INTRODUCTION

E-Cigarettes generate an aerosol by vaporising ‘e-juice’ that is carried by a wick to a heater. Typically, a 44mm CFH is used to trap condensed vapour from the e-cigarettes for subsequent analysis.

OBJECTIVE

The objective of this study was to compare a selection of alternative trapping options and to determine their suitability for e-cigarette analysis.

METHOD

Tests were carried out on commercial e-cigarettes using a dedicated e-cigarette vaping machine (CETI 8 as illustrated), with both 55ml and 70ml puff volumes, square profile duration 3s and repeated at 30s intervals.

Samples from each product type were vaporised onto standard 44mm Cambridge pads, 55mm Cambridge pads and also an electrostatic trap (set for ~20kV electrode voltage). In each case an additional 44mm pad was placed in series with the puff engine path in order to act as a backup trap in the case of condensate breakthrough.

Tests were carried out on commercial e-cigarettes using a dedicated e-cigarette vaping machine (CETI 8 as illustrated), with both 55ml and 70ml puff volumes, square profile duration 3s and repeated at 30s intervals.

RESULTS

Weight gain from the control channels over 300 puffs (no e-cigarette present), were of the order of only 1mg for each trap tested.

Graph 1 demonstrates the observed behaviour of the pressure drop of a 55mm Cambridge filter pad as puffs accumulate.

Graph 2 shows the trapping efficiency of the electrostatic trap was below 45%, much lower than that of the Cambridge traps. Significant quantities of condensate were able to breakthrough the trapping area into the tubing beyond and also into the backup trap.

CONCLUSIONS

- Cambridge filter traps could be suitable for the capture of e-cigarette condensate without the need for frequent halting of the vaping process.
- The 55mm Cambridge trap could be considered as a better alternative than the 44mm version, as replacement may not be necessary during the vaping to exhaustion of typical products.
- The basic principle of electrostatic precipitation was shown to be applicable to e-cigarette condensate. Whilst the low efficiency may not be appropriate for routine analysis of e-cigarettes, there are likely to be applications in analysis for trace metals.

OBSERVATIONS AND ANALYSIS

Small weight gains were detected on control traps with no e-cigarettes present. These gains were most likely due to capture of small amounts of moisture from the laboratory air.

Only a very small amount of breakthrough condensate was detected on backup traps; as shown in Graph 2. No significant condensation was observed in tubing. It is likely that a very small amount of e-cigarette vapour remains uncondensed and so passes through both main and backup traps.


A Comparison of Selected Aerosol Trapping Mechanisms for the Analysis of E-cigarettes

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