vapours	
Butyl acrylate $CH_2=CHCO_2(CH_2)_3CH_3$	211U	2~60	2	Yellow	Pale blue	Material of acrylic resin	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	2 (A) 1 (B)
n-Butyl amine $C_4H_9NH_2$	105SD©	1~20	1	Pale purple	Pale yellow	Organic synthesis intermediate, mfg. insecticide, emulsifying agent, medicine	3	10	Amines	5* (J) C5 (A)
Butyl cellosolve (Ethylene glycol monobutyl ether/2-Butoxyethanol) $C_4H_9OCH_2CH_2OH$	190U©	10~1,000	3	Yellow	Pale blue	Organic solvent treating industrial hygiene	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	20 (A) 25 (B)
Butyl ether $(CH_3CH_2CH_2CH_2)_2O$	111U©	10~1,200	1	Yellow	Brown	Organic solvent treating industrial hygiene	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	
tert-Butyl mercaptan $(CH_3)_3CSH$	130U	1.1~11.0 0.55~5.5	1/2 1	Pale yellow	Pink	Industrial hygiene	2	10	Arsine, Hydrogen selenide, H_2S, HCN, PH_3	
	165SB	[5~80] 2.5~40	(1/2) 1	Yellow	Pink		2	10	H_2S, PH_3, Arsine, Hydrogen selenide, HCN, NO_2, NH_3, SO_2, Other Amines	
Butyl methacrylate $CH_2=C(CH_3)COOC_4H_9$	111U©	20~1,000	1	Yellow	Brown	Organic synthesis intermediate, mfg. synthetic resin, lubricant additive, rust-proof for metal, paper coating agent	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	
tert-Butyl methyl ether (MTBE) $(CH_3)_3COCH_3$	111U©	25~500	1	Yellow	Brown	Fuel, powder, blast cell, antiknock, solvent, abstergent	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	50 (A)
n-Butyric acid $CH_3CH_2CH_2COOH$	216S©	3~60	1	Pale pink	Yellow	Conflate artificial flavour, medicine; emulsifying agent	3	10	SO_2 (1/20 × Acetic acid ∗), NO_2 (10), HCl (2 × Acetic acid ∗), Cl_2 (5)	
Carbon dioxide -ultra high range CO_2	126UH	5~50%	1/2	White	Purple	Industrial hygiene	2	10		5,000 (J.A.B)
Carbon dioxide -extra high range CO_2	126SH	1~20%	1	Pink	Yellow	Combustion gas analysis	2	10	SO_2 (3,000), H_2S (3,000), NO_2 (50)	
Carbon dioxide CO_2	126SA	0.2~5.2% [0.1~2.6%]	1/2 ①	Purple blue	Pale pink	Air contamination test in buildings, closed vessels, tunnels, other confined spaces, CO_2 concentration control in green houses, poultry farm, fruit storage	2	10	HCN (200), Cl_2 (100), SO_2 (500), H_2S (100)	
	126SG	0.04~1.4% [0.02~0.7%]	1/2 ①	Pink	Yellow	Industrial hygiene	2	10	HCN	
	126SB	[0.05~1.0%] 0.021~0.42%	① 2	Purple blue	Pale pink		2	10	HCN (100), Cl_2 (200), SO_2, H_2S (150), NO_2	

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Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
Carbon dioxide CO_2 Concentration chart method	126B	0.03~0.7% 100~1,500	① 3	Purple blue	Pale pink	Industrial hygiene	2	10	HCN (100), Cl_2 (200), SO_2, H_2S (150), NO_2	5,000 (J.A.B)
Carbon dioxide CO_2	126SF	200~4,000 100~2,000	1/2 ①	Pink	Yellow		2	10	NO_2, H_2S, HCl, SO_2, HCN, Cl_2	
Carbon disulphide CS_2	141SA ‡	30~500	1	Pink	Yellow	Mfg. & recovery control in viscose rayon & cellophane plant	2	2 × 5	H_2S (400), SO_2, Cl_2	1 (J.A) 5 (B)
	141SB ‡	2~50 0.8~20	② 4	Pink	Yellow	Industrial hygiene	3	2 × 5	H_2S (120), SO_2, Cl_2	
	141SC ‡	0.1~3.0 0.2~6.4	④ 2	Pale purple	Pale yellow		1	2 × 5	Sulphur dioxide, Hydrogen sulphide, Chlorine	
Carbon monoxide -ultra high range CO	106UH	0.2~20% 0.1~10%	1/2 ①	White	Dark brown	Insect control	3	10	Propane, iso-Butane, Acetylene, Ethylene, Hexane	
Carbon monoxide CO	106SH	0.1~2.0%	1	White	Dark brown	Gas manufacture blast furnace, garage, car park, tunnel, atmospheric pollution survey, prediction of underground spontaneous combustion of coal, leakage detection of coal gas, combustible gas analysis, organic syntheses	1	10	Propane (0.15%), iso-Butane (0.2%), Hexane (0.1%), Acetylene (0.3%), Ethylene (0.15%)	
	106SA	40~2,000 20~1,000 5~50	1/2 ① 4	Yellow	Dark brown		3	10	Ethylene or H_2 (5,000), Acetylene (1/5 × CO ∗), SO_2 (1/5 × CO ∗), NO_2 (1/5 × CO ∗)	
Carbon monoxide -in the presence of Ethylene, colour intensity CO	106B	Measurement for 30~300 seconds 10~1,000	1	Pale yellow	Green to Blue	Prediction of underground spontaneous combustion of coal	3	10	H_2S (1,000), NO_2 (1), H_2 (10%)	
Carbon monoxide -in the presence of Ethylene and Nitrogen oxides, colour intensity CO	106C	Measurement for 30~300 seconds 10~1,000	1	Pale yellow	Green to Blue	Gas manufacture blast furnace, garage, car park, tunnel, atmospheric pollution survey, prediction of underground spontaneous combustion of coal, leakage detection of coal gas, combustible gas analysis, organic syntheses	2	10	H_2 (10%), H_2S (1,000)	50 (J) 25 (A) 30 (B)
Carbon monoxide CO Concentration chart method	100	25~1,000 5~300	1 3	Yellow	Dark brown	Gas manufacture blast furnace, garage, car park, tunnel, atmospheric pollution survey, combustion of coal gas	3	10	Ethylene (5,000), H_2 (5,000), Acetylene, SO_2 or NO_2 (1/5 × CO ∗)	
Carbon monoxide CO	106SS	30~500	1	Yellow	Dark brown	Gas manufacture blast furnace, garage, car park, tunnel, atmospheric pollution survey, prediction of underground spontaneous combustion of coal, leakage detection of coal gas, combustible gas analysis, organic syntheses	1.5	10	Acetylene (1/20 × CO ∗), SO_2 (1/2 × CO ∗), NH_3 (100 × CO ∗), H_2S (1/2 × CO ∗)	
	106S	10~250	3	Yellow	Dark brown	Gas manufacture, blast furnace, garage, car park, tunnel, atmospheric pollution survey, combustion of coal gas	2	10	Ethylene (5,000), H_2 (5,000), C_2H_2 (1/5 × CO ∗), SO_2 (1/5 × CO ∗), NO_2 (1/5 × CO ∗)	

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Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
Carbon monoxide CO	106SC	1~50	1	Orange	Reddish purple	Gas manufacture blast furnace, garage, car park, tunnel, atmospheric pollution survey, prediction of underground spontaneous combustion of coal, leakage detection of coal gas, combustible gas analysis, organic syntheses	2	10	Formic acid, SO_2, C_2H_2, H_2, H_2S	50 (J) 25 (A) 30 (B)
Carbon tetrachloride (Tetrachloromethane) CCl_4	147S ‡	5~60	1	White	Red	Paint manufacture, fire extinguishers waxes, polishes	1	2 × 5	Phosgene, Halogens, Cl_2, Trichloroethylene, Halogenated hydrocarbons	5 (J.A) 2 (B)
Carbonyl sulphide COS	239S	5~60	1	Pink	Yellow	Process control in chemicals mfg.	3	2 × 5	SO_2, CS_2, H_2S, n-Butane(0.1%)	5 (A)
Chlorine Cl_2	109SA	1~40	1	White	Yellowish orange	Leakage detection in electrolytic soda plant, leakage detection & concentration control in synthetic rubber & plastics industry, refinery of titanium & aluminum, chlorinated hydrocarbons, synthetic chemistry, industrial hygiene	2	10	Br_2 (1), Cl_2O (1), NO_2 (1/2 × Cl_2 ∗)	0.5* (J) (0.1) (A)
	109SB	0.5~10.0 0.125~2.5 0.1~2.0	① 4 5	White	Pale orange		2	10	Br_2 (1), ClO_2 (1), NO_2 (1/5 × Cl_2 ∗), NCl_3 (5)	
	109U	0.1~2 0.05~1	① 2	White	Pale purple		2	10	HCl (20 × Cl_2 ∗), NO_2	
Chlorine dioxide ClO_2 Concentration chart method	116	1~20	1	White	Reddish orange	Leakage defection in textile & paper bleaching plant, water treatment	2	10	Br_2, Cl_2 or NO_2 (1)	(C0.1) (A) 0.1 (B)
Chlorobenzene C_6H_5Cl	178SB	5~140 1~5	① 5	White	Pale brown	Industrial hygiene	2	2 × 5	Toluene, Xylene, CO (50), n-Hexane (100), Benzene, Ethyl benzene	10 (J.A) 1 (B)
Chloroform (Trichloromethane) $CHCl_3$	152S ‡	70~500 35~250 23~167	② 3 4	White	Yellowish orange	Industrial hygiene (suspected carcinogen in humans)	2	2 × 5	Halogens, Halogenated hydrocarbons, n-Hexane (200)	3 (J) 10 (A) 2 (B)
Chloropicrin (Nitrotrichloromethane) Cl_3CNO_2	172S ‡	0.1~16.0 0.05~8.0	① 2	White	Pink	Industrial hygiene	1	2 × 5	Carbon tetrachloride, Phosgene	0.1 (J.A)
Chloroprene (2-Chlorobutadiene) CH_2=CClCH=CH_2	169S	1.0~20 0.5~10	1 ②	Greenish yellow	Pink	Industrial hygiene	3	2 × 5	Cl_2, HCl (2,000), Vinyl chloride, Acetylene, Ethylene	(1) (A)
Cresol $C_6H_4(CH_3)OH$	183U	0.5~25.0	2	Pale yellow	Pale brown	Industrial hygiene	2	10	NH_3 (200), Aliphatic amines (50), Aromatic hydrocarbons (50), Phenols (2.5)	5 (J) 20mg/m³ (A)
Crotonaldehyde CH_3CH=CHCHO	190U©	2~40	3	Yellow	Pale blue	Compound materials	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	C0.3 (A)
Cumene (Isopropylbenzene) $C_6H_5CH(CH_3)_2$	111U©	20~140	1	Yellow	Brown	Organic synthesis intermediate, fuel	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	(0.1) (A) 25 (B)
Cyclohexane C_6H_{12}	115S	0.01~0.6%	1	Orange	Dark green	Fire hazard detection in paints industry & painting, extraction process of oils, fats, waxes	3	10	Paraffin hydrocarbons, Acetylene, Ethylene, Benzene (400), Toluene (800), Xylene (2,000)	150 (J) 100 (A.B)
Cyclohexanol $C_6H_{11}OH$	206U	5~500	2	Yellow	Pale blue	Process control in synthetic rubber industry	2	10	Other alcohols	25 (J) 50 (A.B)
Cyclohexanone $C_6H_{10}O$	197U	2~100	3	Yellow	Pale blue	Organic solvent treating, Industrial hygiene	3	10	Alcohols	25 (J) 20 (A) 10 (B)

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Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change		Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
				Original	Stain					
Cyclohexene C_6H_{10}	111U©	20~300	1	Yellow	Brown	Medicament, synthetic intermediate	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	300 (A)
Cyclohexyl amine $C_6H_{11}NH_2$	105SD	1~20	1	Pale purple	Pale yellow	Organic synthesis, plasticizer, rubber processing, corrosion inhibitor, dyes, dry-clean detergent, mfg. emulsifying agent	3	10	Amines	10 (A.B)
Decahydronaphthalene $C_{10}H_{18}$	111U©	20~200	1	Yellow	Brown	Solvent, adstergent, wax for floor	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	
n-Decane $CH_3(CH_2)_8CH_3$	111U©	5~90	1	Yellow	Brown	Organic synthesis intermediate, solvent, abstergent	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	
Diacetone alcohol (4-Hydroxy-4-methyl-2-pentanone) $(CH_3)_2C(OH)CH_2COCH_3$	190U©	10~250	3	Yellow	Pale blue	Fire hazard detection in paints Industry, industrial hygiene	2	10	Alcohols, Halogenated hydrocarbons, Paraffin hydrocarbons, Aromatic hydrocarbons, Esters	50 (A.B)
Diborane B_2H_6	242S	0.1~5.0 0.05~2.5 0.02~1.0	① 2 5	Pale yellow	Reddish purple	Industrial hygiene, semiconductor mfg. process	2	10	Arsine, Phosphine, Silane, Disilane	0.01 (J) 0.1 (A)
Dibromomethane CH_2Br_2	157SB© ‡	2.5~40	1	White	Yellow		3	2 × 5		
Di-n-Butyl amine $(C_4H_9)_2NH$	105SD©	2~20	1	Pale puple	Pale yellow	Mfg. dye	3	10	Amines	
o-Dichlorobenzene $C_6H_4Cl_2$	214S	5~100	1	White	Yellow	Solvent insecticide, industrial hygiene	2	10	Alcohols, Praffin hydrocarbons, Halogenated hydrocarbons, Esters, Aromatic hydrocarbons	25 (J.A.B)
p-Dichlorobenzene $C_6H_4Cl_2$	215S ‡	10~150	1	Pale orange	Purplish blue		1	10	Benzene, Toluene, Hexane	10 (J.A) 25 (B)
1,1-Dichloroethane (Ethylidene chloride) CH_3CHCl_2	235SA ‡	10~160	1	White	Purple	Industrial hygiene	1	3 × 5	Nitrogen oxides, Halogens, Halogenated hydrocarbons, Hexane (20), Alcohols (400), Toluene (20)	100 (J.A.B)
1,2-Dichloroethane (Ethylidene dichloride) $ClCH_2CH_2Cl$	230SA ‡	5~50	1	White	Purple		1	3 × 5	Nitrogen oxides, Halogens, Halogenated hydrocarbons, Hexane (100)	10 (J.A) 5 (B)
2,2'-Dichloroethyl ether $(ClCH_2CH_2)_2O$	223S	2~30	1	Greenish yellow	Pink		1	2 × 5	Halogenated hydrocarbons	15 (J) 5 (A)
1,2-Dichloroethylene (Acetylene dichloride) $ClCH=CHCl$	145SA ‡	42~840 20~400 9.2~184 4.2~84	1/2 ① 2 4	Yellow	Red	Extraction of natural dyes, mfg. perfumes, paints industry & painting, ferment retardation, industrial hygiene	1	10	Vinyl chloride, Hydrogen chloride, Trichloroethylene, Cl_2	150 (J) 200 (A.B)
Dichloromethane (Methylene chloride) CH_2Cl_2	180S ‡	30~1,000 10~200	② 4	White	Reddish orange	Industrial hygiene	2	2 × 5	Halogens, Halogenated hydrocarbons	50 (J.A) 100 (B)
1,2-Dichloropropane $CH_3CHClCH_2Cl$	157SB© ‡	20~250	1	White	yellow		3	2 × 5		1 (J) 10 (A)
1,3-Dichloropropane $ClCH_2CH_2CH_2Cl$	194S ‡	10~500	1	White	Orange		1	2 × 5	Halogenated hydrocarbons	
1,3-Dichloropropene $ClCH_2CH=CHCl$	249S	0.5~10	1	Yellowish green	Pink	Fumigation in soil by the name of D-D	3	2 × 5	Chloropicrin (1,800), MITC (600)	1 (A)
Dicyclopentadiene $C_{10}H_{12}$	190U©	2~60	3	Yellow	Pale blue	Mfg. EP rubber, unsaturated polyester resins, coating materials and perfume	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	5 (A.B)
Diesel fuel	251U	0.5-12.5 1~30	4 ②	White	Pale brown +Pale green (at the top)	To monitor residual and leakage of tank	2	10	Propane, Isobutane, Hexane, Octane, Gasoline,	100mg/m^3 (A)
Diethyl amine $(C_2H_5)_2NH$	222S	1~20	1	Pale purple	Pale yellow	Industrial hygiene	3	10	NH_3, Other amines	10 (J) 5 (A.B)

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				Original	Stain					
Diethylbenzene $C_6H_4(C_2H_5)_2$	111U©	10~180	1	Yellow	Brown	Organic synthesis intermediate, solvent, abstergent	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	
Diisobutyl ketone $[(CH_3)_2CHCH_2]_2CO$	139U©	20~1,000	1	Yellow	Pale blue		2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons, Halogenated hydrocarbons, Paraffin hydrocarbons	25 (A)
Di-iso-Propyl amine $[(CH_3)_2CH]_2NH$	105SD©	1~16	1	Pale purple	Pale yellow	Dyestuffs, surfactant, herbicide	3	10	Amines	5 (A.B)
N,N-Dimethylacetamide $CH_3CON(CH_3)_2$	229S	5~70	2	Pale purple	Pale yellow	Solvents for chemical reaction, refinery and resins paint remover	1	10	CO_2, NH_3, Amines, Hydrazine	10 (J.A.B)
Dimethyl amine $(CH_3)_2NH$	227S	1~20	1	Pale purple	Pale yellow	Industrial hygiene	3	10	NH_3, Other amines	(2) (J) 5 (A) 2 (B)
N,N-Dimethyl aniline $C_6H_5N(CH_3)_2$	105SD©	0.5~9	1	Pale purple	Pale yellow	Mfg. vanillin, dye	3	10	Amines	5 (J.A.B)
Dimethyl ether (Methyl ether) CH_3OCH_3	123S	0.01~1.2%	1	Orange	Dark brown	Impurity test of Methyl chloride, process control, refrigeration	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapours except Halogenated hydrocarbons	400 (B)
N,N-Dimethyl formamide $(CH_3)_2NCHO$	196S	2~30 1~15	① 2	Pale purple	Pale yellow	Stationary phase of chromatography	2	10	SO_2 (200), CO_2 (0.1%), NH_3, Amines, Hydrazine	10 (J) (5) (A) 5 (B)
Dimethyl sulphide $(CH_3)_2S$	250S	0.21-7.9 1~40 2.1-100	4 ① 1/2	Purple	Pale yellow	Odorant for LPG, food flavour for coffee, chocolate, cocoa, synthetic intermediate/ essential oil, etc.	3	10	Mercaptans, Butane	10 (A)
1,4-Dioxane $C_4H_8O_2$	139SB©	0.05~2.5%	2	Orange	Brownish green	Fire hazard detection in paints & painting industry, industrial hygiene	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapours except Halogenated hydrocarbons (50)	1 (J) 20 (A.B)
	119U©	20~500	1	Yellow	Pale blue		2	10	Alcohols, Toluene (500)	
Di-n-Propyl amine $[CH_3(CH_2)_2]_2NH$	105SD©	1~14	1	Pale purple	Pale yellow	Synthesis intermediate	3	10	Amines	
Divinyl benzene $C_6H_4(CHCH_2)_2$	158S©	5~50	1	White	Yellow	Ion exchange resin and membrance, synthetic rubber, etc.	3	10	Methanol (0.35%), Ethanol (0.18%), Ethyl acetate (700), Butyl acetate (700), Butadiene (5), Formaldehyde (15), Acetaldehyde (350), Acrylonitrile (400)	10 (A)
Epichlorohydrine (1-Chloro-2,3-epoxypropane) CH_2CHCH_2Cl (O)	192S	5~50	3	Greenish yellow	Pink	Mfg, epoxy resin, Chlorinated rubber, glycerin	1	2 × 5	Halogenated hydrocarbons	0.5 (A.B)
Ethyl acetate $CH_3CO_2C_2H_5$	111SA	0.1~5.0%	1	Orange	Brownish green	Fire hazard detection in paints industry & painting, mfg, artificial leather artificial silk, perfumes & flavours, photographic films & plates	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapours except Halogenated hydrocarbons (50)	200 (J.B) 400 (A)
	111U	10~1,000	1	Yellow	Brown	Fire hazard detection in paints industry & painting	2	10	Other esters, Ketones, Alcohols, Aromatic hydrocarbons, Halogenated hydrocarbons	
Ethyl acrylate $CH_2=CHCO_2C_2H_5$	211U©	5~60	2	Yellow	Pale blue	Material of Acrylic resin	2	10	Alcohols, Paraffin hydrocarbons, Esters, Halogenated hydrocarbons, Aromatic hydrocarbons	5 (A.B)

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Ethyl alcohol (Ethanol) C_2H_5OH	104SA	0.05~ 5.0%	1	Yellowish orange	Light green	Fire hazard detection in hospital, laboratory, pharmaceutical industry, mfg. perfumes & cosmetics	3	10	Paraffin hydrocarbons, Alcohols, Esters, Ketones, Aromatic hydrocarbons, Halogenated hydrocarbons	STEL 1,000 (A.B)
Ethyl amine $C_2H_5NH_2$	227S	1~20	1	Pale purple	Pale yellow	Industrial hygiene	3	10	Ammonia, Other Amines	10 (J) 5 (A) 2 (B)
Ethyl benzene $C_6H_5C_2H_5$	179S	10~500	1	White	Brown	Industrial hygiene	1.5	10	Toluene (25), Xylene (50), Benzene (10), Methanol (1%), Hexane (0.1%)	50 (J) 20 (A) 100 (B)
Ethyl bromide C_2H_5Br	157SB© ‡	20~400 2~80	1/2 ①	White	Yellow		3	2 × 5		5 (A)
Ethyl-tert-Butyl Ether (ETBE) $C_2H_5OC(CH_3)_3$	248U	1~60	3	Pale yellow	Pale blue	Used for automobile fuel adding the ETBE in Gasoline	1	10	Ethanol	25 (A)
Ethyl cellosolve (Ethylene glycol monoethyl ether) (2-Ethoxyethanol) $C_2H_5OCH_2CH_2OH$	190U	5~500	3	Yellow	Pale blue	Organic solvent treating	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	5 (J.A) 2 (B)
Ethyl cellosolve acetate (Ethylene glycol ethyl ether acetate) $CH_3COO(CH_2)_2OC_2H_5$	190U©	5~150	3	Yellow	Pale blue		2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	5 (J.A) 10 (B)
Ethyl ether (Diethyl ether) $(C_2H_5)_2O$	107SA	0.04~ 1.4%	1	Orange	Dark green	Fire hazard detection in solvent extraction process, hospital, laboratory, organic syntheses, clinical laboratories, explosive mfg.	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapours except Halogenated hydrocarbons (50)	400 (J.A) 100 (B)
	107U	20~400	1	Pale yellow	Pale blue		2	10	Alcohols, Ketones, Esters, Aromatic hydrocarbons	
Ethyl mercaptan (Ethanethiol) C_2H_5SH	165SA	4~160 2~80 1~40	1 ② 4	White	Yellow	Atmospheric pollution survey, concentration control of odorant, plastics manufactures	2	10	Methyl sulphide (1), NO_2 (1), Cl_2 (0.2)	0.5 (A.B)
	165SB	5~80 2.5~40	1/2 1	Yellow	Pink	Odorant for LP gas	2	10	H_2S, PH_3, Arsine, Hydrogen selenide, HCN, NO_2, NH_3, SO_2, Other Amines	
	130U	1.05~10.5 0.525~5.25	1/2 1	Pale yellow	Pink	Industrial hygiene	2	10	Arsine, Hydrogen selenide, H_2S, HCN, PH_3	
Ethyl methacrylate $CH_2=C(CH_3)COOC_2H_5$	111U©	20~500	1	Yellow	Brown	Organic synthesis intermediate; mfg. synthetic resin, lubricant additive, rust-proof for metal, paper coating agent	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	
Ethylene -colour intensity $H_2C=CH_2$	108B	0.5~100 0.1~20	① 5	Pale yellow	Blue	Coal mining safety, concentration control in fruits ripening, organics, mfg. plastics	3	10	CO, NO_2 (1), Cl_2, Butane, Pentane, Acetylene, H_2S (1,000), HCN, CS_2, NH_3, H_2 (10%)	200 (A)
Ethylene $H_2C=CH_2$	108SA	20~ 1,200	1	Yellow	Blue		2	10	CO, H_2S, Acetylene, Propylene	
	108SC	1~200	4	Yellow	Blue	Used for fruits ripening control	2	2 × 5	Acetylene, CO, Propylene, H_2S	
Ethylene dibromide (1, 2-Dibromoethane) $BrCH_2CH_2Br$	166S ‡	1~50	1	White	Yellow	Concentration control in granary fumigation process	1	2 × 5	Halogens or Halogenated hydrocarbons, Hexane (200)	0.5 (B)
Ethylene glycol (Monoethylene glycol) $HOCH_2CH_2OH$	232SA	20~250 mg/m³	2	Pink	Yellow	Industrial hygiene	1.5	2 × 5	Ethylene oxide, SO_2, Aldehydes, H_2S	(25) (A)
	232SB	3~40 mg/m³	3	Pale pink	Yellow		2	2 × 5	Aldehydes, SO_2, H_2S	

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Ethylene oxide CH_2CH_2O	122SA	1.0~ 4.0% 0.01~ 1.8%	1/2 ①	Orange	Dark brown	Concentration control in fumigation of foodstuffs & textiles, fire hazard detection in ethylene glycol plant, sterilization	3	10	Alcohols, Ketones, Aromatic hydrocarbons, Esters, Halogenated hydrocarbons (0.5%)	1 (J.A) 5 (B)
	122SL	130~ 2,600 50~ 1,000	1/2 ①	Yellow	Pale blue		3	10	Alcohols, Esters, Ethers, Ketones, Aromatic hydrocarbons, Aliphatic hydrocarbons(over C_3), Halogenated hydrocarbons	
	122SM	5~100	3	Yellow	Pale blue		3	10	Alcohols, Esters, Aromatic hydrocarbons	
	122SC	1~15	3	Pale pink	Yellow	Concentration control in fumigation & textiles	2	2 × 5	Aldehydes, SO_2, H_2S	
	122SD ‡	0.7~ 14.0 0.1~2.0	1 ④	Yellow	Pale pink	Atmospheric pollution surveys in hospitals	1	2 × 5	Formaldehyde (0.5)	
Formaldehyde HCHO	171SA ‡	20~ 1,500	1	Yellow	Pink	Atmospheric pollution survey, germicide, fungicide organic mfg. industrial hygiene	2	2 × 5	Other aldehydes	0.1 (J) (0.1) (A) 2 (B)
	171SB	1~35	3	White	Brownish orange		3	2 × 5	Other aldehydes (1), Styrene, Ether (1,000), Ethyl acetate (1,000), Trichloroethylene (500)	
	171SC ‡	0.1~4.0 0.05~ 2.0	⑤ 10	Yellowish orange	Pink		1	10	Acetaldehyde, NH_3 (10), NO_2 (3)	
Formic acid HCOOH	216S	1~50	1	Pale pink	Yellow	Mfg. organic medicine, industrial hygiene	3	10	SO_2 (1/20 × HCOOH), NO_2 (10), HCl (2 × HCOOH), Cl_2 (5), Acetic acid	5 (J.A.B)
Furan (Furfuran) C_4H_4O	122SA©	0.2~ 2.0% 0.01~ 0.9%	1/2 ①	Orange	Dark brown	Fire hazard detection in paints industry & painting	3	10	Aromatic hydrocarbons, Esters, Ketones, Alcohols, Halogenated hydrocarbons	
Furfural (2-Furaldehyde) $C_5H_4O_2$	190U©	2~60	3	Yellow	Pale blue	Materials of Nylon 66, insecticide	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	2.5 (J) (0.2) (A) 2 (B)
Furfuryl alcohol $C_4H_3OCH_2OH$	238S	5~25	5	White	Black	Material of furan resin, resin denaturant, solvent, industrial hygiene	1	10		5 (J) (0.2) (A)
Gasoline (Petrol) CnHm	110S	0.05~ 0.6% 0.01~ 0.12%	① 4	Orange	Dark green	Process control, industrial hygiene	3	10	Paraffin hydrocarbons, Acetylene, Ethylene, Cyclohexane, Benzene (400) Toluene (800), Xylene (2,000)	100 (J) 300 (A)
General hydrocarbons iso-C_4H_{10}, n-C_5H_{12}, n-C_8H_{18}, n-C_6H_{14} Mineral turpentine	187S	50~ 1,400	1	Orange	Yellowish green		2	10	Aromatic hydrocarbons	
Heptane $CH_3(CH_2)_5CH_3$	113SB©	100~ 2,000	1	Orange	Yellowish green	Industrial hygiene	2	10	Paraffin hydrocarbons, Aromatic hydrocarbons, Alcohols (6%), Ketones (6%), Esters (6%)	200 (J) 400 (A) 500 (B)
n-Hexane $CH_3(CH_2)_4CH_3$	113SA	0.11~ 1.32% 0.05~ 0.6%	1/2 ①	Orange	Dark green	Solvent recovery control & fire hazard detection in extraction of oils & fats, paints industry & painting	3	10	Paraffin hydrocarbons, Acetylene, Ethylene, Cyclohexane, Benzene (400) Toluene (800), Xylene (2,000)	40 (J) 50 (A) 20 (B)
	113SB	50~ 1,400	1	Orange	Yellowish green		2	10	Paraffin hydrocarbons, Aromatic hydrocabons	
	113SC	20~800 5~200	1 ③	Yellow	Pale blue		2	10	Toluene	
Hydrazine (Amidrazone) N_2H_4	219S	0.2~10.0 0.1~5.0 0.05~ 2.5	2 ④ 8	Yellow	Blue	Rocket fuel, corrosion protection of boiler, antioxidant	2	10	NH_3, Amines	0.1 (J) 0.01 (A) 0.02 (B)

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Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
Hydrogen H_2	137U	0.05~ 0.8%	1/2	Yellow	Blue/ Yellowish green	Industrial hygiene	3	5	Ethanol (0.4%), CO (500)	
Hydrogen chloride HCl	173SA	40~ 1,200 20~600	1/2 ①	Purple	Pink	Industrial hygiene, process control, leakage detection, fire hazard detection, phamaceuticals organics mfg.	2	2 × 5	SO_2, Cl_2	2* (J) C2 (A) 1 (B)
	173SB	4~40 2~20 0.4~4	1/2 ① 5	Yellowish green	Pink		3	2 × 5	Cl_2	
Hydrogen cyanide HCN	112SA	0.01~ 3.0%	1	Yellow	Brownish red	Concentration control in fumigation process	3	10	Acetone, CS_2, SO_2 (200), H_2S (100), Dicyanide	5 (J) C4.7 (A) 10 (B)
	112SB ‡	2~100 0.5~25	① 4	Yellow	Red	Electro-plating, metal hardening fumigation process, industrial hygiene	2	10	SO_2 (1), H_2S (3), NH_3 (5)	
	112SC ‡	0.3~8	3	Yellow	Red		1	2 × 5	SO_2 (1), PH_3, H_2S, NH_3 (2)	
Hydrogen fluoride HF	156S	0.5~30 0.25~15 0.17~2	③ 6 9	Yellowish green	Pink	Dehydrator, mfg. of Hydrofluoric acid, and Freon, industrial hygiene	3	10	Cl_2, HCl	3* (J) 0.5 (A) 1.8 (B)
Hydrogen peroxide H_2O_2	247S ‡	0.5~10.0	5	White	Yellow	Mfg. bleach, industrial chemicals and medicine	1	10	HCHO (10)	1 (A.B)
Hydrogen selenide H_2Se	167S	5~600 1~120	① 5	Pale yellow	Dark brown	Doping gas analysis in mfg. semiconductor, industrial hygiene	1	10	Arsine (10), H_2S, Iron carbonyl (10), SO_2, Hg_2, Acetylene (3%), CO (0.1%), Nickel carbonyl (10)	0.05 (J.A) 0.02 (B)
	242S©	1~20 0.5~10	① 2	Pale yellow	Reddish purple		2	10		
Hydrogen sulphide -ultra high range H_2S	120UT	5~40% 2.5~5%	1/2 1	Pale blue	Black	Oil field (esp. oil well)	3	5	SO_2 (8%)	1 (J.A) 5 (B)
	120UH	2~20%	1/2	Light blue	Black		3	10	SO_2	
Hydrogen sulphide H_2S	120SH	0.1~ 4.0%	1	Pale blue	Black	Process control in sulphur recovery plant in petroleum refinery	3	10	SO_2 (0.5%)	
	120SM	0.1~ 1.2% 0.05~ 0.6%	1/2 ①	White	Dark brown		2	10	SO_2 (0.3%)	
	120SF	100~ 2,000 50~ 1,000 25~500	1/2 ① 2	White	Black	Impurity test of industrial raw gases, chemicals mfg., metallurgy	3	10	SO_2 (5,000), Mercaptans	
	120SC	50~ 1,600	1	Pale yellow	Dark blue	Process control in sulphur recovery plant in petroleum refinery	3	10	CO (10), Ethylene, Propylene, Butylene, Acetylene or Methyl mercaptan (5), HCN, NH_3	
	120SB	6~300 3~150 1~50 0.75~ 37.5	1/2 ① 3 4	White	Dark brown	Mfg. viscose rayon, oil refinery, metal refinery, gasmanufacture, chemical laboratory, process control	3	10	SO_2 (12), Mercaptans (550), NO_2 (2)	
	120SD	2~60 1~30	1/2 ①	White	Pale brown	Process control in sulphur recovery plant in petroleum refinery	3	10	SO_2 (10), Mercaptans (300), NO_2 (2)	
	120SE	2~40 1~20 0.5~10	1/2 ① 2	Yellow	Pink		2	10	PH_3, Mercaptans, NH_3, NO_2	
	120U	0.2~6.0 0.1~3.0	1/2 ①	Pale yellow	Pink	Industrial hygiene	2	10	Arsine, Hydrogen selenide, Mercaptans, PH_3, HCN, SO_2	

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Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
Hydrogen sulphide-Mercaptans -separation measurement H_2S & R·SH	282S	H_2S; 1~30	1	White	Pale brown		2	2 × 5	Tube for H_2S; SO_2 (1/3 × H_2S ∗), NO_2 (1/5 × H_2S ∗)	
		R·SH; 0.5~5.5		Pale yellow	Pink				Tube for R·SH; NO_2 (1), NH_3 (1), H_2S (30)	
Isobutane $(CH_3)_3CH$	113SB©	50~ 1,200	1	Orange	Yellowish green	Industrial hygiene	2	10	Alcohols, Ketones or Esters (60%), Aromatic hydrocarbons, Parafin hydrocarbons	500 (J) STEL 1,000 (A)
Isobutyl acetate $CH_3CO_2CH_2CH(CH_3)_2$	139SB©	0.01~ 1.4%	2	Orange	Brownish green	Fire hazard detection in paints industry & painting, mfg. artificial leather, textile sizing compounds, printing inks	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapours except Halogenated hydrocarbons (50)	150 (A.B)
	153U	10~400	1	Pale yellow	Pale blue	Industrial hygiene	1	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	
Isobutyl acrylate $CH_2=CHCO_2CH_2CH(CH_3)_2$	211U©	5~60	2	Yellow	Pale blue	Industrial hygiene	2	10	Alcohols, Paraffin hydrocarbons, Esters, Halogenated hydrocarbons, Aromatic hydrocarbons	
Isobutyl alcohol (Isobutanol) $(CH_3)_2CHCH_2OH$	208U	5~100	3	Yellow	Pale blue	Detergent of paint and varnish, mfg. Esters for fruit essence, industrial hygiene	2	10	Alcohols, Toluene	50 (J.A.B)
Isobutylene $(CH_3)_2C=CH_2$	113SB©	0.03~ 2.0%	1	Orange	Yellowish green	Mfg. Butyl-rubber	2	10	Paraffin, Aromatic hydrocarbons, Alcohols (6%), Ketones (6%), Esters (6%)	250 (A)
Isobutyric acid $(CH_3)_2CHCOOH$	216S©	3~50	1	Pale pink	Yellow	Disinfectant, arificial flavour, substrate for perfume, tan processing	3	10	SO_2 (1/20 × Acetic acid ∗), NO_2 (10), HCL (2 × Acetic acid ∗), Cl_2 (5)	
Isopentyl acetate (Isoamyl acetate) $CH_3CO_2CH_2CH_2CH(CH_3)_2$	188U	10~400	1	Pale yellow	Pale blue	Industrial hygiene	1	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	100* (J) 50 (A)
Isopentyl alcohol (Isoamyl alcohol) $(CH_3)_2CHCH_2CH_2OH$	209U	5~100	3	Yellow	Pale blue	Stabilizer for Sodium thiosulphate hypo, industrial hygiene	2	10	Alcohols, Toluene	100 (J.A.B)
Isophorone $C_9H_{14}O$	197U©	5~80	3	Yellow	Pale blue	Solvent, ink, paint, lacquer, adhesive, copolymer, lag, finish and biocide	3	10	Alcohols	C5 (A)
Isoprene $CH_2=C(CH_3)CH=CH_2$	190U©	1~16	3	Yellow	Pale blue	Industrial hygiene	2	10	Alcohols, Esters, Aliphatic hydrocarbons (over C_3), Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	
Isopropyl acetate $CH_3CO_2CH(CH_3)_2$	139SB©	0.01~ 1.2%	2	Orange	Brownish green	Fire fazard detection in paints industry & painting, mfg. artificial leather, plastic films, adhesives, recovery of acetic acid, industrial hygiene	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapours except Halogenated hydrocarbons (50)	(100) (A)
	111U	10~ 1,000	1	Yellow	Brown	File hazard detection in paints industry & painting	2	10	Other Esters, Ketones, Alcohols, Aromatic hydrocarbons, Paraffin hydrocarbons	
Isopropyl alcohol (2-Propanol) $CH_3CH(OH)CH_3$	122SA©	0.05~ 2.5%	1	Orange	Dark brown	Fire hazard detection in paints industry & painting, mfg. pharmaceuticals, cosmetics, perfumes, inks, leather dyes, antifreezes, hydraulic brake fluids, metal decreasing & drying, hospitals, laboratories	3	10	Other Alcohols, Ketones, Esters, Aromatic hydrocarbons, Halogenated hydrocarbons (0.5%)	400* (J) 200 (A) 400 (B)
	150U	50~ 1,200 20~480	① 2	Yellow	Pale blue	Industrial hygiene	2	10	Other Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	

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				Original	Stain					
Isopropyl cellosolve $(CH_3)_2HCO(CH_2)_2COH$	190U©	5~350	3	Yellow	Pale blue		2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	25 (A)
Isopropyl ether $(CH_3)_2CHOCH(CH_3)_2$	111U©	30~800	1	Yellow	Brown	Gunpowder, blast, dyestuff, solvent, abstergent, mfg. rubber cement, lens	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	250(A.B)
Isopropyl mercaptan $(CH_3)_2CHSH$	130U	1.15~11.5 0.575~5.75	1/2 1	Pale Yellow	Pink		2	10	Arsine, Hydrogen selenide, H_2S, HCN, PH_3	
Isopropylamine $(CH_3)_2CHNH_2$	222S©	1~12	1	Pale purple	Pale yellow		3	10		5 (A)
Isovaleric acid $(CH_3)_2CHCH_2COOH$	216S©	3~50	1	Pale pink	Yellow	Artiflcial fiavour, perfume and medical uses	3	10	SO_2 (1/20 × Acetic acid ∗), NO_2 (10), HCL (2 × Acetic acid ∗), Cl_2 (5)	
Maleic anhydride $C_4H_2O_3$	216S	0.2~10	4	Pale pink	Yellow	Material of polyester resin	3	10	SO_2 (1/20 × Acetic acid ∗), NO_2 (10), HCL (2 × Acetic acid ∗), Cl_2 (5)	0.2* (J) 0.01 mg/m³ (A) mg/m³ (B)
Mercury vapour Hg	142S	0.5~10 mg/m³ 0.1~2.0 mg/m³	1 ⑤	Grey	Pale orange	Electrolytic soda industry, mfg. thermometer, fluorescent lamp	3	10	HCl (0.5), NO_2 (0.1), Cl_2 (0.1), H_2S (0.5)	0.025 mg/m³ (J.A) 0.02 mg/m³ (B)
Mesityl oxide (4-Methyl-3-penten-2-one) $CH_3COCH=C(CH_3)_2$	190U©	5~100	2	Yellow	Pale blue	Industrial hygiene	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	15 (A)
Methacrylic acid $CH_2=C(CH_3)COOH$	216S©	1~50	1	Pale pink	Yellow	Mfg. soluble polymer	3	10	SO_2 (1/20 × Acetic acid ∗) NO_2 (10), HCL (2 × Acetic acid ∗), Cl_2 (5)	2 (J) 20 (A.B)
1-Methoxy-2-propanol $CH_3CHOHCH_2OCH_3$	197U©	10~500	1	Yellow	Pale blue	Solvent, ink, lacquer, cellulose, dyes, etc	3	10	Alcohols	50 (A) 100 (B)
Methyl acetate $CH_3CO_2CH_3$	111SA©	0.1~ 3.0%	1	Orange	Brownish green	Fire hazard defection in paints industry & painting, mfg. perfumes, dyes, synthetic finishes	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapours, except Halogenated hydrocarbons	200 (J.A.B)
Methyl acrylate $CH_2=CHCO_2CH_3$	211U	2~60	2	Yellow	Pale blue	Material of Acrylic resin, industrial hygiene	2	10	Alcohols, Esters, Paraffin hydrocarbons (over C_3), Aromatic hydrocarbons, Halogenated hydrocarbons	2 (J.A) 5 (B)
Methyl alcohol (Methanol) CH_3OH	119SA	0.05~ 6.0%	1	Yellowish orange	Light green	Fire hazard detection in hospital & laboratory, pharmaceutical industry, paints industry & painting, mfg. printing inks, denatured-alcohol, antifreezes, perfumes & cosmetics, industrial hygiene	3	10	Paraffin hydrocarbons (over C_3), Alcohols, Esters, Aromatic hydrocarbons, Halogenated hydrocarbons	200 (J.A.B)
	119U	20~ 1,000	1	Yellow	Pale blue		2	10	Alcohols, Esters, Aromatic hydrocarbons, Paraffin hydrocarbons, Halogenated hydrocarbons	
Methanol in LPG	119LPG	100~ 1,000 ppmv	1/2	Yellow	Blue or Yellowish green	Antifreezing agent in LP gas	3	10		200 (J.A.B)

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				Original	Stain					
Methyl amine CH_3NH_2	227S	1~20	1	Pale purple	Pale yellow	Industrial hygiene	3	10	NH_3, Other amines	10 (J) 5 (A)
Methyl amyl ketone (2-Heptanone) $CH_3CO(CH_2)_4CH_3$	139U©	25~350	3	Yellow	Pale blue		2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	50 (A)
N-Methyl aniline $C_6H_5NHCH_3$	105SD©	0.5~6	2	Pale purple	Pale yellow	Acid acceptor, solvent	3	10	Amines	0.5 (A.B)
Methyl bromide (Bromomethane) CH_3Br	157SA ‡	10~500	1	White	Reddish orange	Insect fumigation for mills, warehouses, ships, vaults, freight cars, concentration control in granary fumigation	3	2 × 5	Halogens, Halogenated hydrocarbons, Trichloroethylene (20), Tetrachloroethylene (40)	1 (J.A) 5 (B)
	157SB ‡	2~80 1~25 0.4~10	① 2 4	White	Yellow		3	2 × 5	Halogens, Halogenated hydrocarbons, Hexane (200)	
	157SD	8.8~22 0.5~10 0.1~0.5	1/2 ① 3	White	Purple		1	2 × 5		
	157JS	3-70 g/m³	1/2	Yellow	Brown		2	2 × 10		
Methyl butyl ketone $CH_3(CH_2)_3COCH_3$	237S©	5~80	2	Yellow	Pale blue		2	10		5 (J.A.B)
Methyl cellosolve (Ethylene glycol monomethyl ether) (2-Methoxyethanol) $CH_3OCH_2CH_2OH$	190U	5~500	3	Yellow	Pale blue	Organic solvent treating	2	10	Paraffin hydrocarbons (over C_3), Alcohols, Ketones, Aromatic hydrocarbons, Halogenated hydrocarbons, Esters	0.1 (J.A) 1 (B)
Methyl cellosolve acetate $CH_3CO_2CH_2CH_2OCH_3$	190U©	3~120	3	Yellow	Pale blue		2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	0.1 (J.A) 1 (B)
Methyl cyclohexane $C_6H_{11}CH_3$	113SB©	100~ 1,600	1	Orange	Yellowish green	Cellulose solvent	2	10	Paraffin, Aromatic hydrocarbons, Alcohols (6%), Ketones (6%), Esters (6%)	400 (J.A)
Methyl cyclohexanol $CH_3C_6H_{10}OH$	199U	5~200	3	Yellow	Pale blue	Mfg. Imbricating oil & liquer, industrial hygiene	2	10	Alcohols	50 (J.A.B)
Methyl cyclohexanone $CH_3C_6H_9O$	198U	2~100	3	Yellow	Pale blue	Industrial hygiene	2	10	Alcohols	50 (J.A.B)
Methyl ethyl ketone (2-Butanone) $CH_3COC_2H_5$	122SA©	1.0~ 5.0% 0.05~ 2.2%	1/2 ①	Orange	Dark brown	Process control, synthetic resins, solvent; solvent recovery control & fire hazard detection in paint industry & extraction of oils, fats, natural resins, waxes; cleaning & decreasing of metal surface, denaturization of alcohol	3	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons, Halogenated hydrocarbons (0.5%)	200 (J.A.B)
	139SB	0.01~ 1.4%	2	Orange	Brownish green		3	10	Other organic gases or vapours except Halogenated hydrocarbons (50), Acetylene (3%), Propane (0.2%)	
	139U	20~ 1,500	1	Yellow	Pale blue	Process control, fire hazard detection in paints industry, esp. industrial hygiene	2	10	Other Esters, Ketones, Alcohols, Aromatic hydrocarbons, Halogenated hydrocarbons, Paraffin hydrocarbons	
Methyl iodide (Iodomethane) CH_3I	176UH	500~ 15,000	1/2	Yellowish orange	Brownish green	Wood fumigation	3	10		2 (A.B)
	176SC ‡	2.5~50 1~20 0.4~8	1/2 ① 2	White	Gray		1	10	1, 3-Dichloropropene, Hydrogen sulphide, Toluene	

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Methyl isobutyl ketone (Isopropyl acetone) $(CH_3)_2CHCH_2COCH_3$	122SA©	0.01~ 0.6%	3	Orange	Dark brown	Solvent forgums, resins, nitrocellulose	3	10	Alcohols, Other Ketones, Aromatic hydrocarbons, Esters, Halogenated hydrocarbons	50 (J.B) 20 (A)
	155U	5~300	1	Yellow	Pale blue	Industrial hygiene	2	10	Alcohols, Esters, Aliphatic hydrocarbons (over C_3), Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	
Methyl isothiocyanate (MITC) CH_3NCS	245UH	200~ 10,000	1	Yellowish orange	Pale green	Wood fumigation	3	10		
	245UM	25~1,500 10~600	1/2 ①	Pale yellow	Pale blue		1	10		
	245UL ‡	0.66~22 0.3~10	1/2 ①	Pink	Yellowish orange	Soil fumigation	1	10	Carbon dioxide	
Methyl mercaptan (Methanethiol) CH_3SH	164SH	50~ 1,000	1	Pale yellow	Orange	Pesticides, fungicides, plastics, atmospheric pollution survey, concentration control of odorant	3	10	H_2S (650), NO_2 (1,000), Cl_2 (1/3 × CH_3SH ∗)	0.5 (A.B)
	164SA	5~140	1	White	Reddish yellow		2	10	Cl_2 (0.2), Methyl sulphide (1), Ethyl mercaptan, Acetylene, CO, Acetylene, H_2S	
	130U	1~10 0.5~5	1/2 ①	Pale yellow	Pink		2	10	Arsine, Hydrogen selenide, H_2S, HCN, PH_3	
Methyl methacrylate $CH_2=C(CH_3)CO_2CH_3$	184S	10~160	1	Yellow	Pale blue	Pigment, adhesive, paintings	2	10	Esters, Ketones, Alcohols, Aromatic hydrocarbons	50 (A.B)
Methyl propyl ketone $CH_3CO(CH_2)_2CH_3$	139U	20~ 1,500	1	Yellow	Pale blue	Industrial hygiene	2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons, Halogenated hydrocarbons, Paraffin hydrocarbons	200 (A.B)
Methyl styrene $CH_3C_6H_4CH=CH_2$	193S	10~500	1	White	Yellow	Synthetic resin	3	10	Styrene	50 (A)
Monoethanol amine (2-Aminoethanol) $H_2NCH_2CH_2OH$	224SA	1~50 0.5~25	① 2	Pink	Pale purple	Pesticide, solvent, abstergent	2	10	Other Amines, NH_3, Hydrazine	3 (J.A) 1 (B)
Morpholine C_4H_9NO	105SD©	2~22	1	Pale purple	Pale yellow	Solvent, rubber accelerator	3	10	Amines	20 (A) 10 (B)
Naphthalene $C_{10}H_8$	153U©	10~100	1	Pale yellow	Pale blue	Industrial hygiene	1	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	10 (A)
Nickel carbonyl (Nickel tetracarbonyl) $Ni(CO)_4$ Concentration chart method	129	20~700	1	Pale yellow	Dark purple	Waste gas analysis	1/2	10	Arsine, Iron carbonyl, Mercury vapour, H_2S or SO_2 (10), CO (1,000)	0.001 (J) C0.05 (A)
Nitric acid vapour HNO_3	233S ‡	2~20 1~10	① 2	Pale yellow	Purple	Industrial hygiene	1	10	HF (8) or NO_2 (50), HCl	2 (J.A)
Nitrogen dioxide NO_2	117SA	20~ 1,000	1	White	Yellowish orange	Arc welding, acid dipping, garage (diesel exhaust), waste gas analysis in sulphuric & nitric acid dipping of metal products	3	10	Cl_2, Br_2, I_2 or Ozone (5), NO (10)	0.2 (A)
	117SB	0.5~30.0	2	White	Yellowish orange		1	10	Cl_2, Br_2, or I_2 (2), NO (15)	
	117SD	0.1~1.0	3	White	Purple		1.5	2 × 5	O_3 (2), SO_2 (7), Cl_2 (3)	
Nitrogen oxide and dioxide -separately measurable NO & NO_2 Concentration chart method	174A	NO; 10~300 NO_2; 1~40	1	White	Yellowish orange	Industrial hygiene	2	5	Cl_2 (1)	NO; 25 (A) NO2; 3 (A)
	174B				Pale yellowish orange	Flue gas and exhaust gas analysis with hollow glass tubes	2	2 × 5		
Nitrogen oxides $NO + NO_2$	175SH	100~ 2,500	1	White	Green	Exhaust gas analysis	2	10	HCl (500)	NO; 25 (A) NO2; 3 (A)
	175SA ‡	20~250	1	White	Yellow		1	10	SO_2 (100), HCl (1,000)	
	175U	1~30 0.5~15	1/2 ①	White	Purple	Industrial hygiene	3	10	H_2S (5), HCl (500)	

‡ This tube must be stored in a refrigerated place (0-10 °C/32-50 °F).

∗ Interfered by coexistence more than parenthesized rate.

Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
n-Nonane $CH_3(CH_2)_7CH_3$	111U©	10~160 5~80	1/2 ①	Yellow	Brown		2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	200(A)
Organic gas checker	186	–	1	Orange	Black or Dark green		3	10	H_2S (10)	
Oxygen O_2	159SA	2~24%	1/2	White	Brown	Oxygen deficiency in underground or closed vessels, tunnels, mines	2	5	CO_2 (5%), H_2S (2%), NO_2 (2%), SO_2 (2%)	
	159SB	2~24%	1/2	White	Brown	In the area where the danger of gas explosion exists	2	5		
Oxygen- Non-heating Type O_2	159SC	3~24% 1.5~3%	1/2 1	Black	White	Oxygen deficiency in underground or closed vessels, tunnels and mines	2	2 × 5		
Oxygen · Carbon dioxide -separation measurement O_2 & CO_2	281S	O_2; 2~10%	1	White	Brown	Combustion control	1.5	2 × 5		CO_2; 5000 (J.A.B)
		CO_2; 1~20%		Pink	Yellow					
Ozone O_3	182SA	100~ 1,000 50~500	1/2 ①	Dark blue	Yellow	Process control	2	10	Cl_2, NO_2	0.1 (J) 0.05 (A)
	182SB	10~100 5~50 2.5~25	1/2 ① 2	Blue	Pale yellow		2	10	NO_2 (10)	
	182U	0.15~ 3.0 0.05~ 1.0 0.025~ 0.5	1 ③ 6	Blue	White	Air pollution analysis, industrial hygiene	2	10	NO_2 (0.5), Cl_2 (10), Oxidant	
Pentane $CH_3(CH_2)_3CH_3$	113SB©	50~ 1,000	1	Orange	Yellowish green	Industrial hygiene	2	10	Paraffin hydrocarbons, Aromatic hydrocarbons (over C_3), Alcohols (6%), Ketones (6%), Esters (6%)	300 (J) 1,000 (A) 600 (B)
Pentyl acetate (Amyl acetate) $CH_3CO_2(CH_2)_4CH_3$	210U	10~200	3	Yellow	Pale blue	Material of Acrylic resin, industrial hygiene	2	10	Alcohols, Esters, Ketones, Aliphatic hydrocarbons, Aromatic hydrocarbons	100 (J) 50 (A.B)
Pentyl amine $CH_3(CH_2)_3CH_2NH_2$	105SD©	2~22	1	Pale purple	Pale yellow	Dyes, insecticide, synthetic detergent, corrosion inhibitor, medicine, petrol additive	3	10	Amines	
Phenol C_6H_5OH	183U	0.5~25.0	2	Pale yellow	Pale brown	Industrial hygiene	2	10	NH_3 (200), Aliphatic amines (50), Phenols (2.5), Aromatic amines (50)	5 (J.A) 2 (B)
Phosgene (Carbonyl chloride) $COCl_2$	146S ‡	0.5~20 0.1~4.0	① 5	White	Red	Leakage detection in mfg. dyes, chemicals, industrial hygiene	1	10	Cl_2 (5), HCl (10), NO_2 (100), SO_2 (0.2%)	0.1 (J.A) 0.02 (B)
Phosphine in acetylene PH_3	121SA †	20~800	1	Pale blue	Reddish purple	Impurity test of calcium carbide & acetylene	3	10	Arsine or H_2S (10)	0.3 (J.A) 0.1 (B)
	121SB †	5~90	1		Yellowish brown		3	10		

‡ This tube must be stored in a refrigerated place (0-10 °C/32-50 °F).

† Air flow control orifice is required.

Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
Phosphine PH_3	121SS	400~6,000 [200~3,000]	1/2 ①	White	Orange	Fumigation of grains	3	10	Hydrogen cyanide (3%), Ammonia (0.6%)	0.3 (J) (0.05) (A) 0.1 (B)
	121SH	200~3,200 [100~1,600]	1/2 ①	White	Orange	Concentration control in fumigation of tobacco leaves & cereals, doping gas analysis in mfg. semiconductor, industrial hygiene	3	10	NO_2, H_2S, SO_2	
	121SC	40~1,400 [20~700]	1/2 ①	White	Yellow		3	10	Arsine (30), Hydrogen selenide (50), H_2S (40)	
	121SG	5~150	1	White	Yellow		3	10	H_2S (5), H_2Se (5)	
	121SD	1~20.0 [0.5~10.0] 0.25~5.0	1/2 ① 2	Yellow	Pink		1	10	NH_3 (20), Mercaptans, Hydrogen sulphide (50)	
	121U	[0.1~2.0] 0.05~1.0	① 2	Pale yellow	Pink	Industrial hygiene, semiconductor mfg. process	2	10	Hydrogen selenide, Mercaptans, H_2S, HCN, SO_2, Arsine	
α-Pinene $C_{10}H_{16}$	158S©	20~300	1	White	Yellow	Materials for perfume and materia medica	3	10	Methanol (0.35%), Ethanol (0.18%), Ethyl acetate (700), Butyl acetate (700), Butadiene (5), Formaldehyde (15), Acetaldehyde (350), Acrylonitrile (400)	
1-Propanol $CH_3CH_2CH_2OH$	190U©	20~300	2	Yellow	Pale blue		2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	100 (A) 200 (B)
Propane $CH_3CH_2CH_3$	125SA	0.02~0.50%	1	Orange	Brown	Mfg. city gas, fire hazard detection	2	10	Toluene, Hexane, Trichloro-ethylene	1,000 (A)
Propionic acid CH_3CH_2COOH	216S©	3~50	1	Pale pink	Yellow	Mfg. propionate and ester, Nickel-electro plating solution, ester perfume, artificial flavour, medicine, cellulose solvent	3	10	SO_2 (1/20 × Acetic acid ∗), NO_2 (10), HCL (2 × Acetic acid ∗), Cl_2 (5)	10 (A.B)
Propyl acetate $CH_3CO_2(CH_2)_2CH_3$	139SB©	0.01~1.4%	2	Orange	Brownish green	Fire hazard detection in paints industry & painting, mfg. flavours & perfumes	3	10	Other organic gases or vapours except Halogenated hydrocarbons, Acetylene (3%), Propane (0.2%)	200 (J.B) (100) (A)
	151U	20~1,000	1	Yellow	Brown	Paints industry & painting, mfg. flavours & perfumes, industrial hygiene	2	10	Alcohols, Esters, Ketones, Paraffin hydrocarbons, Aromatic hydrocarbons	
Propyl amine $CH_3CH_2CH_2NH_2$	105SD©	1~20	1	Pale purple	Pale yellow	Analgesic	3	10	Amines	
Propylene $CH_2=CHCH_3$	185S	50~1,000	1	Yellow	Dark blue	Leakage detection	2	10	CO (200), Acetylene (50), Ethylene, H_2S (50)	500 (A)
Propylene glycol $CH_3CH(OH)CH_2OH$	122SC©	5~50	1	Pale pink	Yellow	Mfg. moisturizer, lubricant, emulsify, anti-freeze	2	2 × 5	Aldehydes, SO_2, H_2S	
Propylene oxide (1,2-Epoxypropane) $CH_3\underline{CHCH_2}O$	163SA	1.0~5.0% [0.05~3.0%]	1/2 ①	Orange	Dark brown	Leakage detection in preparation of propylene oxide	3	10	Aromatic hydrocarbons, Esters, Ketones, Alcohols, Halogenated hydrocarbons	2 (J.A) 5 (B)
	122SC©	3~70	1	Pale pink	Yellow		2	2 × 5	Aldehydes, SO_2, H_2S	
	163SD ‡	0.2~5.0	2	Yellow	Pale pink		1	2 × 5	Formaldehyde	

‡ This tube must be stored in a refrigerated place (0-10°C/32-50°F).

∗ Interfered by coexistence more than parenthesized rate.

Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
n-Propyl mercaptan $CH_3CH_2CH_2SH$	130U	1.15~11.5 0.575~5.75	1/2 1	Pale yellow	Pink	Industrial hygiene	2	10	Arsine, Hydrogen selenide, H_2S, HCN, PH_3	
Pyridine C_5H_5N	105SD©	0.5~10	1	Pale purple	Pale yellow	Alcohol denaturant, solvent, paint, medical care, dye of fiber	3	10	Amines	1 (A) 5 (B)
Silane SiH_4	240S ‡	[1~50] 0.5~25	① 2	Yellow	Red	Industrial hygiene, semiconductor mfg. process	1	10	PH_3 (20), Arsine (50), Disilane (2), Diborane (20)	100 (J) 5 (A) 0.5 (B)
Styrene (Vinyl benzene) $C_6H_5CH=CH_2$	158S	[5~300] 2.5~150	① 2	White	Yellow	Fire hazard detection in synthetic rubber, resin & plastic industry	3	10	Methanol (0.35%), Ethanol (0.18%), Ethyl acetate (700), Butyl acetate (700), Butadiene (5), Formaldehyde (15), Acetaldehyde (350), Acrylonitrile (400)	20 (J.A) 100 (B)
	158SB	[2~100] 1~50	② 4	White	Yellow		3	2 × 5		
Sulphur dioxide SO_2	103SA	0.1~3.0%	1	Yellow	Blue	Process control in sulphuric acid paint (chemical mfg.)	3	10	H_2S (400)	0.25 (A)
	103SB	0.02~0.3%	1	White	Brown	Process control in sulphuric ore calcination	3	10	H_2S (100)	
	103SC	20~300	1	Purple	Yellow	Metal refining, mfg. sulphuric acid & nitric acid, waste gas analysis	2	10	Cl_2 (1/5 × SO_2 ∗), NO_2 (100), H_2S (100 × SO_2 ∗)	
	103SD	1~60	1	Pink	Yellow	Metal refining, mfg. sulphuric acid & nitric acid, industrial hygiene	3	10	NO_2 (1 × SO_2 ∗), Cl_2 (2 × SO_2 ∗)	
	103SE ‡	[0.5~10] 0.25~5	① 2	Pink	Yellow	Metal refining, mfg. sulphuric acid & nitric acid, waste gas analysis	1	10	NO_2, HCl	
Sulphur dioxide -in flue gas SO_2	103SF	0.02~0.3%	1	White	Orange	Flue gas analysis in heat power plant (with moisture control tube)	3	2 × 5	H_2S (100)	
Sulphur dioxide -in carbon dioxide SO_2	103SG	[0.5~25] 0.1~3	① 4	Blue purple	White	Process control in beverage industry	3	10	NO_2 (0.5), H_2S (0.5), NH_3 (1)	
Sulphuric acid H_2SO_4	244U	0.5~5 mg/m³	5	Yellow	Pink	Petrochemical industry, industrial hygiene	2	10	HCl, HF, NO_2, Nitric acid, C_{12}	0.2mg/m³ (A) 0.05mg/m³ (B)
Tetrachloroethylene (Perchloroethylene) $Cl_2C=CCl_2$	135SG	[0.2~2.0%] 0.1~0.2%	① 2	White	Dark brown	Dry cleaning, metal decreasing, paints industry & painting, solvent recovery control	2	2 × 5	Trichloroethylene, 1, 1, 1-Trichloroethane, 1, 2-Dichloroethylene, Vinyl chloride, CO, Aromatic hydrocarbons	25 (A) 50 (B)
	135SM ‡	125~1,250 [50~500]	1/2 ①	Yellow	Red	Process control in dry cleaning industry	1	10	1,2-Dichloroethylene (10), Trichloroethylene (10)	
	135SA ‡	10~300 [5~150]	1/2 ①	Yellow	Red	Dry cleaning, metal decreasing, paints industry & painting, solvent recovery control	2	10	Vinyl chloride, HCl, 1, 2-Dichloroethylene, Trichloroethylene, Cl_2	
	135SB ‡	[1~10] 0.2~2.0	① 4	Pale orange	Blueish purple		1	10	Trichloroethylene, 1, 2-Dichloroehylene or HCl (2), Vinyl chloride (40)	
Tetraethoxysilane $Si(OC_2H_5)_4$	243U	12.5~200 [5~80]	1 ②	Yellow	Pale blue	Industrial hygiene	3	10	Silane, Phosphine (5), Isopropyl alcohol (7), Trichloroethylene, Tetrachloroethylene, Ethanol (10)	10 (J)

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Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
Tetrahydrofuran $(CH_2)_4O$	102SA©	1.0~5.0% 0.2~3.0%	1/2 ①	Orange	Dark brown	Fire hazard detection in paints industry & painting petrochemical industry, Industrial hygiene	3	10	Alcohols, Esters, Ketones, Aromatic hydrocarbon	50 (J.A.B)
	162U	20~400	1	Yellow	Pale blue		2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons, Halogenated hydrocarbons	
Tetrahydrothiophen C_4H_8S	190U©	4~100	3	Yellow	Pale blue	Odorant	2	10	Alcohols, Esters, Paraffin hydrocarbons, Aromatic hydrocarbons, Ketones, Halogenated hydrocarbons	
Toluene (Methyl benzene) $C_6H_5CH_3$	124SH	100~3,000	1	White	Dark brown	Solvent recovery control	2	10	Benzene, Xylene, Ethyl benzene, Hexane, Methanol	20 (J.A) 50 (B)
	124SA	10~500	1	White	Brown	Solvent recovery control & fire hazard detection in paints industry & painting, rubber & plastics industry, mfg. dyes, printing inks, adhesives, industrial hygiene	3	10	Benzene (10), Xylene (50), Methanol (1%), Hexane (0.1%), Ethyl benzene (10)	
	124SB	2~100	1	White	Brown	Solvent recovery control	3	10	Aromatic hydrocarbons, Hexane (high conc.)	
o-Toluidine $C_6H_4(CH_3)(NH_2)$	105SD©	2~22	1	Pale purple	Pale yellow	Dyes, printing	3	10	Amines	1 (J) 2 (A) 0.2 (B)
p-Toluidine $C_6H_4(CH_3)(NH_2)$	105SD©	2~20	1	Pale purple	Pale yellow	Analytical reagent, dyes	3	10	Amines	2 (A)
1,1,1-Trichloroethane (Methyl chloroform) CH_3CCl_3	160S ‡	30~400 15~30	① 2	White	Yellowish orange	Metal decreasing & cleaning, extraction of oils & fats, paints industry, industrial hygiene	3	2 × 5	Halogens, Halogenated hydrocarbons	200 (J) 350 (A) 100 (B)
1, 1, 2-Trichloroethane Cl_2CHCH_2Cl	236SA ‡	10~100	1	White	Purple	Industrial hygiene	1	3 × 5	Nitrogen oxides, Halogens, Halogenated hydrocarbons, Hexane (100)	10 (J.A)
Trichloroethylene $Cl_2C=CHCl$	134SG	0.05~2.0%	1	White	Yellow	Metal decreasing & cleaning, dry cleaning & insect fumigation of clothes, mfg. printing inks, industrial hygiene	2	10	Tetrachloroethylene, 1, 1, 1-Trichloroethane, 1, 2-Dichloroethylene, Vinyl chloride, CO, Aromatic hydrocarbons	10 (J.A) 100 (B)
	134SA ‡	10~300 5~150	1/2 ①	Yellow	Red		2	10	Vinyl chloride, HCl, 1, 2-Dichloroethylene, Tetrachoroethylene, Cl_2	
	134SB ‡	2.3~36.8 1~16 0.2~3.2	1/2 ① 4	Pale orange	Blueish purple		1	10	Tetrachloroethylene, 1, 2-Dichloroethylene or HCl (2), Vinyl chloride (20)	
Triethyl amine $(C_2H_5)_3N$	213S	2~20 1~10 0.5~2	1/2 ① 2	Pale purple	Pale yellow	Mfg. emulsifier, organic solvent, waterproofing agent, dyestuff, surface activator and agricultural chemicals etc. industrial hygiene	3	10	NH_3, Other Amines	0.5 (A) 2 (B)
Trimethyl amine $(CH_3)_3N$	105SE	5~100 2.5~50 0.5~10	1/2 ① 5	Pale purple	Pale yellow		3	10	Sulphur dioxide, Chlorine, Amines	5 (A)
	222S	1~20	1	Pale purple	Pale yellow	Industrial hygiene	3	10	NH_3, Other Amines	
1, 2, 4-Trimethyl benzene $C_6H_3(CH_3)_3$	111U©	20~250	1	Yellow	Brown		2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	25 (J.A.B)
2, 2, 4-Trimethyl pentane $(CH_3)_3CCH_2CH(CH_3)_2$	113SB©	200~4,000 100~1,400	1/2 ①	Orange	Yellowish green	Automotive fuel	2	10	Paraffin, Aromatic hydrocarbons, Alcohols (6%), Ketones (6%), Esters (6%)	

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Gas to be measured (Synonym) Chemical Formula	Tube No.	Measuring Range (ppm)	No. of Pump Strokes	Colour Change: Original	Colour Change: Stain	Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	Interferences (ppm)	T.L.V (ppm) J: JPN A: U.S.A B: U.K.
n-Undecane $CH_3(CH_2)_9CH_3$	111U©	10~140	1	Yellow	Brown		2	10	Alcohols, Esters, Ketones, Aromatic hydrocarbons	
n-Valeric acid $CH_3(CH_2)_3CO_2H$	216S©	3~70	1	Pale pink	Yellow	Artificial flavour, perfume, lubricant, plasticizer, medicine	3	10	SO_2 (1/20 × Acetic acid ∗), NO_2 (10), HCL (2 × Acetic acid ∗), Cl_2 (5)	
Vinyl acetate $CH_3CO_2CH=CH_2$	237S	10~120 5~60	① 2	Yellow	Pale blue	Process control in Acetylene plant	2	10	Ethylene (150), Alcohols, Ethers, Esters	10 (A) 5 (B)
Vinyl chloride (Chloroethylene) $CH_2=CHCl$	132SA	0.05~1.0%	1	Brownish orange	Brownish green	Leakage & fire hazard detection in PVC plant, industrial hygiene	3	10	Acetylene (3%), Propane (0.2%), Other organic gases or vapors except Halogenated hydrocarbons (50)	2.5 (J) 1 (A) 3 (B)
	132SB ‡	5~500	1	White	Reddish orange	Process control, leakage detection and fire hazard detection in synthetic rubber & plastics industry	1.5	2 × 5	Cl_2, HCl, Other Halogens, Halogenated hydrocarbons	
	132SC	0.4~12.0 0.2~6.0 0.1~3.0	1 ② 4	Yellowish green	Pink	Industrial hygiene	3	2 × 5	HCl (500), Acetylene (1%), Ethylene (300), Cl_2 (50)	
Water vapour H_2O	177SA	1.7~33.8 mg/L	1	Greenish yellow	Purple	Industrial hygiene, process control	3	10	Methanol (0.3%), Ethanol (0.3%), Ethyl acetate (0.3%), Acetone (0.5%), NH_3 (0.02%), NO_2 (0.2%)	
	177U	0.05~2.0 mg/L	1	Yellow	Blue (over 0.6mg/L) Yellowish green (below 0.6mg/L)		3	10	Alcohols	
	177UL	3~80 LB/MMCF	1	Yellow	Blue (over 40LB/MMCF) Yellowish green (below 40LB/MMCF)	Petrochemical industry, industrial hygiene	3	10		
Water vapour -ultra low range H_2O	177UR	2~12 LB/MMCF	2	Yellow	Yellowish green		3	10		
Xylene (Dimethyl benzene) $C_6H_4(CH_3)_2$	143SA	5~1,000	2	White	Brown	Leakage & fire hazard detection in phthalic acid plant, paints industry & painting mfg. dyes, adhesives, printing inks, cleaning fluids, industrial hygiene	1.5	10	Benzene, Toluene, Ethyl benzene, Methanol (1%), Hexane (0.1%)	50 (J.B) 100 (A)
	143SB	5~200	2	White	Brown		2	10	Toluene (1/5 × Xylene)	

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∗ Interfered by coexistence more than parenthesized rate.

SUBSTANCES TO BE MEASURED BY USING CONVERSION CHARTS

Conversion charts are available, upon request, for the following listed chemical substances using existing detector tubes within the Kitagawa range. These conversion charts are for use in a temperature of 20°C/68°F.
Other conditions, such as different temperatures, humidity and coexisting gases, are not confirmed.
Please specify the name of the substance to be measured together with the tube number when ordering.

Gas to be measured / Chemical Formula	Tube No. to be used	Measuring Range (ppm)	No.of Pump Strokes	Colour Change		Shelf Life (year)	Q'ty of tubes/ box	T.L.V. (ppm) J: JPN A: U.S.A B: U.K.
				Original	Stain			
Allyl chloride $CH_2=CHCH_2Cl$	132SC	1~40	3	Yellowish green	Pink	3	2×5	1 (A)
Benzyl chloride $C_6H_5CH_2Cl$	132SC	1~16	1	Yellowish green	Pink	3	2×5	1 (A) 0.5 (B)
1-Bromopropane $CH_3CH_2CH_2Br$	157SA	10~500	1	White	Reddish orange	3	2×5	0.5 (J) 0.1 (A)
2-Bromopropane $(CH_3)_2CHBr$	157SA	10~500	1	White	Reddish orange	3	2×5	1 (J)
m-Chlorotoluene $C_6H_4Cl(CH_3)$	132SC	0.5~10	2	Yellowish green	Pink	3	2×5	–
o-Chlorotoluene $ClC_6H_4CH_3$	132SC	1~50	2	Yellowish green	Pink	3	2×5	50 (A)
p-Chlorotoluene $ClC_6H_4CH_3$	132SC	1~50	2	Yellowish green	Pink	3	2×5	–
p-Cymene $CH_3C_6H_4CH(CH_3)_2$	102SD	20~200	1	Yellow	Dark brown	2	10	–
1,1-Dichloroethylene $CH_2=CCl_2$	132SC	1~22	1	Yellowish green	Pink	3	2×5	5 (A)
Disilane Si_2H_6	240S	1~50	1	Yellow	Red	1	10	–
Ethylene chlorohydrine $ClCH_2CH_2OH$	119U	5~300	3	Yellow	Pale blue	2	10	C1 (A)
Iodine I_2	117SB	0.7~42	1	White	Yellow	3	10	0.1 (J) 0.01 (A)
Mineral turpentine –	111U	4~200	1	Yellow	Brown	2	10	100 (A)
Trichlorotoluene $C_6H_5CCl_3$	132SC	0.2~4.0	1	Yellowish green	Pink	3	2×5	–
☆Benzaldehyde C_6H_5CHO	190U	5~70	3	Yellow	Pale blue	2	10	–
☆1,1,2,2-Tetrachloroethane $CHCl_2CHCl_2$	236SA ‡	20~80	3	White	Purple	1	3×5	1 (J.A)

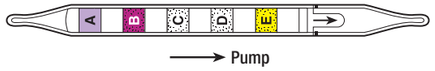
☆The conversion charts and the measuring ranges may vary with each manufacturing lot.
‡This tube must be stored in a refrigerated place (0-10°C/32-50°F).

LIST OF KITAGAWA PRECISION GAS DETECTOR TUBES

INORGANIC GAS/ORGANIC GAS QUALITATIVE DETECTOR TUBES

Two unique multi-layered qualitative tubes and a special colour chart to identify 60 chemicals in a couple of minutes.

Inorganic Gas Qualitative Detector Tube Tube No.131



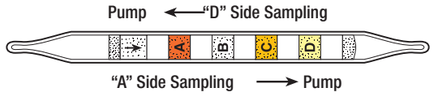
A	B	C	D	E	Substances (ppm level)
					Ammonia (5)/ Amines (5) Hydrazine (5)
					Sulphur Dioxide (10) Acetic Acid (15)
					Hydrogen Chloride (20)
					Chlorine (5)
					Nitrogen Dioxide (5)
					Hydrogen Suphide (10)
					Carbon Monoxide (10)
					Phosphine (2)
					Acetylene (10)
					Methyl Mercaptan (10)

Specifications

❶ Tube/box : 10 tubes (10-time use)
❷ Pump stroke : 1 (100mL)
❸ Sampling time : 20 seconds
❹ Shelf life : 1 year

If Tube No. 131 shows no stains, test for these substances:
Carbon Dioxide (126SA)
Ethylene(108B)
Hydrogen Cyanide (112SB)
Hydrogen Fluoride (156S)
Nitric Oxide (174A)
Phosgene(146S)

Organic Gas Qualitative Detector Tube Tube No.186B



"A" Side A	"D" Side Sampling A	B	C	D	Substances to be detected (Detectable limit [ppm])
					n-Butane (10) Propane (100) Tetrachloroethylene (100) Trichloroethylene (10) Vinyl Chloride (10)
					Hexane (10) Pentane (10)
					1,3-Butadiene (100)
					Gasoline (0.1 mg/L)
					Benzene (100) Toluene (200)
					Ethyl Benzene (400) Xylene (1000)
					Acetylene (1000) Ethylene (10)
					Styrene (100)
					Acetone (600) Benzene (10) Butyl Acetate (100) Toluene (30) Ethyl Acetate (600) Xylene (60) Ethyl Benzene (60) Ethylene Oxide (100) Kerosine (0.1 mg/L) Methyl Ethyl Ketone (100)
					Formaldehyde (10)
					Heptane (10) Carbon Disulphide (100)
					Methanol (100) 1-Butanol (100) Methyl iso-Butyl Ketone (100) 1,1,1-Trichloroethane (1000)
					Acetaldehyde (100) Ethyl Cellosolve (100) Tetrahydrofuran (100)
					Isopropyl Alcohol (600)
					Acetylene (100) Carbon Monoxide (100)
					Methyl Mercaptan (100)
					Arsine (100) Hydrogen Sulphide (100)
					Cresol (20) Phenol (10)
					Aniline (40)
					Ethyl Amine (100)

Specifications

❶ Tube/box : 10 tubes (5-time use)
❷ Pump stroke : 1 (100mL) +1 (100mL)*
❸ Sampling time : 30+30 seconds*
❹ Shelf life : 2 years

* The "A" side sampling and the "D" side sampling are required by using two fresh tubes for one-time analysis.

If Tube No. 186B shows no stains, test for these substances:
Acetic Acid (216S)
Carbon Tetrachloride (147S)
Methyl Bromide (157SB)
Pyridine(105SD)
Methane and Ethane

NOTE
means both stain colours are considered equivalent

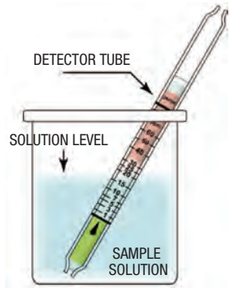
DETECTOR TUBES FOR DISSOLVED SUBSTANCES IN SOLUTION

Substance	Tube No.	Measuring Range (ppm)	Sampling		Colour Change		Typical Applications	Sampling Method	Shelf Life (year)	Q'ty of tubes/ box
			Volume (mL)	Time (sec)	Original	Stain				
Sulphide ion S^{2-}	200SA	2~1,000	over 5.0	180	White	Dark brown	Waste water analysis in pulp & paper mills, petroleum refineries, other chemical industries, waste disposal vplants, water treatment plant	Immersion method	1	10
	200SB	0.5~10	over 5.0	150	White	Pale brown			1	10
Chloride ion Cl^-	201SA	10~2,000	over 5.0	90	Brown	Pale yellow	Detection of salt water in marine lubricating oils, impurity test, testing portable water supply	Immersion method	3	10
	201SB	3~200	over 5.0	90	Brown	White			2	10
	201SC	1~60	over 5.0	180	Brown	Pale yellow			2	10
Copper ion Cu^{2+}	203S	1~100mg/L	over 5.0	60	White	Orange	Waste water analysis in pulp & paper mills, petroleum refineries, other chemical industries, waste disposal plants, water treatment, school hygiene	Direct sampling method ■	1	10
Cyanide ion CN^-	204S	0.2~5	over 5.0	120 to 240	White	Blue	KCN & NaCN in water	Direct sampling method ■	2	10
Salinity NaCl	205SL	0.01~0.8%	over 5.0	30	Brown	White	Detection of salt water in marine lubricating oils, impurity test, testing portable water supply	Suction method □	2	10
Free residual chlorine Cl_2	234SA	0.4~5	over 5.0	180	White	Purple	Detection of dissolved chlorine for disinfection & sterilization of swimming pools, etc.	Immersion method	2	10
Water content in solvent H_2O	77S	10~160mg/L 50~400mg/L	Position C D	10 10	Yellow	Blueish purple	Detection of water content in solvent	Direct sampling method ■	2	10

■Rubber bulb is required. □Rubber bulb and filter paper are required.

● Direct sampling method
Insert the end of detector tube into the rubber bulb to draw sample solution up.

● Immersion method
Immerse the end of detector tube in a sample solution and use capillary action to soak the sample up.



DETECTOR TUBES FOR COPMRESSED BREATHING AIR SAMPLING

Substances to be measured	Tube No.	Measuring Range (ppm)	Sampling Time (min)	Colour Change		Shelf Life (year)	Q'ty of tubes/ box
				Original	Stain		
Carbon monoxide CO	600SP	5~100 2.5~5	② 4	Yellow	Dark brown	2	10
Carbon dioxide CO_2	601SP	100~3,000	2	Purplish blue	Pale pink	2	10
Oil mist	602SP	0.3~5mg/m^3	25	Yellow	Pale blue	2	10
Water vapour H_2O	603SPA	20~160mg/m^3	1	Yellow	Yellowish green or blue	3	10
Oxygen O_2	604SP ※	2~24%	1	White	Brown	2	10

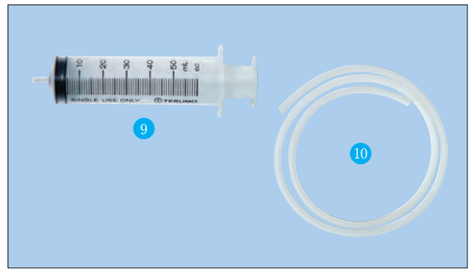
※50mL plastic syringe and 1m vinyl tube are required.

Compressed Breathing Air Sampling Kit P-41R

Impurities in breathing air for respiration can adversely affect human health. The kit is designed to measure these contaminants in SCBA, SCUBA and other pressurized breathing air cylinders, as well as directly from the outlet of an air compressor or purifier. The kit easily measures five components within minutes : carbon monoxide, carbon dioxide, oil mist, water vapor and oxygen by aerating the detector tube with an exclusive reducing valve from the breathing air source.

<P-41> includes;

❶ Control assembly
(Including an adapter with W22-14RH Female thread for rescue and on-land cylinders)
❷ International fitting yoke (For a scuba cylinder)
❸ Gas detector tubes (sold separately)
❹ Tube protector
❺ Tip cutter for gas detector tubes
❻ Wrench
❼ Digital stopwatch
❽ Carrying case (Aluminum)



Optional Accessories for 604SP only;

❾ 50mL plastic syringe
❿ 1m vinyl tube

HIGH SENSITIVITY TUBES

Tube No.	Gas to be measured Chemical Formula	Measuring Range (ppm)	Sampling		Colour Change		Typical Applications	Shelf Life (year)	Q'ty of tubes/ box
			Flow Rate (mL/min)	Time (min)	Original	Stain			
710 ‡	Formaldehyde HCHO	0.01~0.12 0.04~0.48	300	㉚ 10	Yellowish orange	Pink	Indoor air pollutants	1	20
710A ‡		0.05~1.0 0.10~2.0	30	㉚ 15	Yellowish orange	Pink		1	20
713 ‡		0.01~0.50	350	10	Yellowish orange	Pink		1	20
721 ‡	Toluene $C_6H_3CH_3$	0.05~1.0	200	20	White	Brown		1	10
721© ‡	Ethyl benzene $C_6H_4(C_2H_5)_2$	0.05~1.2						1	10
721© ‡	Xylene $C_6H_4(CH_3)_2$	0.1~1.4						1	10
730	p-Dichlorobenzene p-$C_6H_4Cl_2$	0.01~0.40	200	15	Yellow	Reddish purple		1	10
740	Nitrogen dioxide NO_2	0.01~0.1 0.02~0.2	200	⑳ 10	White	Reddish purple	Atmospheric environment measurement	2	10
750	Trichloroethylene $Cl_2C=CHCl$	30~400μg/m³ 69~920μg/m³	100	㉚ 15	Yellowish orange	Purple red		1	2×10
760	Tetrachloroethylene $Cl_2C=CCl_2$	30~400μg/m³ 69~920μg/m³	100	㉚ 15	Yellowish orange	Purple red		1	2×10
770	Hydrogen fluoride HF	0.05~1.0	250	10	Pale yellow	Pink	Industrial hygiene	2	10
900NHH	Ammonia NH_3	10~80μg/m³	400	60	Pale purple	Pale yellow	For cultural-property protection in art galleries and museums	2	10
901NHL		1~12μg/m³	400	60	Pale purple	Pale yellow	For clean room monitoring of semiconductor industries	2	10
910	Organic acid	Acetic acid; 10~400μg/m³ 25~1000μg/m³	200	㊿ 30	Pale pink	Pale yellow	For cultural-property protection in art galleries and museums	3	10
		Formic acid; 20~800μg/m³	200	60					

‡This tube must be stored in a refrigerated place (0-10°C/32-50°F).
Air Sampler is required for above tubes.

LIST OF KITAGAWA PRECISION GAS DETECTOR TUBES

TIME WEIGHTED AVERAGE TUBES

Tube No.	Gas to be measured Chemical Formula	Measuring Range (ppm)	Sampling		Colour Change		Typical Applications	Shelf Life (year)	Q'ty of tubes/ box	T.L.V. T.W.A (ppm) J: JPN A: U.S.A B: U.K.
			Flow Rate (mL/min)	Time (hr)	Original	Stain				
500	Carbon monoxide CO	5~400	6	0.5~8	White	Brown ringed	Industrial hygiene	3	10	50 (J) 25 (A) 30 (B)
501	Ammonia NH_3	5~200	8	1~8	Purple	Yellow		3	10	25 (J.A.B)
502	Hydrogen Sulphide H_2S	1~20	6	1~8	White	Brown		1	10	1 (J.A) 5 (B)
503	Sulphur dioxide SO_2	0.5~20	6	1~8	Purple	Yellow		3	10	0.25 (A)
504	Toluene $C_6H_5CH_3$	20~200	10	1~8	White	Brown		3	10	20 (J.A) 50 (B)

TLV-TWA(The Threshold Limit Value-Time Weighted Average):The time-weighted average concentration for an 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

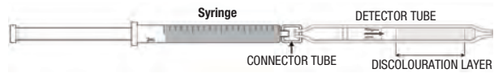
CRIMINAL INVESTIGATION TUBES (FOR SCREENING TEST ONLY)

Tube No.	Detector Tube Chemical Formula	Measuring Range (ppm)	No. of Pump Strokes	Colour Change		Typical Applications	Sampling Method	Shelf Life (year)	Q'ty of tubes/ box
				Original	Stain				
290P	Detector tube for crime investigation	–	1	White	[Gasoline]Brown/dark brown/orange [Kerosene]Pink/dark brown	Discriminate Gasoline and/or Kerosene	Vacuum method	2	10
290P Ⅱ	Detector tube for crime investigation	–	1	White	[Gasoline]Yellow/brown/greenish brown [Kerosine]Brown/pale pink/pale brown			2	10
290CN ‡ †	Hydrogen cyanide in blood HCN	2~30mg/L	1	Yellow	Red	Screening test to identify cause of one's death	Vacuum method	2	2×5
290CO †	Carbon monoxide in blood CO	20~90%COHb	1	Yellow	Blackish brown			1	2×5
290EA †	Ethyl alcohol in blood C_2H_5OH	0.2~2.0mg/mL	3	Pink	Pale blue			1	2×5
290HS ‡ †	Hydrogen sulphide in blood H_2S	0.1~1.0μg/mL	1	Pale yellow	Pink			1	2×5
290PQ	Paraquat dichloride in blood -qualitative $CH_3(C_5H_4N)_2CH_3Cl_2$	–	–	White	Blue		Injection method	3	10

‡This tube must be stored in a refrigerated place (0-10°C/32-50°F).
†Air flow control orifice is required.

● Vacuum method
=Use sampling pump AP-20 or AP-1

● Injection method=Connect a syringe to the detector tube and insert sample into the tube.



Option

Air Flow Control Orifice (for AP-20 with O-ring)

Some detector tubes require the orifice to use.

Tip Cutter

Included in a tube box for dissolved substances in solution, high sensitivity and collection tubes to cut the ends of the detector tubes.

Charcoal Tube 800B

Scavenger : coconut shell charcoal
Fill ration : 1st layer : 100mg
2nd layer : 50mg
● 20 tubes/box, cap 40 pcs
sticker 20 pcs, tip cutter

Charcoal Tube 800E / 800EC

Scavenger : synthetic charcoal
Fill ration:1st layer : 100mg
2nd layer : 50mg
● 10 tubes/box, cap 20 pcs
sticker 10 pcs, tip cutter

800EC has a scratch for easy cut of the tube.

Silica Gel Tube 801

Scavenger : silica gel type A
Fill ration : 1st layer : 300mg
2nd layer : breakthrough indicator
● 10 tubes/box, cap 20 pcs
sticker 10 pcs, tip cutter

DNPH-Treated Silica Gel Sorbent Tube 810

Scavenger : DNPH-treated silica gel
Fill ration : 400mg
● 20 tubes/box, cap 40 pcs
sticker 20 pcs, tip cutter

‡ This tube must be stored in a refrigerated place (0-10°C/32-50°F) or a freezer (-18°C/0°F).

DNPH-Treated Silica Gel Sorbent Cartridge 815H

Scavenger : DNPH-treated silica gel
Fill ration : 400mg
● 10 pcs/bag, sticker 10 pcs

‡ This cartridge must be stored in a refrigerated place (0-10°C/32-50°F).

Option
Tube Holder
STH-800A / STH-800B
STH-800A for
801/800E/800EC
STH-800B for 800B

Air Sampling Pump ASP-1200

Designed to be used with detector tubes, DNPH tubes and/or charcoal tubes for working environment measurement.

- High suction power
- Large and light display
- 10 measuring patterns can be registered
- USB connector
- Simple operation with crisscross key
- Enhances dust proof and water proof capabilities (equivalent to “IP43”)

SPECIFICATION

Flow volume setting range	10-1200mL/min (constant flow function)
Flow volume accuracy	10-100mL/min : ±5mL/min 100-1200mL/min : ±5% against indication value
Accumulated flow volume indication range	0.0-9999.9L
Accumulated time indication range	00:00-999:59 (hour:minute)
Timer	Set start-time and end-time
Operating temp. & humidity	0-40°C ; 0-90%RH (non-condensing)
Power supply	4×AA size battery (alkaline, nickel metal-hydride, or lithium) AC power (input AC100-240V 50/60Hz, output DC5V Max 1.8A, USB Micro-B terminal(male))
Size & weight	145(W)×99(H)×54(D)mm 490g (including batteries)
Options	Impinger holder, impinger hook, replacement filter (10pcs)

Air Sampling Pump DSP-550

Collects sapmles into a sampling bag directly
for air sampling in work environment.

- Almost zero VOC adsorption inside the air sampliing pump
- Small, excellent quietness and no vibration
- Constant flow, set start-time and end-time, correct flow volume function
- Attachable to a tripod directly

SPECIFICATION

Flow volume setting range	50-550mL/min (constant flow function)
Flow volume accuracy	Either ±10mL/min or within ±5% against flow volume setting, whichever bigger
Accumulated flow volume indication range	0.00-99.99L
Accumulated time indication range	00:00-99:59 (hour:minute)
Timer	Set start-time and end-time
Operating temp. & humidity	0-40°C ; 0-90%RH (non-condensing)
Power supply	2×AA size battery(alkaline, nickel metal-hydride) or USB power DC5V(output 0.5A or more) Micro-USB B connector
Size & weight	68(W)×120(H)×31(D)mm 170g (including batteries)
Options	Replacement filter with tube (3pcs)

We develop and offer various rapid and easy detection kits using detector tubes applying our build up technique for variety of industries, where means for analyzing are used to require expertise and significant time and money.

Harmful Gas Detector for Disaster Relief P-50/UFO-ⅡH

In various disasters blown up, rescue teams often suffer from secondary disasters. Among them, disasters caused by invisible toxic gases make relief efforts dangerous.
The kits offer fast and easy detection of toxic gases at rescue site.

<P-50> includes;

- Detector tubes
  131 Inorganic Gas Qualitative Tube
  186B Organic Gas Qualitative Tube
- Gas qualitative flow charts
- AP-20B sampling pump×2
- SH-5N extension hose(5m)
- B-191 Tip cutter
- Container for used tubes
- Carrying case

<UFO-ⅡH> includes;

○ For inorganic gases		※
Ammonia	105SB	10
Carbon dioxide	126SA	10
Carbon disulphide	141SA	5
Carbon monoxide	106SA	10
Chlorine	109SB	10
Hydrogen chloride	173SB	5
Hydrogen cyanide	112SB	10
Hydrogen fluoride	156S	10
Hydrogen selenide	167S	10
Hydrogen sulphide	120SB	10
Nitric acid vapour	233S	10
Nitro-oxide compound	174A	5
Phosgene	146S	10
Sulphur dioxide	103SD	10

○ For organic gases		※
Acetylene	101S	10
Chloroform	152S	5
Ethylene oxide	122SA	10
Methyl alcohol	119SA	10
Methyl amine	227S	10
Toluene	124SA	10

※Measurement times/box.

Flue Gas Sampler P-10FG

Measures gas samples from a gas duct such as Nitrogen oxides, Sulphur dioxide, Oxygen to prevent pollution easily and quickly.
For voluntary control of emission standard.

<P-10FG> includes;

- AP-20B sampling pump
- Stainless steel sampling probe
  (Length 980mm when 3 probes connected)
- Thermometer (0~300°C)
- Ribbon heater(AC220V, 50W)
- Suction pump
- Rubber connection tube (1.5m)
- Carrying case

✻ Detector tubes are sold separately.

Detector tubes for P-10FG

Gas to be measured	Tube no.	Measuring range	Q'ty of tubes/box
Nitro-oxide compound	174B	10~ 300ppm:NO 1~ 40ppm:NO_2	5
Nitrogen oxides	175SA	20~ 250ppm	10
	175SH	100~2500ppm	10
Oxygen	159SC	1.5~ 24ppm	5
Sulphur dioxide	103SC	20~ 300ppm	10
	103SD	1~ 60ppm	10
	103SF	0.02~ 0.30%	5

SPECIAL DETECTOR KIT FOR DETECTOR TUBES

Simple Measurement Set for Chlorocarbons in Drainage P-20/P-24AP

Offers easy detection of solvents in drainage by measuring the head space gas with detector tubes where contaminating public water or groundwater caused by chlorine-based organic solvents from dry cleaning or cleansing of semiconductor component bring a problem.

<P-20> includes;

- Resinous gas collector (100mL)
- B-190 Tip cutter
- Collecting bottle (500mL)
- Thermometer

◎ AP-20 sampling pump is required for 50mL sampling.

<P-24AP> includes;

- AP-20B sampling pump
- Grease
- Rubber tube connector×2
- Hand strap
- Collecting bottle (500mL)×5
- Thermometer
- Carrying case

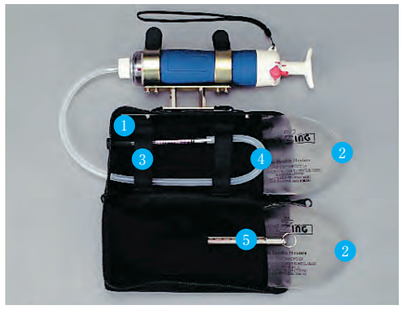
✻ Detector tubes are sold separately.

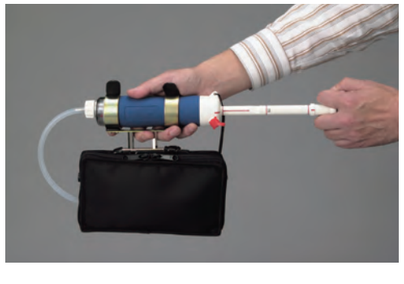
Detector tubes for P-20/P-24AP

Gas to be measured	Tube no.	Measuring range (mg/L)	Q'ty of tubes/box
Benzene	118SC	0.1~1.5	10
Carbon tetrachloride	147S ‡	0.1~1.0	2×5
1,2-Dichloroethane	230SA ‡	0.3~3.7	3×5
1,1-Dichloroethylene	132SC	0.01~0.27	2×5
cis-1,2-Dichloroethylene	145S ‡	0.1~2.7	10
Dichloromethane	180S ‡	2~54	2×5
1,1,1-Trichloroethane	160S ‡	0.67~9.0	2×5
1,1,2-Trichloroethane	236SA ‡	1.4~5.6	3×5
1,3-Dichloropropene	132SC	0.02~0.5	2×5
Trichloroethylene◎ ( ) is the maximum range available with P-20.	134SA ‡	0.15~8.80(4.40)	10
	134SB ‡	0.03~1.00(0.47)	10
Tetrachloroethylene◎ ( ) is the maximum range available with P-20.	135SA ‡	0.14~8.20(4.10)	10
	135SB ‡	0.03~0.64(0.27)	10

‡ This tube must be stored in a refrigerated place (0-10°C/32-50°F)

Tube Warming System TWS-201





Measures gases and vapours in low temperature conditions down to-20°C/-4°F.
Inside of the bag is heated when hot packs are clicked and gas detector tubes are brought up to their operating temperatures.

<TWS-201> includes;

❶ Bag
❷ Hot pack×2
❸ Detector tube holder
❹ Conection tube
❺ Thermometer

Air Flow Indicator Tube 301

Used with air flow indicators AS-1, AS-2 or AS-3.
A visual examine by a smoke generation is common to inspect an indoor airflow or a function of a local exhaust ventilation, where a heat source is not an ideal. AS-1 and AS-2 do not carry any heat sources and can be used in explosion-risk areas.
Air flow indicator tube has a film coating to avoid scattering of reagents inside for safe check of the airflow.
Complies with OSHA(Occupational Safety and Health Administration, UNITED STATES DEPARTMENT OF LABOR)'S protocol for respirator fit testing(29CFR 1910 134 App A).

<Tube no.301> includes;

- Air flow indicator tube×10
- Tip cutter
- Cap×4

* One tube makes about 100 times smoke.

<CAUTION FOR USE>

Air flow indicator tube fills smoke generators in a glass tube. Once the smoke generator is released into the air, it reacts with water vapour in the air and generates a white smoke.
The white smoke generated includes toxic hydrogen chloride. Be aware of the below.

1) Avoid inhaling or touching the white smoke. The white smoke may irritate eyes, nose and throat. In case you inhale the white smoke, rinse your mouth well. In case you touch the white smoke, wash off well.
2) Avoid using the air flow indicator tube near precision instruments because it includes corrosive gas. It may corrode metal parts or cause a malfunction.
3) Do not use in confined spaces, crowded places or residential areas. In case it is used in those areas, vent the areas well.
4) Do not use in hospitals, food handling places or clean rooms.

Air Flow Indicators AS-1/AS-2 (for continuous monitoring)

AS-1 : Insert the air flow indicator tube into the rubber bulb and squeeze the bulb to generate the white smoke. For momentary and intermittent inspection of the direction and speed of the airflow.

AS-2 : Insert the air flow indicator tube into the inlet of the rubber bulb and squeeze the bulb to generate the white smoke continuously by putting through an air buffered in the air reservoir. For continuous inspection of the direction and speed of the airflow. The white smoke continutes for about one minute.

<AS-1> includes;

- Rubber bulb
- Carrying case

<AS-2> includes;

- Rubber bulb and Air reservoir
- Carrying case

* Air flow indicator tubes are sold separately.

Air Flow Indicator AS-3 (for remote monitoring)

To inspect an airflow from ventilation fans and hood installed in unreachable places.
2 modes (continuously and intermittently) are available by switch operation at a pump part started by batteries.
Not an explosion-proof. Do not use at hazardous areas.

SPECIFICATION

Pump	Diaphragm
Power supply	4×AA size alkaline dry battery
Run time	Approx. 4 hours (alkaline dry batteries, with air flow indicator tube)
Size	51(W)×67(H)×84(D)mm(pump part), length 2m
Weight	300g (including dry batteries)

* Air flow indicator tubes are sold separately.

Air Flow Indicator AF-1

(with a fan adaptor)

Components

<AF-1> includes;

- Air flow indicator
- Fan adaptor with cone
- Spare cone
- Fluid in a bottle SZFF-03
- A plus driver (to open the battery door)
- Carrying case
- AA size battery×7

To create a visualization by white smoke (propylene glycol vapour) to check a draft air, airflow direction and speed of draft, duct and ventilation fans or at remote working places or leakage check of dust collector, etc.

- Easy opeartion when you are in a protective equipment.
- Continuous and intermittent mode.
- Fluid is made of distilled water, glycerin (USP kosher food additive) and Propylene glycol (USP kosher food additive) and does not contain acid substances which are corrosive or hazardous.
- One fill of fluid makes about 20 minutes operation.
- One bottle of fluid makes about 7 hours operation.
- Not an explosion-proof. Do not use at hazardous areas.

SPECIFICATION

Power supply	7×AA size alkaline dry battery
Run time	Approx. 90 minutes (alkaline dry batteries)
Size	51(W)65(W)×235(H)×120(D)mm (w/o fan adaptor)
Weight	Air flow indicator only approx. 185g (exluding batteries)

Tube No.	Detector Tube Name	Tube No.	Detector Tube Name	Tube No.	Detector Tube Name	Tube No.	Detector Tube Name
77S	Water content in solvent	109SB	Chlorine	120SE	Hydrogen sulphide	133A	Acetaldehyde
100	Carbon monoxide	109U	Chlorine	120SF	Hydrogen sulphide	133SB	Acetaldehyde
101S	Acetylene	110S	Gasoline	120SH	Hydrogen sulphide	134SA	Trichloroethylene
102SA	Acetone	111SA	Ethyl acetate	120SM	Hydrogen sulphide	134SB	Trichloroethylene
102SA©	Tetrahydrofuran	111SA©	Methyl acetate	120U	Hydrogen sulphide	134SG	Trichloroethylene
102SC	Acetone	111U	Ethyl acetate	120UH	Hydrogen sulphide	135SA	Tetrachloroethylene
102SD	Acetone	111U	Isopropyl acetate	120UT	Hydrogen sulphide	135SB	Tetrachloroethylene
103SA	Sulphur dioxide	111U©	tert-Butanol	121SA	Phosphine in acetylene	135SG	Tetrachloroethylene
103SB	Sulphur dioxide	111U©	Butyl ether	121SB	Phosphine in acetylene	135SM	Tetrachloroethylene
103SC	Sulphur dioxide	111U©	Butyl methacrylate	121SC	Phosphine	136	Acrolein
103SD	Sulphur dioxide	111U©	tert-Butyl methyl ether	121SD	Phosphine	137U	Hydrogen
103SE	Sulphur dioxide	111U©	Cumene	121SG	Phosphine	138U	Butyl acetate
103SF	Sulphur dioxide in flue gas	111U©	Cyclohexene	121SH	Phosphine	139SB	Methyl ethyl ketone
103SG	Sulphur dioxide	111U©	Decahydronaphthalene	121SS	Phosphine	139SB©	Butyl acetate
104SA	Ethyl alcohol	111U©	n-Decane	121U	Phosphine	139SB©	1,4-Dioxane
105SA	Ammonia	111U©	Diethyl benzene	121U	Arsine	139SB©	Isobutyl acetate
105SB	Ammonia	111U©	Ethyl methacrylate	122SA	Ethylene oxide	139SB©	Isopropyl acetate
105SC	Ammonia	111U©	Isopropyl ether	122SA©	Furan	139SB©	Propyl acetate
105SD	Ammonia	111U©	n-Nonane	122SA©	Isopropyl alcohol	139U	Methyl ethyl ketone
105SD©	n-Butyl amine	111U©	1,2,4-Trimethyl benzene	122SA©	Methyl ethyl ketone	139U	Methyl propyl ketone
105SD	Cyclohexyl amine	111U©	n-Undecane	122SA©	Methyl isobutyl ketone	139U©	Diisobutyl ketone
105SD©	Di-n-Butyl amine	112SA	Hydrogen cyanide	121SC	Ethylene oxide	139U©	Methyl amyl ketone
105SD©	Di-iso-Propyl amine	112SB	Hydrogen cyanide	122SC©	Propylene glycol	140SA	Arsine
105SD©	N,N-Dimethyl aniline	112SC	Hydrogen cyanide	122SC©	Propylene oxide	141SA	Carbon disulphide
105SD©	Dipropyl amine	113SA	n-Hexane	122SD	Ethylene oxide	141SB	Carbon disulphide
105SD©	n-Methyl aniline	113SB	n-Hexane	122SL	Ethylene oxide	141SC	Carbon disulphide
105SD©	Morpholine	113SB©	Isobutylene	122SM	Ethylene oxide	142S	Mercury vapour
105SD©	Pentyl amine	113SB©	Methyl cyclohexane	123S	Dimethyl ether	143SA	Xylene
105SD©	Propyl amine	113SB©	2,2,4-Trimethyl pentane	124SA	Toluene	143SB	Xylene
105SD©	Pyridine	113SB©	Heptane	124SB	Toluene	145SA	1,2-Dichloroethylene
105SD©	o-Toluidine	113SB©	Isobutane	124SH	Toluene	146S	Phosgene
105SD©	p-Toluidine	113SB©	Pentane	125SA	Propane	147S	Carbon tetrachloride
105SE	Ammonia	113SC	n-Hexane	126B	Carbon dioxide	150U	Isopropyl alcohol
105SE	Trimethyl amine	105SE	Bromine	126SA	Carbon dioxide	151U	Propyl acetate
105SH	Ammonia	115S	Cyclohexane	126SB	Carbon dioxide	152S	Chloroform
105SM	Ammonia	116	Chlorine dioxide	126SF	Carbon dioxide	153U	Isobutyl acetate
106B	Carbon monoxide	117SA	Nitrogen dioxide	126SG	Carbon dioxide	153U©	Naphthalene
	-in the presence of ethylene	117SB	Nitrogen dioxide	126SH	Carbon dioxide	155U	Methyl isobutyl ketone
106C	Carbon monoxide	117SD	Nitrogen dioxide	126UH	Carbon dioxide	156S	Hydrogen fluoride
	-in the presence of ethylene	118SB	Benzene-in the presence of	128SA	Acrylonitrile	157JS	Methyl bromide
	and/or nitrogen oxides		other aromatic hydrocarbons	128SB	Acrylonitrile	157SA	Methyl bromide
106S	Carbon monoxide	118SC	Benzene	128SC	Acrylonitrile	157SB	Methyl bromide
106SA	Carbon monoxide	118SD	Benzene	128SD	Acrylonitrile	157SB©	Bromochloromethane
106SC	Carbon monoxide	118SE	Benzene-in the presence of		Nickel carbonyl	157SB©	Bromoform
106SH	Carbon monoxide		other aromatic hydrocarbons	130U	tert-Butyl mercaptan	157SB©	1-Bromopropane
106SS	Carbon monoxide	119SA	Methyl alcohol	130U	Ethyl mercaptan	157SB©	2-Bromopropane
106UH	Carbon monoxide	119LPG	Methanol in LPG	130U	Isopropyl mercaptan	157SB©	Dibromomethane
107SA	Ethyl ether	119U	Methyl alcohol	130U	Methyl mercaptan	157SB©	1,2-Dichloropropane
107U	Ethyl ether	119U©	1,4-Dioxane	130U	n-Propyl mercaptan	157SB©	Ethyl bromide
108B	Ethylene	120SB	Hydrogen sulphide		Inorganic gas-qualitative	157SD	Methyl bromide
108SA	Ethylene	120SC	Hydrogen sulphide-in the	132SA	Vinyl chloride	158S	Styrene
108SC	Ethylene		presence of sulphur dioxide	132SB	Vinyl chloride	158S©	Divinyl benzene
109SA	Chlorine	120SD	Hydrogen sulphide	132SC	Vinyl chloride	158S©	α-Pinene

LIST OF KITAGAWA PRECISION GAS DETECTOR TUBES BY TUBE NO.

Tube No.	Detector Tube Name	Tube No.	Detector Tube Name	Tube No.	Detector Tube Name	Tube No.	Detector Tube Name
158SB	Styrene	189U	2-Butanol	216S©	Propionic acid	502	TWA-Hydrogen sulphide
159SA	Oxygen	190U	Ethyl cellosolve	216S©	n-Valeric acid	503	TWA-Sulphur dioxide
159SB	Oxygen	190U	Methyl cellosolve	219S	Hydrazine	504	TWA-Toluene
159SC	Oxygen-Non-heating type	190U©	1-Butanol	221SA	n-Butane	600SP	Compressed breathing air test (CO)
160S	1,1,1-Trichloroethane	190U©	Butyl cellosolve	222S	Diethyl amine	601SP	Compressed breathing air test (CO2)
162U	Tetrahydrofuran	190U©	Diacetone alcohol	222S	Trimethyl amine	602SP	Compressed breathing air test (Oil mist)
163SA	Propylene oxide	190U©	Ethyl cellosolve acetate	222S©	Isopropylamine	603SPA	Compressed breathing air test (H20)
163SD	Propylene oxide	190U©	Furfural	223S	2,2'-Dichloroethyl ether	604SP	Compressed breathing air test (02)
164SA	Methyl mercaptan	190U©	Isoprene	224SA	Monoethanol amine	710	Formaldehyde-Indoor air quality
164SH	Methyl mercaptan	190U©	Mesityl oxide	227S	Dimethyl amine	710A	Formaldehyde-Indoor air quality
165SA	Ethyl mercaptan	190U©	Crotonaldehyde	227S	Ethyl amine	713	Formaldehyde-Indoor air quality
165SB	Ethyl mercaptan	190U©	Dicyclopentadiene	227S	Methyl amine	721	Toluene-Indoor air quality
165SB	tert-Butyl mercaptan	190U©	Isopropyl cellosolve	229S	N,N-Dimethylacetamide	721©	Ethyl benzene-Indoor air quality
166S	Ethylene dibromide	190U©	Methyl cellosolve acetate	230SA	1,2-Dichloroethane	721©	Xylene-Indoor air quality
167S	Hydrogen selenide	190U©	1-Propanol	232SA	Ethylene glycol	730	p-Dichlorobenzene-Indoor air quality
168SA	1,3-Butadiene	190U©	Tetrahydrothiophen	232SB	Ethylene glycol	740	Nitrogen dioxide
168SB	1,3-Butadiene	192S	Epichlorohydrine	233S	Nitric acid vapour	750	Trichloroethylene
168SC	1,3-Butadiene	193S	Methyl styrene	234SA	Free residual chlorine	760	Tetrachloroethylene
168SE	1,3-Butadiene	194S	1,3-Dichloropropane	235SA	1,1-Dichloroethane	770	Hydrogen fluoride
169S	Chloroprene	196S	N,N-Dimethyl formamide	236SA	1,1,2-Trichloroethane	800B	Charcoal tube
171SA	Formaldehyde	197U	Cyclohexanone	237S	Vinyl acetate	800E	Charcoal tube
171SB	Formaldehyde	197U©	Isophorone	237S©	Methyl butyl ketone	800EC	Charcoal tube
171SC	Formaldehyde	197U©	1-Methoxy-2-propanol	238S	Furfuryl alcohol	801	Silica-gel tube
172S	Chloropicrin	198U	Methyl cyclohexanone	239S	Carbonyl sulphide	810	DNPH sampling tube
173SA	Hydrogen chloride	199U	Methyl cyclohexanol	240S	Silane	811	DNPH sampling tube
173SB	Hydrogen chloride	200SA	Sulphide ion	242S	Diborane	815H	DNPH sampling cartridge
174A	Nitro-oxide compound	200SB	Sulphide ion	242S©	Hydrogen selenide	900NHH	Ammonia in art galleries/museums
174B	Nitro-oxide compound	201SA	Chloride ion	243U	Tetraethoxysilane	901NHL	Ammonia in clean room
175SA	Nitrogen oxides	201SB	Chloride ion	244U	Sulphuric acid	910	Organic acid in art galleries/museums
175SH	Nitrogen oxides	201SC	Chloride ion	245UH	Methyl isothiocyanate		
175U	Nitrogen oxides	203S	Copper ion	245UL	Methyl isothiocyanate		
176SC	Methyl iodide	204S	Cyanide ion	245UM	Methyl isothiocyanate		
176UH	Methyl iodide	205SL	Salinity	247S	Hydrogen peroxide		
177SA	Water vapour	206U	Cyclohexanol	248U	Ethyl-tert-Butyl Ether		
177U	Water vapour	208U	Isobutyl alcohol	249S	1,3-Dicholoropropene		
177UL	Water vapour	209U	Isopentyl alcohol	250S	Dimethyl sulphide		
177UR	Water vapour	210U	Pentyl acetate	251U	Diesel fuel		
178SB	Chlorobenzene	211U	Butyl acrylate	280S	Acetylene・Ethylene		
179S	Ethyl benzene	211U	Methyl acrylate		-separation measurement		
180S	Dichloromethane	211U©	Ethyl acrylate	281S	Oxygen・Carbon dioxide		
181S	Aniline	211U©	Isobutyl acrylate		-separation measurement		
182SA	Ozone	213S	Triethyl amine	282S	Hydrogen sulphide・Mercaptans		
182SB	Ozone	214S	o-Dichlorobenzene		-separation measurement		
182U	Ozone	215S	p-Dichlorobenzene	290CN	Hydrogen cyanide in blood		
183U	Cresol	216S	Acetic acid	290CO	Carbon monoxide in blood		
183U	Phenol	216S	Formic acid	290EA	Ethyl alcohol in blood		
184S	Methyl methacrylate	216S©	Acetic anhydride	290HS	Hydrogen sulphide in blood		
184S©	Allyl alcohol	216S©	Acrylic acid	290PQ	Paraquat dichloride in blood-qualitative		
185S	Propylene	216S©	n-Butyric acid	290P	Detector tube for crime investigation		
186	Organic gas checker	216S©	Isobutyric acid	290P Ⅱ	Detector tube for crime investigation		
183S	Organic gas-qualitative	216S©	Isobutyric acid	301	Air flow indicator tube		
187S	General hydrocarbons	216S©	Maleic anhydride	500	TWA-Carbon monoxide		
188U	Isopentyl acetate	216S©	Methacrylic acid	501	TWA-Ammonia		

APPLICATIONS OF KITAGAWA GAS DETECTOR TUBE SYSTEM

INDUSTRIAL HYGIENE

Measures harmful gases and vapours quickly in the atmosphere to control the concentration at the work places.

INDUSTRIAL WASTE WATER

Measures effluent to identify the source of pollution simply and quickly at anywhere.

PROCESS CONTROL

Measures impurities in gases as raw feedstock and intermediate to ensure high product quality and prevent catalyst poisoning for rising production efficiency. efficiency topoisoning.

FIRE/EXPLOSION PREVENTION

Measures mixed combustible gases speedy and safely on-site without ignition source to prevent fire and explosion by leaked or generated gas.

ON BOARD

Measures toxic gas before entering cargo rooms or checks residual gas after cleaning chemical tanks in conformity with the IMO rule.

AIR POLLUTION CONTROL

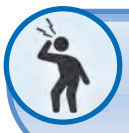
Measures toxic gases such as SO_2 and NO_2 in flue gas rapidly on-site to identify and contorl the source of pollutant in the air.

COMBUSTION EFFICIENCY

Measures CO, CO_2 and O_2 in exhaust gas to check combustion efficiency of combustion appliances.

EDUCATION

Measures classroom environment or as an experimental tool for learning combustion and photosynthesis in a science class.



PREVENT ACUTE POISONING

Measures leaked, blowout, generated or residual toxic gases rapidly to prevent poisoning.

DRINK DRIVING CONTROL

Measures alcohol in breath and contributes to prevent alcohol-related accidents.

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●Specifications are subject to change without any prior notice.