

$\delta^{13}\text{C}$ for Carbon Dioxide (CO_2) CM-CRDS System

PICARRO



CM-CRDS advantages, versus EA-IRMS, include:

- Significantly lower capital cost for the system
- Much simpler operation that does not require extensive training
- Less frequent calibration and lower cost of maintenance
- Lower cost of consumables required for operations
- Greater automation and higher throughput

The Picarro **Combustion Module Cavity Ring-Down Spectroscopy (CM-CRDS)** System analyzes the carbon isotopic ($\delta^{13}\text{C}$) composition or signature of organic products. Organic food and beverages and renewable products are part of a multibillion-dollar global industry where economic value is based on purity and sustainability.

Authenticity of ingredients or raw materials is essential to organic, sustainable product quality and, by extension, to building and maintaining brand value and preference. Conversely, the dilution, adulteration, or counterfeiting of such products can erode consumer confidence, damage a brand name, and harm a product's or company's financial performance.

CM-CRDS is a fast, easy-to-use, and cost-effective method to validate and ensure authenticity and purity. It provides measurement accuracy and precision comparable to elemental analyzer isotope ratio mass spectroscopy (EA-IRMS). And it is much easier to use with greater automation and higher throughput at a significantly lower capital and operational cost.

The Combustion Module, designed by Costech (a leader in combustion systems) for Picarro, is connected to an isotopic analyzer via the Picarro Liaison™ Universal Interface or a Caddy. The system typically processes samples every 10 minutes with precision better than 0.3‰. Control and data recording is managed by software on the Picarro $\delta^{13}\text{C}$ analyzer.

For a more detailed description of CM-CRDS system performance for specific applications, see the following application notes:

- App Note – Coconut Water Adulteration
- App Note – Honey Adulteration
- App Note – Bioplastics Verification

For a third-party comparison of IRMA and CRDS performance, see the FDA poster from ASITA 2016, "A Comparison of IRMS and CRDS for the Detection of Economic Adulteration of Lemon Juice and Honey."

The application notes and poster are available at www.picarro.com/products/combustion_module

Picarro CM-CRDS Performance Specifications

$\delta^{13}\text{C}$ in Carbon Dioxide (CO_2)	<0.4‰ guaranteed (0.2–0.3‰ typical) Sample-to-Sample
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Picarro CM-CRDS System Specifications

Minimum Sample Size	250 μgC (guaranteed precision); 400 μgC (typical precision)
Sample-to-Sample Analysis Time	10 min
Carrier Gas	N_2 (UHP)
Combustion Gas	O_2 (UHP)
Optional Reference Gas	CO_2 at 3000 ppmv in N_2
Carrier Gas Flow Rate	<90 ml/min of N_2 at 760 Torr
Autosampler Attached	Pneumatic Autosampler with 50-position carousel (99 and 148 positions optional)
Power Requirements	90–120 VAC, 50/60 Hz and 220, 50 Hz
Installation: Weight, Dimensions	Benchtop: 160 lbs, 38" x 29" x 23"