Multivariate optimization of method for analysis of emissions from heated tobacco by HS-SPME GC×GC-TOFMS

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Cigarette smoke is a highly complex dynamic aerosol system generated by distillation, pyrolysis and combustion reactions when the tobacco is burnt. As the burning tip of a cigarette reaches temperatures up to 1000ºC, more than 6800 compounds have been identified in mainstream smoke[1]. Heating tobacco to temperatures lower than 300ºC simplifies the composition of emissions by lowering the production of chemicals[2].

The study focused on developing and optimising an analytical strategy for the characterisation of heated tobacco. Emissions were generated using an A14 smoking engine from Borgwaldt. Sampling was performed according to the Health Canada Intense applying 12 bell shaped puffs of 55ml volume, 2s puff duration and 30s interval between the puffs. Emissions were captured on glass fiber filter for Head Space Solid-Phase Micro Extraction (HS-SPME) analysis. Experimental design was applied for the optimization of the HS-SPME extraction parameters. The emmisions of heated tobacco have been analyzed by means of comprehensive two-dimennsional gas chromatography coupled to time of flight mass spectrometry (GCxGC-TOFMS).

Based on initial results, the complexity of heated tobacco emissions appeared to be quite complex. The peak table-based processing software used for the study revealed up to 7000 hits (S/N > 100) depending on the SPME fiber used. Unsupervised library search results of studied emissions revealed up to 2500 unique and acceptably identified compounds (library matching higher than 75%). The range of identified compounds was in similar order of magnitude compared to combustible tobacco products studied in details earlier[3,4].

References

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