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Application News

GCMS/MS

Analysis of flavour compounds in e-liquids

No. SCA_280_087

▪ Introduction

In recent years the popularity of e-cigarettes and the market for the refillable solutions of the e-cigarettes (e-liquids) have grown rapidly. Usually these e-liquids are a mixture of propylene glycol, glycerine, water, nicotine and different flavourings. Beside nicotine, especially the aroma compounds are suspicious to be harmful to human health, when vaporized at high temperatures and inhaled afterwards. Isopulegol, Menthon, Isomenthon, Pulegon and Carvon are some of those flavour compounds typically used in e-liquids.

According to the EU guideline 2014/40/Eu (TPD2) the manufacturer and importers of e-liquids have to declare every compound exceeding a content of 0.1 % in the finished product. A perfect method for analysis of the ready to sale e-liquids is using a GCMS/MS system for identification of the components by means of automatical search in a database and final quantification.

▪ Material and methods

The samples were analysed with a Shimadzu triple quadrupole mass spectrometer GCMS-TQ8040 equipped with an autosampler AOC-20i for liquid injections. The GCMS instrumentation was configured as twin line system with 2 columns installed into the MS and a total carrier gas flow of 1.5 ml (He).

A mixture of Isopulegol, Menthon, Isomenthon, Menthol, Pulegol and Carvon, each compound in the same concentration, was used as standard.

▪ Results

The newly developed method shows high linearity, of the calibration curves (figure 1). Also the separation and identification of the aroma compounds in real samples works very well, shown below for the example of the stereoisomers Menthon and Isomenthon.

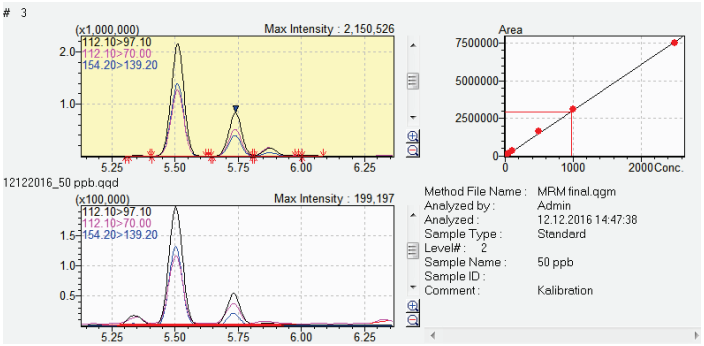

Figure 1: Identification of Menthon and Isomenthon in a real sample (upper chromatogram) and comparison with standard solution (lower chromatogram)

The excellent results of reproducibility measurements demonstrate impressively the robustness of the method:

Compound	% RSD Area/Conc
Isopulegol	1.14
Menthon	0.41
Isomenthon	0.72
Menthol	0.68
Pulegon	0.29
Carvon	0.34

Table 1: Relative standard deviation of repeatability tests (n=6), 2.5 ng/µl of standard solution

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