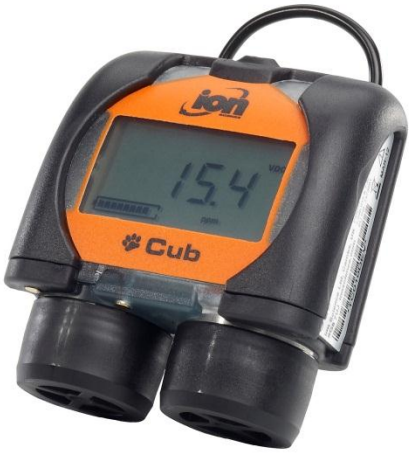
PID monitors for aromatics and benzene in petrochemical environments

Introduction

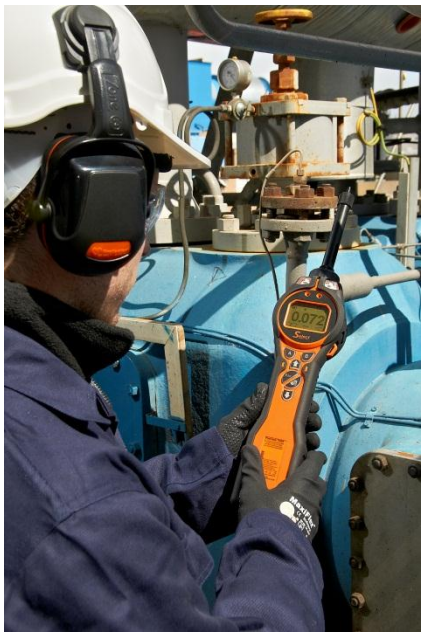


Aromatic chemical compounds produced by oil refineries and petrochemical plants form the building blocks for numerous important materials, including dyes, detergents, solvents, adhesives, plastics, synthetic rubbers and pharmaceuticals. But the aromatic compounds produced in these environments, such as benzene, toluene and xylene isomers are also highly toxic.

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 TWA of 1 ppm (OSHA).

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

Detecting benzene and total aromatic compounds (TACs)



Typically, benzene has been monitored using hand-held photoionisation detection (PID) instruments fitted with a benzene pre-filter. In 2011 Ion Science introduced the Tiger Select, a revolutionary hand-held detector with two-mode operation for the rapid detection of benzene and total aromatic compounds (TACs) providing the most accurate and reliable data available.

Utilising the proprietary high output Ion Science 10.0 electron volts (eV) detection system, a reading for TACs is seen immediately on start-up. Should TACs be detected above the regulatory limit, a Draeger benzene pre-filter tube can be easily attached to Tiger Select to ensure rapid detection and selective measurement of benzene.

Should the benzene reading exceed the regulatory limit, a short-term exposure limit (STEL) can be immediately initiated. This three-step process provides instantaneous TAC readings and minimises tube usage when benzene levels are low.

Throughout the measurement process, Tiger Select continues to display real-time data, ensuring the final reading represents the full value of actual benzene present. Benzene concentrations are displayed down to ppb levels, giving you the most accurate, reliable data you can count on. Its unique IonPID™ VOC sensor incorporates both Anti-contamination and Fence Electrode technology for extended operation in difficult working environments. Tiger Select is capable of providing 15-minute STELs and eight-hour TWAs for TACs.

Application Article 239

Personal PID monitors

Monitoring the breathing space of the individual employee to measure the levels of potentially harmful compounds that the individual is exposed to as he or she moves around the plant over the course of the day is best performed using a personal PID monitor.

Cub^{TAC} used to detect benzene at refinery.

The new Cub^{TAC} from Ion Science, with its proprietary, high output 10.0 eV lamp provides continuous monitoring and alarms for Total Aromatic Compounds (TACs), with market leading parts-per-billion sensitivity. Providing accurate monitoring of the full range of aromatic compounds, Cub^{TAC} affords the best possible protection for plant personnel, giving early warning of any harmful levels of exposure to hazardous aromatic compounds, including benzene.

Compact and lightweight Cub^{TAC} is the smallest, lightest personal PID monitor of its kind on the market. Cub^{TAC} is comfortable and unobtrusive to wear, yet is sensitive to over 480 gaseous compounds, with a range from 1 ppb - 5,000ppm.

With a fast response time of less than 13 seconds, Cub^{TAC} provides readings in ppb and mg/m3 on its bright, backlit LCD display, with selectable data logging time. When exposure exceeds preset limits Cub^{TAC} provides a number of alarm options, including flashing red LEDs, an audio alarm and vibration, or a combination of the three.

Calibrated on benzene, Cub^{TAC} provides real time readings which, when below the threshold for benzene, ensure compliance with local regulations and is the perfect complement to the Tiger Select. A Cub variant with 10.6 eV lamp is also available for monitoring VOCs.

Cub^{TAC} incorporates the same PID technology employed on the fixed and hand-held Ion Science detectors. The unique IonPID^{TM} sensor incorporates both Anti-contamination and Fence Electrode technology for extended operation in challenging, humid and dusty environments.

Ion Science gas detectors have been independently verified as the best performing PID technology available today, offering fastest, most accurate and most consistent results, with the widest range and market leading sensitivities down to 10 ppb.

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