Using GC/MS/MS for Environmental Semi-Volatile Analysis following U.S. EPA Method 8720E

Agilent Triple Quadrupole GC/MS

Joel Ferrer, MBA Product Manager, Triple Quadrupole GC/MS





Using GC/MS/MS for Environmental Semi-Volatile Analysis following U.S. EPA Method 8720E DE05753239

Introducing the 7000E GC/TQ and 7010C GC/TQ





🔅 Agilent

March 30, 2023

Next-Generation Mass Spec Intelligence Intelligence Powered Advances on GC/TQ



NEW SWARM Autotune completes 2X faster



System Screening & System Evaluation assess presence of ions and electronics status



Diagnostic Tune used for troubleshooting



A detailed system report (MSR) can be sent to a service engineer for speedy diagnostic efforts



Triggered MRM (tMRM) – enables more confidence in compound confirmation with maximum duty cycle efficiency



Simultaneous dMRM/Scan – adds scan functionality to the popular dMRM mode for full sample visibility





Sustainability Meets Performance Agilent HydroInert El Source for 7000E GC/TQ



- Prevent Disruptions from Helium shortages and supply chain instability
- Agilent HydroInert El Source is designed to overcome undesirable in-source chemistry and results in great spectral fidelity with H₂ as a carrier
- Take Full Advantage of Hydrogen as a Carrier Gas including faster run times and improved chromatography
- Operate Stress-Free with numerous safety features like H₂ Leak Detectors, the Agilent GC H₂ Leak Sensor Module, and running with a H₂ Generator for maximum assurance



Introduction U.S. EPA Method 8270E



High Visibility

One of the most widely referenced methods globally

Dirty Matrices

Environmental extracts from solid wastes, soils, air, and wastewater

Challenging Chromatography

Chromatography and resolution can be particularly difficult

Agilent Expertise

Agilent has most extensive experience with the method



Advantages of GC/MS/MS U.S. EPA 8270E



Increased sensitivity for reduced sample sizes and smaller extraction volumes

High selectivity resulting in faster batch review from decreased data complexity

Simultaneous dMRM/scan mode removes the "blinders" from the analysis

Tuning verification is simplified with a Manufacturer's Recommended Tune

6



Manufacturer's Recommended Tune Agilent Triple Quadrupole GC/MS

Communication of the recommended turned

- parameters for best instrument operation
- Uses reported values from the Check Tune and Autotune Report
- Enables labs to **increase productivity** and eliminate the constant tuning and de-tuning to meet method performance requirements
- Applies to the following Agilent GC/TQ instruments:
 - 7000C, 7000D, and 7000E
 - 7010A, 7010B, and 7010C

	Agilent	Agfeint Technologike, Inc. 1 500 227 5770 keephone 501 Sturies Chael Bauswert Winne Aghert Soon Winted States		
tuno	Manufacturer's Re	commended Tune – Agilent Triple Quadrupole GC/MS		
ion	In Lagione 1 we prove process and process and even the the set of the part for the CV Vision converse theor Lagione 1 TSUS devices in TSUS devices Traine Causal August explorem. As a such, Agine in recurrentering the use of August and the Company and and the responsement is also also also also also also require use of Chaute Turk and Elementar August and August and the Section and August and also proceeding the Company devices and the Research and and the Section and parameters proceeding the Section and Beneficial August and the Research and parameters proceeding the Section and Beneficial August and the Research and and the Research and parameters			
	Using the Dheck Turke and General performance of the instrument is performed regularly and prior to p	es Autoure Report functions enables the specator to monitor the thout modifying the sure parameters. This review alroyal be premeting data.		
	Security Agreet experiments manipular Agreet experiments and any subley between a space of monitorial to the state of monitorial and To the state of the of the state To the state of the of the state To the state of the state of the state to the st	te abundense of Perfuence/buc/sense (PPTBA) on the initial an imports created using the Generate Autoure Report Function immended VGII abundenses for the Agian 15000, 15000, 15000 using an init source immperature of 20010.		
Tune	Talkert n; T	With Grift Bucaremented Readment 17. Readment temper http://itelance 17. Readment temper http://itelance		
	Brould the nationant not meet in mass fragments from the table a after cleaning the on source the former multiselements.	te recommended 1/01 abundances for one or more of the calibrition. Against suggests performing a routine on source cheming, on 1/01 abundances period, please contact Aginet Suggest for	7	
	New Residence Against recommends the Autour of 2.7 amu, "The action-sci peak in withit segret for masses 49, 244,	e to parformed using a (201 Resolution target peak usids) (P1046) the to accommended to be usids a 2.00 arts, of the 1.7 arts, peak and 502		
	Mean Accounty Against recommends that the life of the larget mass for masses (1)	as Assignment of the calibrant mass fragments be within a 1.2 at 1394, and 932	~	
and uning to	If the Autorum completes success phone for all terms, Review both above fail within the recommend	of U) perform a Deals "yes and verify then an 'D' reason's the Autourse report and Deals "sure report to verify the parameter econo from Applies.		
	5	5		
		Total Second		
			2	

Agilent 7000E GC/TQ with U.S. EPA Method 8270E



8



Agilent 7000E GC/TQ with U.S. EPA Method 8270E



9

Excellent Method Performance



Figure 1. Total ion chromatogram from composite of all dMRM transitions showing separation in 16.9 minutes.



7000E GC/TQ Inert Plus XTR Source (9 mm lens)



0.005-10 μg/mL
0.005-5 μg/mL
0.025-5 μg/mL
0.05-10 μg/mL
0.05-5 μg/mL
0.05-10 μg/mL
0.05-5 μg/mL
0.1-10 μg/mL



Excellent Method Performance





Excellent Method Performance





7000E GC/TQ Inert Plus XTR Source (9 mm lens)

Figure 2. Benzo(b)fluoranthene and benzo(k)fluoranthene at 2.0 µg/mL (88.6% resolution)



Figure 3. Indeno[1,2,3-cd]pyrene and dibenz[a,h]anthracene at 2.0 µg/mL (62.6% resolution)

12

16.6

16.5



Acquisition Mode Flexibility

- Agilent GC/TQ in MS1 scan mode retain great spectral information and enable the move over to MRM if desired
- dMRM/scan is an excellent new mode for this workflow
 - Remove the blinders!
 - MassHunter Unknowns Analysis





Agilent 7000E GC/TQ with U.S. EPA Method 8270E











7000D GC/TQ Inert Plus XTR Source (9 mm lens)



77 compounds in 10 minutes!

Acquisition time (min)

Figure 4. Total ion chromatogram for the 50 $\mu\text{g}/\text{mL}$ calibration standard showing a 10-minute run time.







Considerations for Fast Analysis

17

March 30, 2023





Agilent 7000E GC/TQ with U.S. EPA Method 8270E



Semi-Volatiles with Hydrogen Carrier Gas



Figure 5. Total ion chromatogram for the 50 μ g/mL calibration standard showing a 10-minute run time.

0.02-100 μg/mL = 0.05-100 μg/mL = 0.1-100 μg/mL = 0.2-100 μg/mL
0.1-75 μg/mL = 0.2-75 μg/mL = 0.02-75 μg/mL = 0.02-50 μg/mL
0.05-50 μg/mL = 0.5-100 μg/mL = 1-100 μg/mL = 2-100 μg/mL



Semi-Volatiles with Hydrogen Carrier Gas





Considerations for Hydrogen Carrier Gas



21



Conclusions

GC/MS/MS for U.S. EPA Method 8270E

Agilent 7000E & 7010C GC/TQ instruments provide:

- Best-in-class specificity and selectivity for semivolatile analysis
- Flexibility to meet your method and productivity goals with Inert Plus XTR, HydroInert, and HES
- dMRM/scan data acquisition mode to remove the blinders of MRM analysis
- Agilent Manufacturer's Recommended Tune to help labs get to doing the science they care most about





For This Information...



And MORE!

Visit us at www.Agilent.com



