

## GX-6100 Multi-Gas Monitor

### Benzene Detection Solution

#### **Benzene – Hazard Overview**

Benzene ( $C_6H_6$ ) is a volatile, colorless and highly flammable aromatic hydrocarbon belonging to the group of volatile organic compounds (VOCs). It is naturally present in crude oil and petroleum products and is commonly encountered throughout the oil and gas industry, including upstream, midstream and downstream operations. Due to its high volatility, benzene exposure occurs primarily through inhalation, especially in confined or poorly ventilated spaces.

Benzene is classified as a **Group 1 carcinogen** by the International Agency for Research on Cancer (IARC) and is associated with serious blood disorders, including leukemia.

#### **Health and Safety Implications**

Benzene is classified as a Group 1 human carcinogen by the International Agency for Research on Cancer (IARC). It has been definitively linked to acute myeloid leukemia (AML) and other blood disorders due to its ability to disrupt bone marrow function, even at relatively low concentrations.

The American Petroleum Institute (API) stated as early as 1948: “It is generally considered that the only absolutely safe concentration for benzene is zero.” The compound’s high volatility means that inhalation is the primary route of occupational exposure, especially in enclosed or poorly ventilated spaces.



#### **Regulatory exposure recommendations**

- Under Directive (EU) 2019/130, the EU Binding Occupational Exposure Limit (BOELV) for benzene is 0.2 ppm ( $0.66 \text{ mg/m}^3$ ) as an 8-hour TWA.
- Under ALCOAST 287/25, the U.S. Coast Guard (USCG) applies an internal action level of 0.02 ppm for pre-entry verification of benzene concentrations.

This very low limit requires reliable and sensitive gas monitoring in workplaces where benzene may be present.

**Benzene is a naturally occurring component in** crude oil and petroleum-based products and is widely encountered across the entire oil and gas value chain, including:

- Upstream operations (e.g., drilling platforms, wellheads)
- Midstream processes (e.g., pipelines, storage tanks, compressor stations)
- Downstream facilities (e.g., refineries, chemical plants)
- In addition to its presence in industrial operations, benzene may be released through incomplete combustion of fossil fuels, tobacco smoke, and other anthropogenic sources. Its mobility in air, water, and soil contributes to environmental dispersion, raising concern for airborne exposure, groundwater contamination, and soil pollution near production and processing sites.

Due to the hazardous nature of benzene, the use of supplied-air respirators or self-contained breathing apparatus (SCBA) is recommended when exposure limits are exceeded. In addition, continuous gas monitoring is essential for protecting workers during operations involving potential benzene release.

#### **RKI's Solution for Benzene Detection: GX-6100 with PID Technology**

RKI Instruments provides an effective and configurable solution for benzene detection using the GX-6100 multi-gas monitor equipped with Photoionization Detector (PID) technology. When configured with a 10.0 eV PID sensor and used together with a benzene-specific filter tube, the GX-6100 enables selective benzene measurement by significantly reducing interference from other volatile organic compounds (VOCs).

This approach is particularly well suited for applications requiring low-level benzene monitoring in complex VOC environments, while preserving the flexibility and functionality of a full multi-gas monitoring platform.

The GX-6100 can operate both in a standard PID-based VOC monitoring mode and in a benzene-specific measurement mode when the filter tube is applied. Benzene measurements are initiated manually by the user and performed in accordance with the manufacturer's operating instructions. The filter tube is used exclusively during the benzene measurement process and is removed for normal VOC monitoring.

This procedure ensures controlled, repeatable, and selective benzene measurements while maintaining full VOC monitoring capability with the same instrument.

### **Dual PID Capability via Smart Sensor Slots**

The GX-6100 features two intelligent sensor slots, providing flexible configuration options.

- Each slot can accept PID, IR or electrochemical (EC) sensors
- Up to two PID sensors can be installed simultaneously, depending on configuration
- Sensors are automatically recognised by the instrument

This allows the GX-6100 to be configured for:

- Broad-range VOC monitoring
- Benzene-specific detection using a 10.0 eV PID
- Multiple PID ranges within a single instrument

### **Versatile Multi-Gas Monitoring Platform**

The GX-6100 is a configurable multi-gas monitor designed for comprehensive atmospheric monitoring within a single instrument. Depending on configuration, the GX-6100 can monitor multiple gases simultaneously using a combination of PID, infrared (IR) and electrochemical (EC) sensors installed in its intelligent sensor slots. Sensor combinations and the total number of measured gases depend on the selected configuration and installed sensors.

### **Available Sensor Options**

- Combustible gases
  - LEL / %Vol / PPM hydrocarbons
- Oxygen (O<sub>2</sub>)
- Toxic gases
- Hydrogen sulfide (H<sub>2</sub>S)
- Carbon monoxide (CO)
- Electrochemical (EC) toxic sensors, including:
  - NH<sub>3</sub>, Cl<sub>2</sub>, HCN, NO<sub>2</sub>, PH<sub>3</sub>, SO<sub>2</sub>
- Photoionization Detectors (PID) with selectable lamp energies:
  - 10.6 eV PID (low range): 0–40 000 ppb
  - 10.6 eV PID (high range): 0–4000 ppm
  - 11.7 eV PID: 0–1000 ppm for VOC monitoring of compounds with higher ionization potentials.
  - 10.0 eV PID: VOC 0–100 ppm; Benzene selects 0–50 ppm when used with a filter tube.