# IMPURITIES IN SPECIALTY GAS
BEVERAGE GRADE CO$_2$ AND ULTRA-PURE GASES

Parts-per-billion detection utilizing gas chromatographs and hydrocarbon analyzers.

mocon®
AMETEK®

BEVERAGE GRADE CO$_2$ IMPURITIES

Carbon dioxide (CO$_2$) made for the beverage industry is a product of industrial processes including combustion, fermentation, ammonia/hydrogen production, chemical and refinery operations, and other natural processes. These sources, as well as the supply chain itself, can introduce trace contaminates into the CO$_2$ that can pose health concerns or unwanted flavoring.
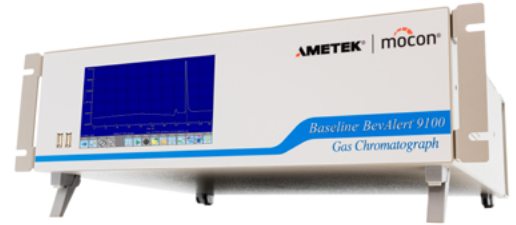

VOCs in CO$_2$

Detector	Photoionization (PID)
Carrier Gas	UHP Nitrogen and Hydrogen
Sample	Carbon Dioxide
MDQ/LDL	AA < 50ppb, MeOH < 2ppm Benzene < 2ppb, TEX < 5ppb

The BevAlert® Gas Chromatograph (GC) can be applicated to detect acetaldehyde, methanol, benzene, toluene, ethylbenzene and xylenes well below the recommended International Society of Beverage Technologists (ISBT) detection limits. For this application, the GC will utilize a dual-column configuration. The pre-cut column will remove interfering heavier components and moisture, reducing analysis time and protecting the analytical column.

Other Volatile Organic Compounds may be added to the analysis if so desired.
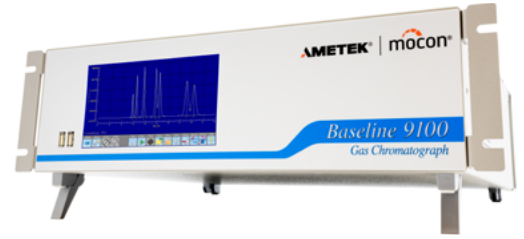
Total Sulfur in CO$_2$
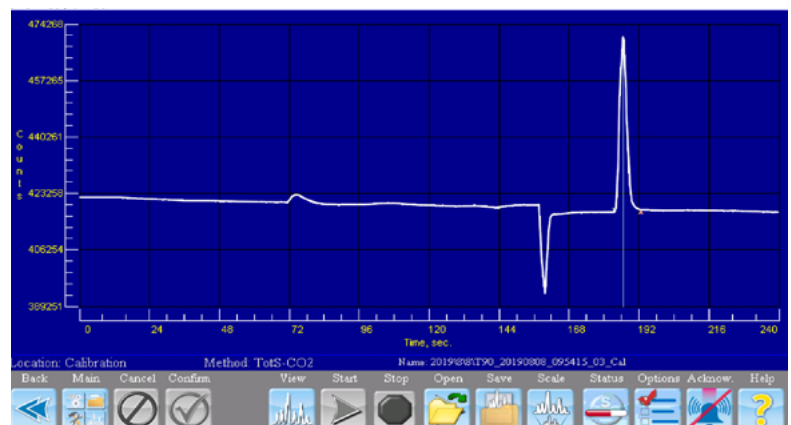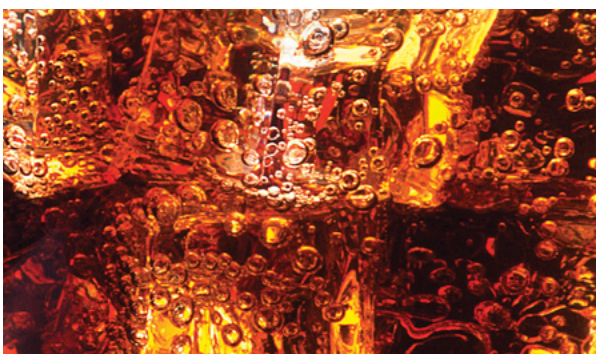
| Detector	Photoionization (PID)
Carrier Gas	UHP Hydrogen
Sample	Carbon Dioxide
MDQ/LDL	< 20ppb

The BevAlert Total Sulfur GC detects parts-per-billion levels of total sulfur in beverage-grade carbon dioxide. A fixed volume of sample is injected and passes through a compact, high-temperature reduction reactor where undesirable sulfur-containing compounds are reduced to hydrogen sulfide. Hydrogen sulfide is separated from potentially interfering components on the analytical column and elutes to the photoionization detector (PID).

ULTRA-PURE GASES IMPURITIES

Bulk gases and specialty blends are used for numerous manufacturing and medical purposes. Sources of these gases may be distillation of air, electrolysis, or as a by-product of chemical production, and each of these sources can produce certain impurities that can cause harm to health or production.


Total Sulfur in Hydrogen for Fuel Cells
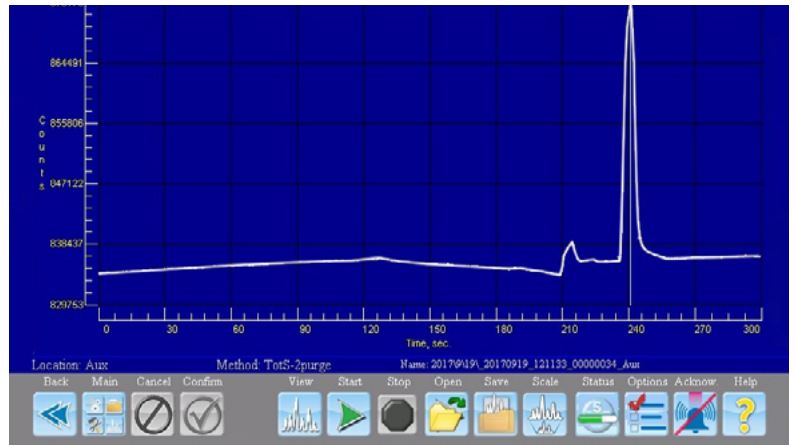
Detector	High Sensitivity PID (HS-PID)
Carrier Gas	UHP Hydrogen
Sample	Hydrogen
MDQ/LDL	< 2ppb

As hydrogen-based fuel cells become more widely adopted throughout various industries, ensuring sulfur-free hydrogen is a must to avoid poisoning the catalyst. The MOCON® BASELINE® 9100 (utilizing an HS-PID) can detect very low-level total sulfurs by converting all sulfurs to hydrogen sulfide using a reduction reactor.

Helium, Neon, Hydrogen in Nitrogen
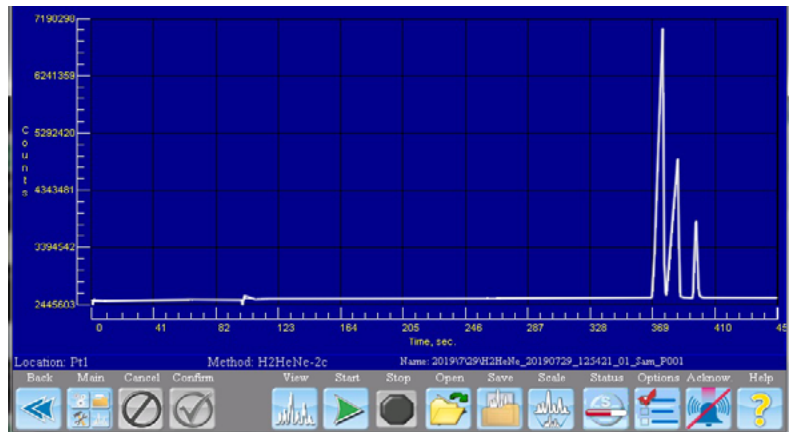
Detector	Thermal Conductivity (TCD)
Carrier Gas	UHP Argon
Sample	Nitrogen
MDQ/LDL	He < 100ppm, Ne < 200ppm H_2 < 100ppm

Depending upon the target gases and their required detection levels, AMETEK MOCON will select an appropriate detector, columns and pneumatics to meet the customer's requirements or regulations. The BASELINE product line has been providing solutions for decades to detect low-level impurities related to: *Calibration Gases, Food and Beverage Gases, Space Flight Production, Semiconductor Fabrication* and *Process Control*.
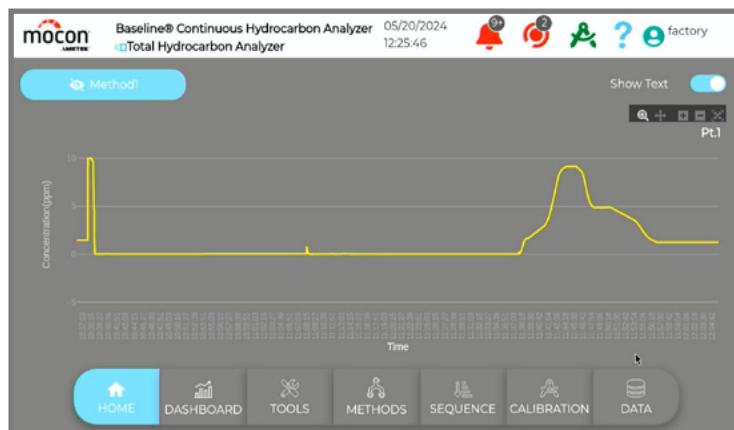
TOTAL HYDROCARBON IMPURITIES

The MOCON BASELINE CHA Total Hydrocarbon Analyzers are instruments designed for continuous process hydrocarbon gas measurement in industrial settings looking for gas impurities. The CHA Analyzer provides either visual data or a graph of total hydrocarbons over time. Analyzers are easily integrated with data analysis systems. The analyzer can be purchased in a variety of configurations with internal components for single or multi-point sampling, with or without a sample pump.

Hydrocarbons In Ultra-Pure Gases

Detector	Flame Ionization (FID)
Support Gases	UHP H$_2$, Zero Air
Sample	Ultra-Pure Gases
MDQ/LDL	10ppb

MOCON BASELINE CHA Total Hydrocarbon Analyzers are best-in-class analyzers that have been providing solutions for decades to quickly detect low-level impurities in Calibration Gases, and Food and Beverage Gases. The latest version of CHA Analyzers includes a graphing function that allows the user to easily see any excursions or trends in the data. Alarms can be set to inform users if and when impurities are too high for an application, allowing for immediate corrections.

CUSTOM PROCESS GC APPLICATIONS

The applications shown in this brochure are common examples of the different analyses we have created for our customers. Contact us to discuss your detection needs. AMETEK MOCON will select the best detector for your application commonly utilizing Photoionization (PID), High-sensitivity Photoionization (HS-PID), Flame Ionization (FID) or Thermal Conductivity (TCD). Analytical arrangements typically involve a single-valve, two-column configuration, but may vary depending upon the application.