ANALYSIS OF VOLATILE ORGANIC COMPOUNDS (VOCs) IN RADIELLO® 145 CARTRIDGES BY GC/MS FOLLOWING THERMAL DESORPTION INTO CANISTERS

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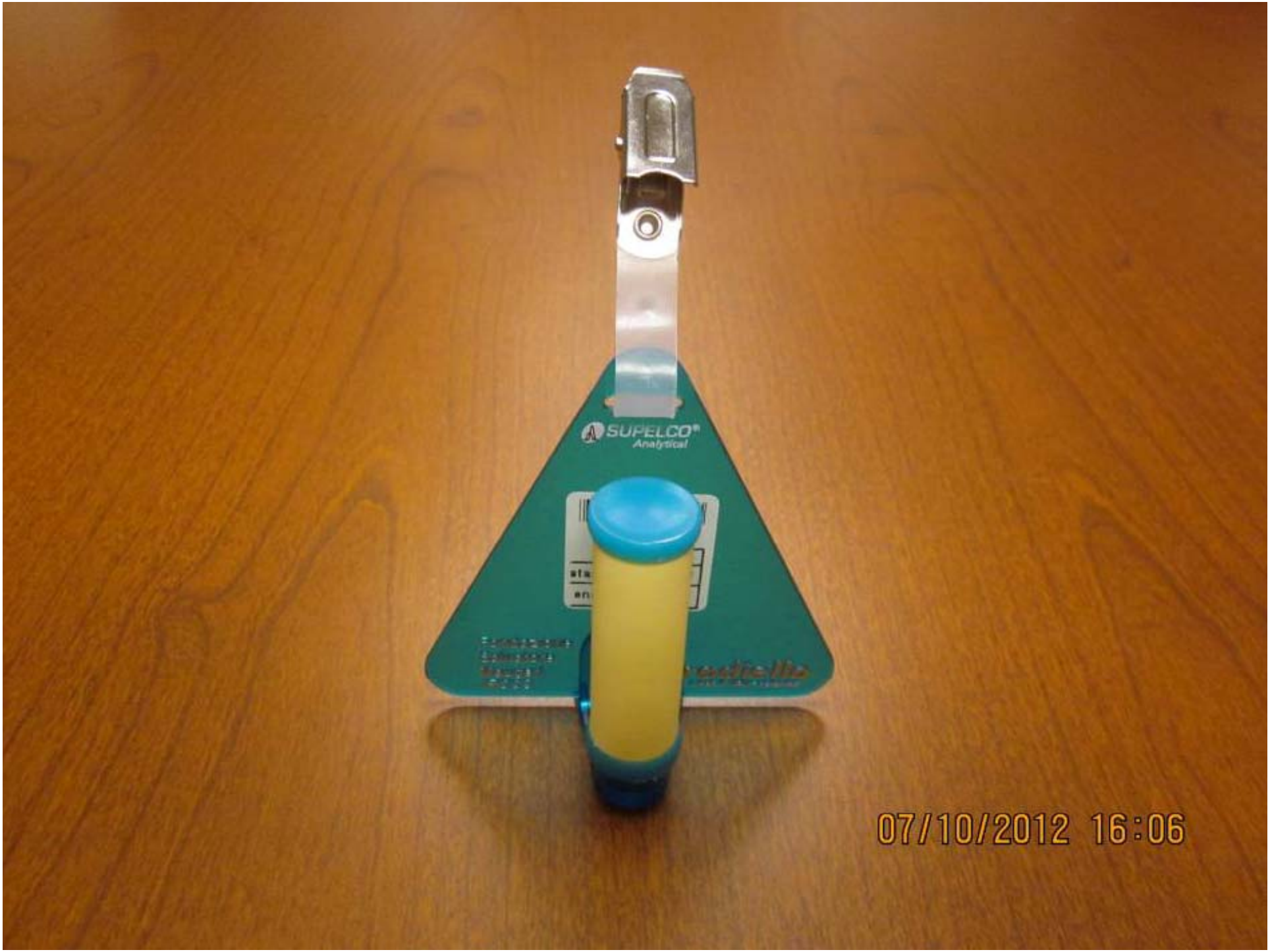
WHEN YOU NEED TO BE SURE SGS

OVERVIEW

- Introduction to Radiello® 145
- The standard protocol for the analysis of Radiello® 145
- Entech 5400 Thermal Transfer System as an alternative to Perkin-Elmer Turbomatrix® thermal desorber
- Advantages of analyzing air samples in canisters
- Conclusion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Analytical
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VOCs with Radiello® by thermal desorption

- Adsorbing cartridge packed with graphitised charcoal code 145
- Yellow diffusive body code 120-2
- Supporting plate code121
- Vertical Adaptor code 122

Advantages of Radiello® sampler

- Easy to use
- Low cost
- Long sampling time without backdiffusion
- High sensitivity
- Long holding time

RADIELLO® 145 ANALYSIS

- The standard protocol for the analysis of the Radiello® 145 cartridge is carried out with Perkin-Elmer Turbomatrix thermal desorber and Agilent GC/MS system
- Desorption parameters:
  Desorption at 370 °C for 15 minutes
  Cryofocusing trap at -20 °C during primary desorption, 99 °C/sec to 290 °C, at 290 °C for 1 minute during secondary desorption
- Six port valve at 150 °C, transfer line at 200 °C
  Carrier gas: helium at 24 psi
  Desorption flow: 100 ml/min
  inlet split: 90 ml/min (flow from tube to cryofocusing trap 10 ml/min)
  Outlet split: 30 ml/min

RADIELLO® 145 ANALYSIS (CONT'D)

- Column: 50m x 0.2 mm x 0.5 um 100% dimethylpolysiloxane
- GC oven: 40 °C for 3 minutes, 8 °C/min up to 80 °C, 80 °C for 1 minute, 20 °C/min up to 280 °C, 280 °C for 3 minutes.
- GC-MS interface: 270 °C
- Flow: helium, 0.8 ml/min

AN ALTERNATIVE TO THE STANDARD PROTOCOL

- Entech 5400 Thermal Transfer System automates the transfer of tube samples into canisters
- Automated leak-checking before the sample transfer
- Final pressure adjustment to maintain same sample volume

Adapted from Entech Instruments Inc 2011 – 2012 catalog

5400 THERMAL TRANSFER SYSTEM DESORPTION PARAMETERS

- Desorption: 330 °C for 30 minutes
- Target pressure: 16 psia
- Canister size: 6000 cc
- Leak check time: 20 seconds
- max leak rate: 0.2 psi
- max start pressure: 2 psia

GC/MS METHOD TO15 PARAMETERS

- Column: 60 m x 0.32 mm x 1 um 100% dimethylpolysiloxane
- GC oven: 35 °C for 5 minutes, 9 °C/min up to 150 °C, 20 °C/min up to 220 °C, 220 °C for 5 minutes.
  GC-MS interface: 220 °C
- Flow: helium, 1.2 ml/min

INITIAL DEMONSTRATION OF CAPABILITY STUDY (SPIKED WITH GAS STANDARD)

Target Compound	Spiked (ppb)	1 (ppb)	2 (ppb)	3 (ppb)	4 (ppb)	RSD (%)	R% (%)
Vinyl chloride	6.12	5.14	5.12	5.22	5.20	0.92	84.5
1,1-Dichloroethene	6.12	6.64	6.64	6.80	6.68	1.13	109
trans-1,2-Dichloroethene	6.12	7.06	7.00	7.20	7.08	1.18	116
cis-1,2-Dichloroethene	6.12	6.98	7.04	7.16	7.06	1.06	115
Benzene	6.12	5.86	5.86	5.96	6.06	1.61	97.0
Trichloroethene	6.12	5.94	5.92	6.04	6.22	2.27	98.5
Toluene	6.12	5.78	5.76	5.92	6.00	1.96	95.8
Tetrachloroethene	6.12	6.18	6.24	6.34	6.64	3.22	104
Ethylbenzene	6.12	5.72	5.74	5.88	6.06	2.68	95.6
m,p-Xylene	12.2	11.3	11.4	11.6	12.1	2.82	95.0
o-Xylene	6.12	5.70	5.72	5.82	6.04	2.68	95.1

INITIAL DEMONSTRATION OF CAPABILITY STUDY (SPIKED WITH LIQUID STANDARD)

Target Compound	Spiked (ppb)	1 (ppb)	2 (ppb)	3 (ppb)	4 (ppb)	RSD (%)	R% (%)
Vinyl chloride	12.0	1.88	1.96	1.88	1.76	4.41	15.6
1,1-Dichloroethene	7.72	6.72	6.44	6.00	6.52	4.73	83.1
trans-1,2-Dichloroethene	7.72	6.60	6.60	6.00	6.40	4.42	82.9
cis-1,2-Dichloroethene	7.72	6.52	6.44	6.00	6.36	3.63	82.0
Benzene	9.58	8.68	8.56	8.00	8.44	3.52	87.9
Trichloroethene	5.70	4.64	4.68	4.32	4.52	3.56	79.7
Toluene	8.12	6.56	6.56	6.04	6.60	4.15	79.3
Tetrachloroethene	4.51	3.48	3.56	3.32	3.52	3.03	76.9
Ethylbenzene	7.05	5.52	5.52	5.00	5.56	4.95	76.6
m,p-Xylene	14.1	11.0	11.1	10.1	11.2	4.76	76.9
o-Xylene	7.05	5.36	5.36	4.88	5.36	4.58	74.3

ADVANTAGES OF THE NEW APPROACH

- Conduct multiple analyses by rerunning the sample at different sample volumes (dilution factors)
- Shared initial calibration by Radiello® 145 and method TO15
- Methanol free
- High sensitivity

CONCLUSION

- The Radiello® diffusive sampler for air sampling is an easy to use sampling tool that offers high sensitivity, low cost, long sampling time.
- The standard analytical method for Radiello® 145 cartridge is set up with Perkin-Elmer Turbomatrix thermal desorber and Agilent GC/MS system.
- A new approach is proposed for the analyses of Radiello® 145 cartridges by transferring samples from tubes into canisters.

QUESTIONS?