

GASTEC
FLUOROCHLOROCARBONS DETECTOR TUBE
CALIBRATED FOR TRICHLOROFLUOROETHANE R-113

The Gastec Detector Tube No. 51 provides a rapid, fully quantitative analysis of the concentration of TRICHLOROFLUOROETHANE in air with an accuracy tolerance of $\pm 25\%$ utilizing the Gastec Multi-Stroke Gas Sampling Pump in conjunction with Model 840 Gastec Pyrotec Pyrolyzer.

PERFORMANCE:

Calibration Scale:	10-400 ppm (based on 1 pump stroke)
Measuring Range:	10-400 ppm
Number of Pump Stroke:	1
Correction Factor:	Tube Reading X 1
Detecting Limit*:	2 ppm (Minimum detectable concentration)
Sampling Time:	1.5 minutes per pump stroke
Color Change:	Yellow-Reddish Brown

****SHELF LIFE:**

Please refer to the Validity Date printed on the box of tube.

PRESSURE CORRECTION:

To correct for pressure, multiply the tube reading by

$$\frac{\text{Tube Reading (ppm)} \times 1013 \text{ (hPa)}}{\text{Atmospheric Pressure (hPa)}}$$

MEASUREMENT PROCEDURE:

The Gastec Fluorochlorocarbons Detector tube No. 51 is used with Gastec Pyrotec Pyrolyzer that pyrolyzes halogenated hydrocarbons and measure the decomposed substances by the detector tube.

- Remove the inlet clamping nut from the Model 800 Gastec Gas Sampling Pump. Set the Pyrotec Pyrolyzer to the Sampling Pump.
- Push the power switch of the Pyrolyzer on and confirm that the battery of the Pyrotec Pyrolyzer is sufficient for use.
If the pilot lamp of the power switch does not light, replacement of the batteries is needed.
- Break tips off a fresh primary and analyzer tube by bending each tube end in the tube tip breaker of the pump.
- Connect the primary tube securely into the rubber inlet of the Pyrotec Pyrolyzer with the arrow on the tube pointing toward the Pyrotec body. Also connect the analyzer tube to the rubber inlet of the sampling pump positioned on the center of Pyrotec Pyrolyzer with the arrow on the tube pointing toward the pump.
- Assemble for Teflon U-Tube with plastic hexagon screw and analyzer tube.
- Make certain the pump handle is all the way in. Align the guide marks on handle and pump body.
- Pull the handle all the way out until it locks on 1 pump stroke (100 ml). Wait 1.5 minutes until staining stops.
- Read concentration at the interface of the stained-to-unstained reagent.
- After sampling, put the power switch of the Pyrotec Pyrolyzer off. To remove the remaining gas in the Pyrotec Pyrolyzer, connect used tubes with it and take 4 pump strokes in the fresh air.

APPLICATION FOR OTHER FLUOROCHLOROCARBONS & GASES:

Name of Gases	Chemical Formula	Factor (n=1)	Measuring Range
R-11 Trichloromonofluoromethane	CCl_2F	0.8	8-320 ppm
R-12 Dichlorodifluoromethane	CCl_2F_2	1.1	11-440 ppm
R-22 Monochlorodifluoromethane	CHClF_2	2.5	25-1000 ppm
R-112 Tetrachlorodifluoroethane	$\text{CCl}_2\text{FCCl}_2\text{F}$	0.7	7-280 ppm
R-113 Trichlorotrifluoroethane	$\text{CClF}_2\text{CCl}_2\text{F}$	1.0	10-400 ppm
R-113b Trichlorotrifluoroethane	CCl_3CF_3	1.0	10-400 ppm
R-114 Dichlorotetrafluoroethane	$\text{CClF}_2\text{CClF}_2$	2.0	20-800 ppm
R-123 2,2-Dichloro-1,1,1-tri-	CHCl_2CF_3	1.4	14-560 ppm

	fluoroethane			
R-124	2-Chloro-1,1,1,2-tetrafluoroethane	CHClFCF_3	4.5	45-1,800 ppm
R-141b	1,1-Dichloro-1-fluoroethane	$\text{CH}_2\text{CCl}_2\text{F}$	1.0	10-400 ppm
R-142b	1-Chloro-1,1-difluoroethane	CH_2CClF_2	2.0	20-800 ppm
R-225ca	3,3-Dichloro-1,1,1,2,2-pentafluoropropane	$\text{CHCl}_2\text{CF}_2\text{CF}_3$	1.8	18-720 ppm
R-225cb	1,3-Dichloro-1,1,2,2,3-pentafluoropropane	$\text{CHClFCF}_2\text{CClF}_2$	2.3	23-920 ppm
R-225ca & R-225cb at 1:1 Mixture			2.0	20-800 ppm

The Gastec detector tube No. 51 can also be used for the detection of following substances with charts below:

(1) Enflurane (2-Chloro-1,1,2-Trifluoroethyl Difluoromethyl Ether) $\text{CHClFCF}_2\text{OCHF}_2$

Tube 51 Reading (n=1)	10	50	100	150	200	300	400
Enflurane Conc. (ppm)	100	350	525	670	780	1,010	1,230

(2) Isoflurane (1-Chloro-2,2,2-Trifluoroethyl Difluoromethyl Ether)

Tube 51 Reading (n=1)	10	50	100	150	200	300	400
Isoflurane Conc. (ppm)	160	300	420	520	620	830	1,040

CORRECTION FACTOR:

Detector tubes are primarily designed to measure specific gases. But it is also possible to measure other substances of similar chemical properties with the aid of a correction factor or chart. A correction factor is a figure which is multiplied by the concentration interpreted from the color starting on the detector tube. The correction may also be presented as a chart on tube if the correction relationship is nonlinear. Therefore, please make use of the correction factor/chart measuring ranges as a reference. Moreover, this factor may vary slightly between production batches. For a more precise factor please contact your Gastec distributor.

CORRECTION FOR TEMPERATURE, HUMIDITY AND PRESSURE:

Calibration of the Gastec detector tube No. 51 is based on a tube temperature of 20°C (68°F) and not the temperature of the gas being sampled, approximately 50% relative humidity and normal atmospheric pressure.

No correction is required for tube temperature of 0-40°C (32-104°F) and for relative humidity range of 0-100%. To correct for pressure, multiply by

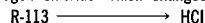
$$\frac{760}{\text{Atmospheric Pressure (mmHg)}}$$

CALIBRATION AND ACCURACY:

The Gastec detector tube No. 51 is carefully calibrated as an integral part of the manufacturing process. Calibration and accuracy test are performed using combinations of standard reference gas of known concentration and dynamic gas flow system and gas chromatographic technique.

DETECTION PRINCIPLE:

Halogenated hydrocarbons are pyrolyzed by the Pyrotec Pyrolyzer and produce hydrogen chloride which changes the pH indicator to reddish brown.

**INTERFERENCES:**

Other halogenated hydrocarbons produce similar stain by themselves.

DANGEROUS AND HAZARDOUS PROPERTIES:

Threshold Limit Value-Time Weighted Average by ACGIH(1998): 1,000 ppm (7-8 hours)

SEE OPERATING INSTRUCTIONS INCLUDED WITH THE GASTEC MULTI-STROKE GAS SAMPLING PUMP.

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99D-51-1
 Printed in Japan