BrightSpec

Introducing the

isoMRR

One easy-to-use instrument to simplify your most complex quantitative workflows.

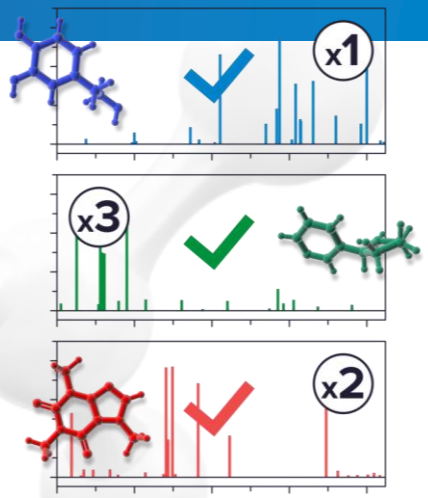
BrightSpec

Technology

Molecular Rotational Resonance

Quantify Small Molecules in One Simple Workflow.

Molecular rotational resonance (MRR) enables direct, structure-specific detection to simplify the quantitation of small molecules, without chromatography, physical reference standards, or indirect inference.



Theoretical Spectra

Instrument

Meet the isoMRR

Ultra-Precise Quantitation and Chiral Analysis, Streamlined

The isoMRR™ enables robust, highly specific chemical quantitation. Built on the simplicity of MRR, the isoMRR™ platform adds advanced quantification capabilities across an array of chemical classes, making it ideal for raw material verification, QA/QC, and process optimization.

It's the perfect balance of performance and ease of use for busy analytical labs.

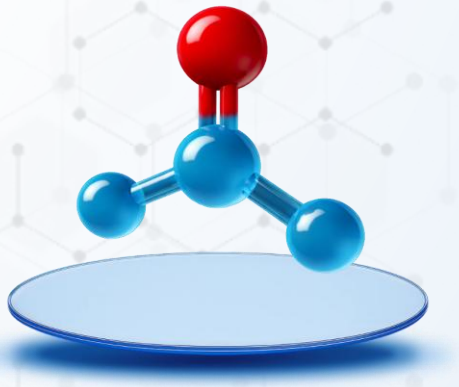
Pharmaceutical • Chemical • Consumer Goods

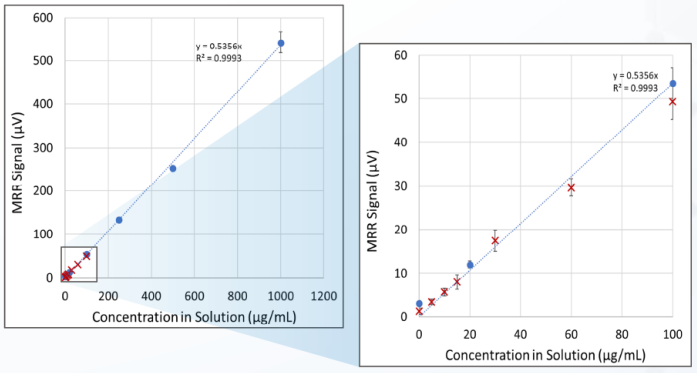
Formaldehyde Quantitation **Without the Complexity**

Formaldehyde analysis is notoriously difficult. Traditional methods rely on derivatization, long prep times, and often yield uncertain results, especially in water. The isoMRR™ offers a fundamentally different approach.

By measuring the unique rotational signature of formaldehyde in gas phase, the isoMRR™ enables:

- **Direct quantitation with no chromatography**
- **High specificity in complex matrices**
- **Fast, automated workflows**
- **No sample prep or pure reference standards**





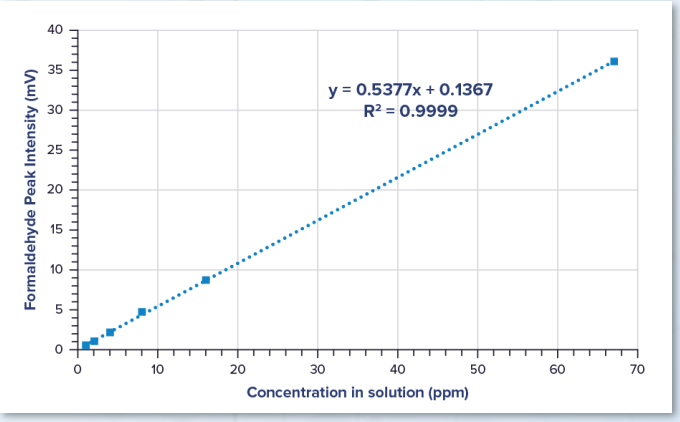
MRR signal response vs formaldehyde concentration

Compared with conventional GC workflows, MRR cuts analysis time by over 60%.

It enables reliable, low-ppm detection in complex sample matrices, reduces the risk of user error, and supports true walkaway automation.

The use of SpectrAline Cartridges on the spectraMRR platform expands matrix compatibility for MRR, enabling direct quantitative analysis of volatile analytes in aqueous samples.

As demonstrated with formaldehyde, water-based matrices can be analyzed with the same structural specificity and quantitative reliability observed in conventional solvent systems.



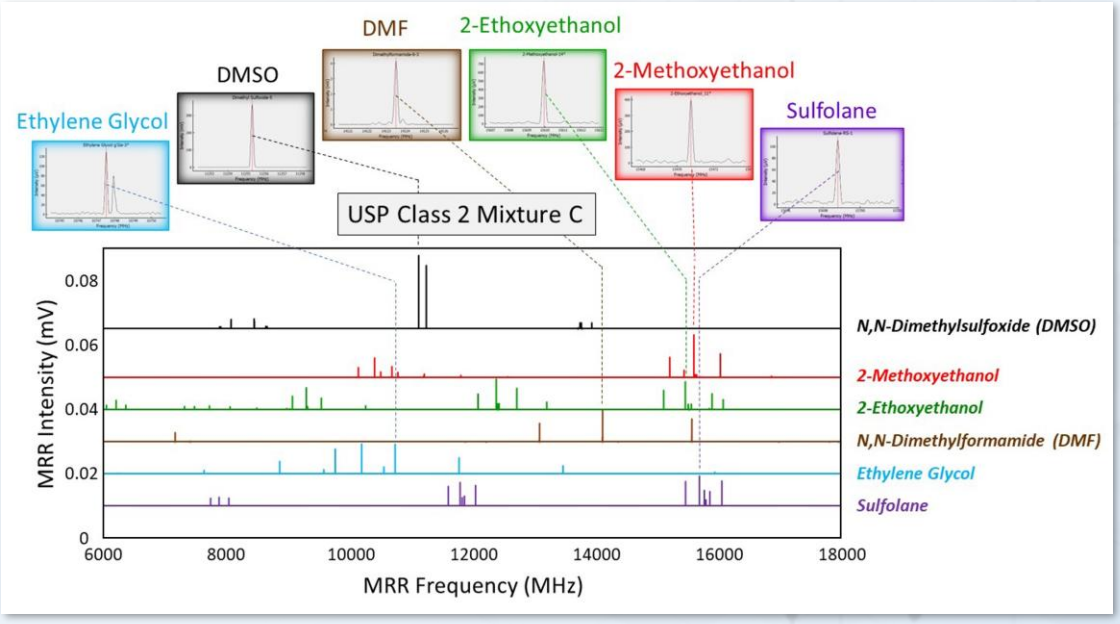
Residual Solvent Analysis **Without the Bottlenecks**

Residual solvent testing is essential, but traditional GC methods can be slow and resource-intensive, requiring method development, chromatographic separation, and ongoing optimization.

The isoMRR™ offers a simpler approach. By measuring each solvent's unique rotational fingerprint, it enables quantitation in a single measurement, without chromatography or complex method setup. In this study, the isoMRR directly quantified residual solvents in APIs including acetaminophen, aspirin, and ibuprofen, with strong linearity, repeatability, and accurate recovery even in complex matrices.

What this means for labs:

- Direct residual solvent quantitation without chromatography
- Minimal setup and reduced method development
- Reliable performance across compounds and formulations
- Faster decisions with greater confidence in USP <467> workflows



Essential Oil Authenticity **Made Simple**

Essential oil authenticity is critical for product quality and consumer trust. Traditional methods like GC-MS struggle with isobaric compounds, co-elution, and extensive method development. BrightSpec's **isoMRR™ platform** overcomes these limitations, offering a **fast, highly specific, and reproducible** solution for essential oil analysis.

Constituent	MRR Concentration Converted to GC Peak Area (%)			Concentration Range (%)
	SAMPLE 1	SAMPLE 2	SAMPLE 3	US STANDARD
Limonene	3.18	3.70	1.72	1–2.5
Eucalyptol	6.82	7.61	4.78	4–6
Trans Sabinene Hydrate	0.36	0.04	0.91	0.5–2.3
Menthone	25.45	18.67	22.09	15–25
Isomenthone	4.21	4.77	3.28	2–4.5
Menthofuran	0.66	0.39	2.21	1.5–6
Neomenthol	3.02	3.78	3.85	2.5–4.5
Menthyl Acetate	3.83	4.46	4.52	3–6.5
Menthol	43.68	47.57	40.57	36–46

MRR analysis of three peppermint oil samples revealed clear differences in composition, with variations in key terpenes that indicate potential adulteration (values in red). This rapid, precise approach ensures essential oils meet expected quality standards and helps detect inconsistencies.

Faster & More Efficient

Cuts analysis time by 80% compared to conventional methods.

Direct Identification & Quantification

No need for separation; detects and measures key components in a single run.

High Sensitivity

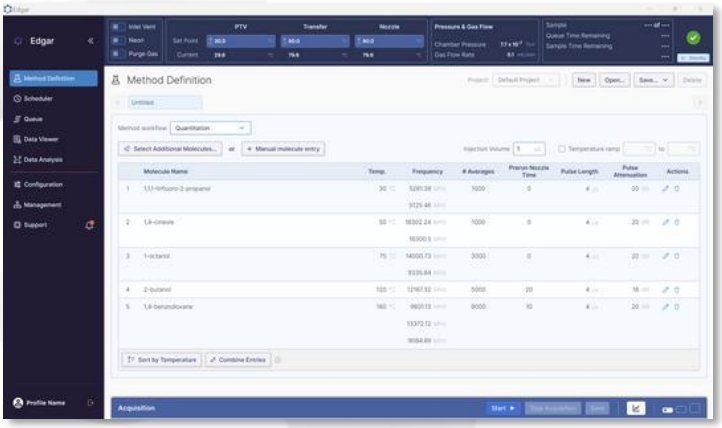
Accurately identifies minor and major terpenes, crucial for detecting adulteration.

User-Friendly Software

From Spectra to Solutions in Seconds

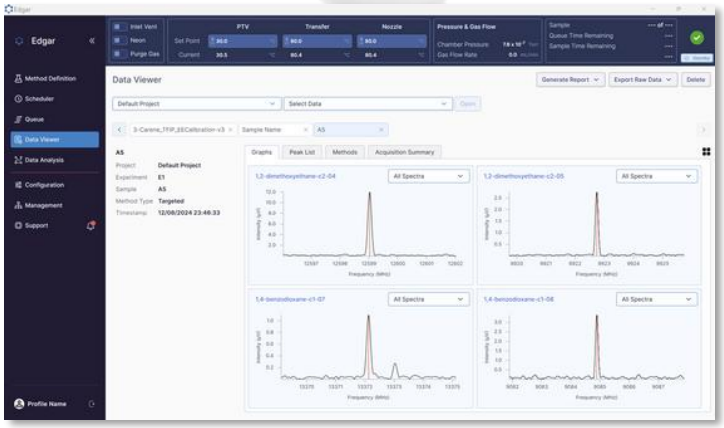
Leverage our Library

Accelerate your workflow with a software suite built to make rotational spectroscopy fast, simple, and scalable. Powered by pre-validated MRR libraries, move from setup to confident results in minutes. BrightSpec libraries simplify method development and enable immediate, high-confidence molecular identification.



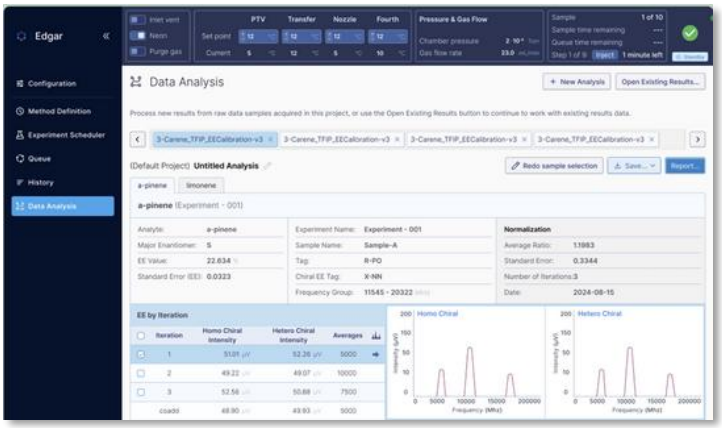
Streamlined Workflows

Our end-to-end software suite guides complex molecular analysis, enabling chemists to achieve precision without specialized training or complex hardware dependencies.



Superb Results

Empowering industrial chemists with intuitive rotational spectroscopy tools that deliver faster, more accurate molecular analysis. Our software suite transforms complex spectroscopic data into actionable insights, reducing analysis time from hours to minutes.



Key Benefits

The isoMRR™ Advantage

Forget complex methods and incomplete results.
Precision made simple.

Unambiguous Quantitation

MRR spectra are highly specific to the three-dimensional structure of molecules in the gas phase, allowing you to quantify molecules with confidence, even when they exhibit isomerism or chirality.

User-Friendly Software

The software suite provides users with simple application driven methods for accurate and reproducible quantitation in complex mixtures.

Streamlined Workflow

The isoMRR provides structurally specific quantitation in a single measurement, eliminating the need for derivatization or extractions and combining multiple techniques.

Time Savings

BrightSpec's solution delivers results with unprecedented speed and precision, accelerating development without sacrificing accuracy.

isoMRR

Technical Specifications	
isoMRR Frequency Range	6-18 GHz
Acquisition Bandwidth	1 MHz
Liquid Injection Temperature Range	RT+5-200°C
Headspace Injection Temperature Range	40-200°C
Instrument Weight	800 lbs
Instrument Footprint	67" L x 37" W x 72" H
NA Power Supply	120V, 60Hz, 20A
EU Power Supply	230V, 50Hz, 16A
Carrier Gas	Neon (40 mL/Min.)
Purge Gas	Nitrogen (Purge)
Certifications	CE

Analytical Specs

Quantitation	
Sample Type	Liquid, Headspace
Mass Range	50-300 AMU
Dipole Moment	>0.1 debye
Liquid Injection Volume	10 µL (Typical)
Headspace Source Volume	1 mL (Typical)
Analyte (Typically Required)	100 ng
Time to Result (Typical)	<10 Min.
Dynamic Range	> 1:1,000
Sensitivity (LOQ)	0.001% / ppm
Repeatability	<10% RSD
Linearity	R2 >0.99
Reference Library (Measured)	>500 Compounds
Chiral Analysis	%EE

BrightSpec