Application Note: ANCCSGCPESTWW

Analysis of Triazine Pesticides in Wastewater by GC/MS

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Key Words

- US EPA Method 619
- Triazine
- pesticides
- waste water
- TG-5SilMS
- 5% Phenyl

Introduction

US EPA 619 is an analytical GC/MS method used for determining certain triazine pesticides in municipal and industrial wastewater. This method was developed by the US Environmental Protection Agency to monitor industrial and municipal discharges under 40 *CFR* 136.1.

EPA method 619 was performed using a splitless injection mode on a Thermo Scientific TRACE GC coupled to a Thermo Scientific ion trap mass spectrometer.

The Thermo Scientific TraceGOLD TG-5SilMS provides excellent performance for the analysis of triazine pesticides, in accordance with the EPA method 619.

Goal

To demonstrate the suitability and performance of TraceGOLD™ TG-5SilMS for the analysis of EPA method 619; triazine pesticides in wastewater.

Experimental details

The triazine pesticides stated in the EPA method 619 were run on a TRACE™ GC fitted with a TriPlus autosampler. The ion trap mass spectrometer was used in a segmented mode to allow precise control of groups of ions for improved ion statistics and ion ratios. The column used for the analysis of a series of triazine compounds, was a low polarity silarylene phase with selectivity comparable to a 5% diphenyl/95% dimethyl polysiloxane phase. The data was acquired and processed using Thermo Scientific Xcalibur data handling software..

Sample preparation

A pre-mixed 1 ng/µL of each triazine pesticide standard solution prepared in acetone was used for the analysis.

Column	Part Number
TraceGOLD TG-5SilMS, 30 m × 0.25 mm × 0.25 µm,	26096-1420
Guard Column 2 m × 0.32 mm	260RG497
Press-Fit Union	64000-001

Thermo Scientific TriPlus Autosampler	
Sample volume	1 µL

TRACE GC Ultra	
Oven Program	60 °C (5 min), 8 °C/min, 300 °C (10 min)
Equilibration Time	0.5 min
Injector	275 °C, Splitless (1 min)
Split Flow	30 mL/min
Column Flow	Helium, 1.5 mL/min (constant flow)
Transfer Line Temperature	300 °C

Thermo Scientific Ion Trap MS	
MS Type	ITD 230 LT (250 L turbo pump)
MS Source Temperature	225 °C
MS Source Current	250 µA
Electron Energy	70 eV
Filament Delay	5 min
MS Aquisition Mode	EI+, 45-450 amu Segmented Scan

Consumables	Part Number
BTO 17 mm septa	31303211
3 mm ID Focus Liner, 105 mm long	45350032
Liner graphite seal	29033406
10 µL, 80 mm Syringe	36502019
Graphite ferrules to fit 0.32 mm id columns	29053487
Graphite/vespel 0.25 mm ID ferrules for GC/MS interface	29033496
2 mL clear vial and Si/PTFE seal	60180-599

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Results

The requirements for the EPA method 619 were achieved with separation of all of the triazine anaytes using the TraceGOLD TG-5SilMS on a GC/MS system. Triazine pesticides are generally difficult to analyse because any activity in the column results in peak tailing or reduced efficiency of the column. The stationary phase in the TraceGOLD TG-5SilMS provides excellent performance due to minimal interaction of active compounds with active sites on the column, therefore no significant peak tailing was observed. Figure 1 shows the TIC chromatogram for 1 ng/µL of triazine pesticides in acetone obtained using a TraceGOLD TG-5SilMS column. Table 1 shows the peak identification of triazine pesticides according to the retention times on the TraceGOLD TG-5SilMS column.

Conclusions

The TraceGOLD TG-5SilMS column demonstrated excellent performance for the analysis of triazine pesticides with no peak tailing of analytes. The chromatogram illustrates the superior performance of the TraceGOLD TG-5SilMS for the analysis of pesticides in accordance with the EPA method 619.

References

1. EPA method 619: http://water.epa.gov/scitech/swguidance/methods/bioindicators/upload/2007_11_06_methods_method_619.pdf

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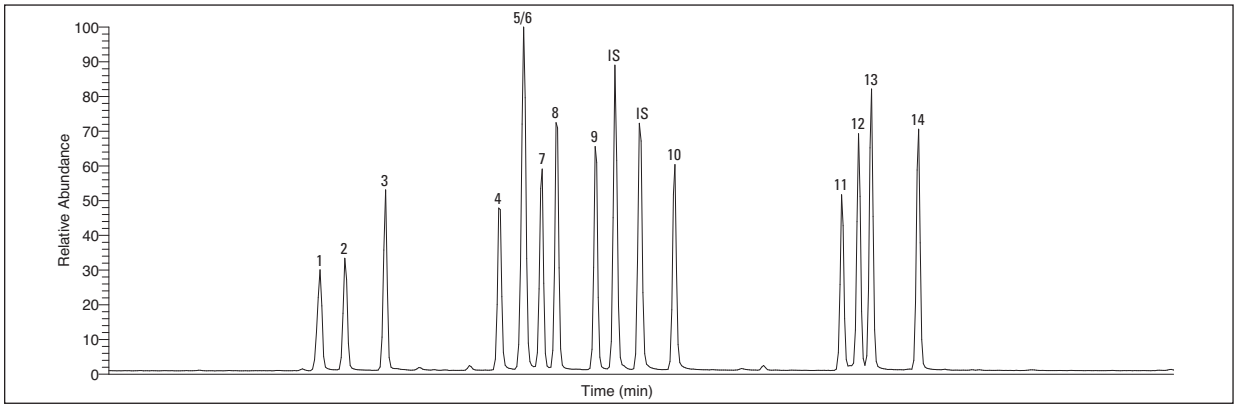

Figure 1: TIC chromatogram of 1 ng/µL of triazine pesticide mix separated on a TG-5SilMS column

Compond Name	Peak No.	Compond Name	Peak No.
Atrazine-desisopropyl	1	Terbuthylazine	9
Atrazine-desethyl	2	IS	IS
Terbuthylazine-desethyl	3	IS	IS
Atraton	4	Secbumeton	10
Simazine	5	Simetryn	11
Prometon	6	Ametryn	12
Atrazine	7	Prometryne	13
Propazine	8	Terbutryn	14

Table 1: List of triazine pesticides according to retention times

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