SHIMADZU
Excellence in Science

Gas Chromatograph Mass Spectrometer

Simplify Your EO & 2-CE Analysis with HS Trap-GCMS

Ethylene oxide (EO) may be effective in reducing or eliminating microbiological contamination with Salmonella. However, its use in food has been prohibited in the European Union for it is a carcinogenic, mutagenic and reprotoxic disinfectant. Recently, EO and its conversion product **2-chloroethanol (2-CE)** have been found in a range of food products and additives. In response to that, the European Rapid Alert System for Food and Feed (RASFF) prohibits the sales of goods exceeding the maximum residue level (MRL) of 0.05 mg/kg (or 50 ppb) for the sum of EO and 2-CE.

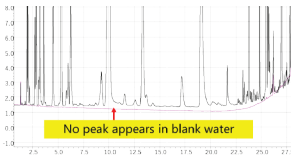
Conventional methods for the analysis of EO and 2-CE, such as the QuOil (CEN/TS 17062:2019 modified) and QuEChERS (EN 15662), require meticulous sample preparations. Even with that, they produce results with limited reproducibility due to the high volatility of the target compounds. To overcome these challenges, Shimadzu offers the HS Trap-GCMS (i.e. GC-MS/MS equipped with dynamic headspace) with the following advantages:

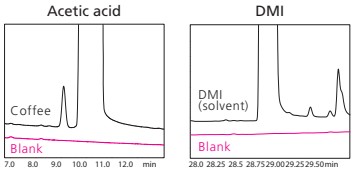
Advantage of HS Trap-GCMS	Technological Exposition
Highly Repeatable Results	Headspace technology is perfect in handling highly volatile compounds
Greatly Simplified Sample Preparation	Headspace inherently extracts volatiles from the sample matrix
Supreme Sensitivity Beyond MRLs	GC-MS/MS improves selectivity on even the most complex sample matrix (e.g. food) and dynamic headspace pre-concentrates the target compounds

Shimadzu has developed three methods based on GC-MS/MS equipped with dynamic headspace catering to different application requirements. In all three methods, the limit of quantitation (LOQ) greatly surpasses the EU MRL. Depending on your requirements, various evaluation parameters can be found in the following table:

Headspace Injection Method	Method 1 (Both EO & 2-CE)		Method 2 (only 2-CE)	Method 3 (only EO)
Target Compound	EO	2-CE	2-CE	EO
LOQ level conc. in ppb	10 ppb	10 ppb	5 ppb	6 ppb
% RSD at LOQ (n=6)	2.1	4.9	9.1	1.7
Calibration Levels	10, 20, 30, 40, and 50 ppb		0.1, 0.5, 1, 2, 3, 4, and 5 ppb	2, 4, 6, 8, and 10 ppb
Linearity (R^2)	0.9995	0.9979	0.9997	0.9991

※ Results obtained on sesame seeds sample – For more information, check out Shimadzu Application News 06-SAIP-GC-031-EN





Residual acetic acid in coffee
< 0.0001 %

Residual DMI solvent
< 0.0001 %

Pink chromatograms indicate a blank run (pure water) right after an analysis of coffee aroma – **carryover is negligible!**

Minimal Carryover

with NX Transfer Line

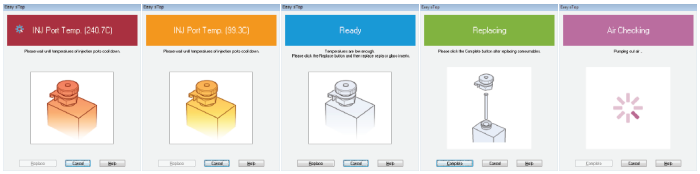
- The super short inert transfer line (30 cm) ensures minimum adsorption of analytes and maximum suppression of peak broadening, thus minimum carryover between analyses.

※ No visible transfer line due to the exceptional shortness

Minimal Maintenance

with GCMS NX series

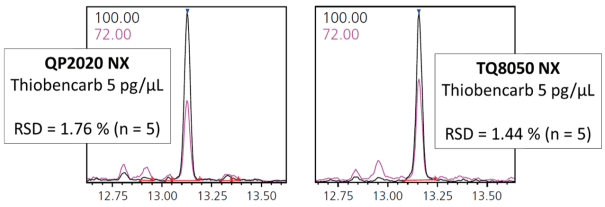
- **ClickTek™** for one-touch injection port handling
- **Easy sTop** drastically reduces maintenance time



Clearly know how much time you will need to proceed to the next step of maintenance with **Easy sTop**

- **Active Time Management** to view estimated remaining time of autotuning, batch completion, etc.

ClickTek™ is a one touch inlet maintenance
The injection port can be opened or closed without tools by simply sliding the ClickTek lever. Replace the insert, slide the lever and feel the click for a leak-free install every time.



MSMS – two instruments in one
Use GC-MS and GC-MS/MS functions interchangeably with no compromise in sensitivity and selectivity

Maximise Flexibility and Throughput

with Ultra Fast Mass Spectrometer (UFMS)

The combination of multiple injection modes (liquid and headspace) and detection modes (MRM, SIM, and Scan) cater for the most pharmaceutical applications.

- Perform targeted screening and quantitation of known compounds, or identification of unknown compounds.
- UFMS ensures no compromise of sensitivity running at normal or top speed.

Complete Compliance

with LabSolutions

With an expansion of data privacy laws around the world, the regulatory landscape is evolving with each new version getting more stringent than the last. In Shimadzu, we continuously innovate our technology to help in keeping the privacy and security policies up with current regulatory and legal requirements.

- **Data protection and privacy** from unauthorized access
- Regulatory **records retention** and full account of compliance.
- **Information integrity and authenticity** in accordance to regulations such as FDA 21 CFR Part 11.

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Shimadzu (Asia Pacific) Pte Ltd.

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