

# Automated Solventless Sample Extraction – from Headspace to Solid Phase Microextraction, Thermal Extraction, Chamber Testing, and Pyrolysis

Introduction: Ms. Yunyun Nie, GERSTEL GmbH & Co.KG, Germany (language: Mandarin)

Solventless Extraction is an environmentally friendly technique used in sample preparation. It has developed rapidly in recent years and is preferred in laboratories and industry due to its time, labor and cost-savings and in particular its elimination of solvent and minimization of sample size. High recovery, sensitivity, and low detection limits are routinely achieved. In the first part of this tutorial, several solventless extraction techniques will be introduced, such as headspace (HS) analysis, solid phase microextraction (SPME), stir bar sorptive extraction (SBSE), chamber emission testing and pyrolysis. In the next two presentations, dynamic headspace (DHS) techniques and thermal desorption (TD) techniques will be presented in detail with respect to their usability and effectiveness for selected samples in the fields of food, flavor and fragrance (FFF) or material testing and characterization. In the last presentation, recent developments in automated microextraction techniques will be presented by Prof. Ouyang from Sun Yat-sen University.

Extending Dynamic Headspace (DHS): Dr. Xiao Li, GERSTEL LLP, Singapore (language: Mandarin)

Two ways of extending the power of DHS, the full evaporation technique (FET) and multi volatile methods (MVM) will be introduced. By fully evaporating the solvent matrix, FET can extend the volatility range of compounds compared to standard HS, DHS, or SPME. MVM uses sequential DHS sampling to analyze VVOCs, VOCs and SVOCs from aqueous samples and can cover an even wider range of volatility of compounds (vapor pressures from  $\sim 0.0001$  to 120 kPa). The performance of DHS, FET and MVM will be demonstrated using aroma compounds in tea, brewed coffee, shampoo and milk powder at sub-ppb to ppm levels.

TD Related Techniques: Dr. Eike Kleine-Benne, GERSTEL GmbH & Co.KG, Germany (language: English)

Thermal Desorption (TD), a sample extraction technique and sample introduction technique for gas chromatography is discussed with a focus on material characterization. Some application examples are screening interior materials (e.g. from vehicles or buildings) for VOC and SVOC emissions to direct thermal extraction of particulates captured on PM 2.5 dust filters. Fully automated micro-scale emission chamber screening methods to determine VOC and SVOC emissions from building and insulation materials will be considered. Finally, pyrolysis for the characterization of polymers and non-volatile compounds will be reviewed.

Development of Automated Microextraction Techniques Based On GERSTEL MPS System:

Dr. Gangfeng Ouyang, Sun Yat-sen University, China (language: Mandarin)

Rapid, automated and solvent-free are the developing trends of sample preparation technique. In this study, fully-automated microextraction techniques, including headspace solid-phase microextraction (HS-SPME), coupled with GC/MS and HPLC were investigated with the use of Gerstel Multi Purpose autosampler, sample extraction, injection and analysis procedures can be automatically carried out. Under the optimized extraction conditions, the developed methods presented shorter analysis time, lower limits of

detections (LODs) and satisfied with the use of SPME couple with HPLC and GC/MS, MPS system can be easily applied in environmental and food samples.