

Detecting benzene in refinery applications



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The problem

Benzene is a critical industrial chemical which is commonly found throughout the petrochemical industry. However, it is extremely hazardous and a recognised human carcinogen. To protect individuals, legislation has been put in place across the globe to ensure exposure is kept to a minimum, typically a time weighted average (TWA) of 1 ppm.*

As this exposure limit is so low, its concentration alone usually defines the toxicity of vapours in the petrochemical industry as a whole. Therefore, it is essential that sub ppm benzene concentrations can be measured rapidly in the presence of the hundreds of aromatic and aliphatic compounds encountered throughout the industry.

The solution: Cub^{TAC} + Tiger Select

Traditionally, it has not been possible to collect accurate real-time measurements due to a lack of available technology. However, the combination of the Ion Science Cub^{TAC} personal PID monitor plus the Tiger Select handheld screening device now make this a reality....



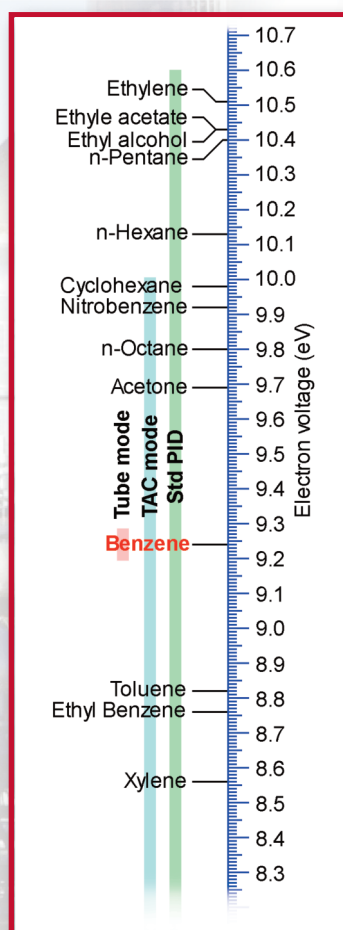
Cub^{TAC} personal PID monitor worn to provide continuous detection.

...How Cub^{TAC} + Tiger Select detect benzene

Photoionisation detection (PID) allows the detection of benzene at ppb levels however, it is also sensitive to all the other aromatic and aliphatic compounds present.

Monitoring specifically for benzene is a 3 stage process:

- 1) A 10.0 eV lamp is used in the Cub^{TAC} and Tiger Select to screen out the aliphatics, leaving the Total Aromatic Compounds = **TAC mode**.
- 2) If concentration exceeds 1 ppm with TAC mode, the Tiger Select is fitted with a filter tube that only allows benzene to pass through. The user can then assess the actual levels of benzene = **Tube mode**.
- 3) If benzene concentration exceeds 1 ppm in Tube mode, the user can then make an assessment of the short term exposure limit = **STEL mode**.



*OSHA standards

Continuous benzene protection



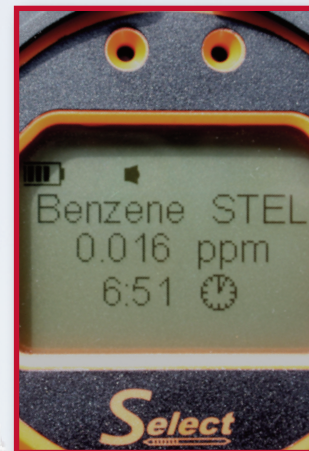
If Cub^{TAC} alarms, TAC exceeds 1 ppm** indicating benzene concentrations may be above safe levels.



To confirm the Cub^{TAC} reading Tiger Select is used in TAC mode.



If 1 ppm is exceeded switch to Tube mode.



If this is below 1 ppm, all is well, if above enter STEL mode.

Cub^{TAC} + Tiger Select; the ultimate tools for monitoring benzene

The revolutionary Tiger Select and Cub^{TAC} utilise the Ion Science patented Fence Electrode Technology and Anti-contamination design that deliver incomparable sensing performance over the range of environmental conditions experienced on site.

Cub^{TAC}

Cub^{TAC} is the smallest, lightest personal PID monitor available with market leading parts-per-billion (ppb) sensitivity.

Robust yet small, comfortable and unobtrusive to wear Cub^{TAC} provides fast, accurate detection of total aromatic compounds including benzene, protecting workers within their environment. A Cub variant is also available for detecting a wide range of volatile organic compounds (VOCs).

Visit www.ionscience.com/cub for more info on Cub.



Tiger Select

The Tiger Select hand-held gas detector with two mode operation rapidly detects benzene and Total Aromatic Compounds providing accurate, reliable data you can count on.


Its unique ability to rapidly switch between TAC mode and Tube mode means Tiger Select offers the most versatile portable benzene specific product on the market.

Visit www.ionscience.com/select for more info on Tiger Select.



**User can define alarm levels

TIGER SELECT TECHNICAL SPECIFICATION	
ACCURACY *	±10% display reading ± one digit benzene
RESPONSE TIME	120 seconds. Progressive indication of benzene is displayed in real time.
INTRINSICALLY SAFE APPROVALS	II 2G Ex ia IIC T4 (-15 °C ≤ Ta ≤ +45 °C) ITS09 ATEX 26890X IECEX ITS 10.0036X US and Canadian approvals pending
BATTERY LIFE	Li-ion: life up to 30 hours, charge time 6.5 hours Alkaline: 3 x AA, typically 12 hours life
PID LAMPS	Kr PID lamp with 10.0 eV filter pellet
DATA LOGGING	> 120,000 data log points including date and time stamp
COMMUNICATION	Direct USB 1.1
ALARM	Flashing LED's Amber (low alarm) Red (high alarm) Sounder 95 dBA at 300mm (12") Vibration on alarm Pre-programmed TWA and STEL
TEMPERATURE	Operating: -20 to 60 °C, -4 to 140 °F (non Intrinsically Safe) Humidity: 0-99% RH (non condensing)
WEIGHT & DIMENSIONS	Instrument (probe fitted, no tube attached) Length: 465 x Height: 89 x Depth: 61 mm (18.3 x 3.5 x 2.4") Packed weight in standard case: 5 kg (176 oz)
RESOLUTION	10 ppb or 0.033 mg/m³ benzene
RANGE	0 - 40 ppm or 130 mg/m³ benzene in tube mode 0 - 20,000 ppm in TAC mode (gas dependent)
CALIBRATION	2 and 3 point calibration (via calibration kit accessory)
UPGRADEABLE	Sensitivity; H & S mode; data logging. Available in standard running mode.
IP RATING	Designed to IP65 (heavy rain)
LCD DISPLAY	Back lit
FLOW RATE	220 ml/min (150 cc/min flow alarm)
DOCKING STATION OPTIONS	Charging cradle Travel dock

CUB TECHNICAL SPECIFICATION	
ACCURACY	±5% display reading + one digit
RESPONSE TIME	<13 seconds (T90)
APPROVALS	Europe: ATEX: CE, Ex II 1G, Ex ia IIC T4; -20 °C ≤ Ta ≤ 55 °C IECEX: Ex ia IIC T4 -20 °C ≤ Ta ≤ 55 °C China: Ex ia IIC T4 -20 °C ≤ Ta ≤ 55 °C  US and Canadian approvals: Class I, II and III, Division I, Hazardous (Classified) Locations
BATTERY	Battery life up to 16 hours Battery charge time 4 hours
PID LAMP OPTIONS	10.6eV, 10.0eV
DATA LOGGING	30,000 readings
COMMUNICATION	USB 2.0
ALARM	LEDs, audio and vibrate Sounder 95 dB Pre-programmed TWA & STEL. Work exposure alarm levels on all models.
TEMPERATURE	Operating: -20 to 55 °C, -4 to 131 °F Humidity handling: Fence Electrode Technology
WEIGHT & DIMENSIONS	111g (3.91 oz) 61 x 66 x 59 mm (2.4 x 2.6 x 2.3")
RESOLUTION	0.001 ppm
RANGE	ppm 0.1 - 5,000 ppm ppb 0.001 - 5,000 ppm TAC 0.01 - 5,000 ppm
CALIBRATION	2 point calibration via docking station
UPGRADEABLE	Upgrade ppm to ppb
IP RATING	Designed to IP65 (heavy rain)
LCD DISPLAY	Back lit multi colour
FLOW RATE	N/A (no pump)
DOCKING STATION OPTIONS	Charge only Charge and USB communication Charge, USB communication and calibration

This publication is not intended to form the basis of a contract and specifications can change without notice.

Unrivalled Detection.

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