

Analysis of mainstream tobacco smoke by SPME-GC×GC-TOFMS

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Tobacco smoke is an extremely complex and dynamic aerosol consisting of liquid/solid droplets (particulate phase) suspended in a mixture of gases and semi-volatiles (gaseous phase). It is formed during overlapping processes of burning, pyrolysis, pyrosynthesis, distillation, sublimation, condensation, filtration and elution¹. Smoke is emitted either as the mainstream smoke inhaled by the smoker or emitted from the smoldering cigarette in the form of sidestream smoke. Mainstream smoke consists of about 5600 identified compounds² and some reports claim the number of unidentified compounds might reach up to 100 000³.

Mainstream tobacco smoke has been analyzed by means of comprehensive two-dimensional gas chromatography coupled to time of flight mass spectrometry (GC×GC-TOFMS), which is an established analytical technique for the characterization of complex mixtures of volatiles. Samples were analyzed after solid-phase microextraction (SPME) followed by thermal desorption (TD).

This research focuses on the development of a strategy for the analysis of large numbers of samples from different tobacco formulations. Efforts are directed to the estimation of the relative importance of intra-product variation compared to inter-product variation, to evaluate how powerful the technique is for distinguishing quantitative or qualitative differences between samples. The statistical comparison is used for highlighting possible significant variations inside specific classes of compounds.

¹ Liu, C., McAdam, K., Perfetti, T., *Mini-Reviews in Organic Chemistry*, 8 (2011) 349.

² Perfetti T.A, Rodgman A. *Beitr. Tabakforsch. Int.* 24/5 (2011) 215.

³ Wakeham, H. In *162nd National Meeting, American Chemical Society*; Schmelz, I., Ed.; Plenum Press: Washington, DC, 1971, p 1.