



Nicotine Assay of 16 mg/g Electronic Cigarette from '10 Motives'

Report Number: F378A

Mike Ellicott
07 January 2011

LPD Laboratory Services Limited

Suite 1 - D Building Philips Site
Philips Road
Blackburn
Lancashire, BB1 5RZ
United Kingdom
www.lpdlabservices.co.uk
enquiries@lpdlabservices.co.uk
Tel 01254-676074
Fax 01254-278845

Art Devlin – 10 Motives

Suite 20, Edwin Foden Business Centre, Moss Lane, Sandbach, Cheshire CW11 3AE

Disclaimer

This report shall not be 'published' or 'extracts reproduced' without written permission from 'LPD Lab Services Limited', in accordance with the [laboratory's terms and conditions of sale](#).

Description

One type of electronic cigarette 'Cartridge' was supplied to confirm the nicotine concentration found within the electronic cigarette 'Cartridge', and suggest a classification for the products under the current CHIP Regulations.

The product was as follows: -

- 10 Motives Electronic Cigarette 16 mg /g

The electronic cigarette which replicates the action of smoking, producing a tobacco aromatised smoke which when inhaled quickly delivers the nicotine to the lung.

The Electronic Cigarettes do not contain "Tobacco" as such, but are formulated using a refined tobacco leaf extract, where the extract used in manufacture may typically contain $\geq 95\%$ Nicotine. The EC cartridges should therefore be exempt from the current Tobacco Legislation.

Nicotine is classified as a poison and is on the "Poisons List A", however, there are "No special restrictions to any purchasing group". It is therefore appropriate to deal with the electronic cigarettes under the CHIP Regulations.

An electronic cigarette was removed from the packaging and weighed, then carefully disassembled.

At the 'illuminated end' the grey coloured cap was removed and placed in a clean beaker. This did not require solvent washing.

Similarly, at the 'mouth' end of the e-cigarette, the translucent rubber cap was removed and also added to the beaker. This also did not require solvent washing.

At the 'mouth' end, two discs were removed from the steel tube which required solvent washing to remove traces of nicotine solution. These were placed in the glass filter funnel for solvent washing.

A rod was then inserted into the steel tube at the 'illuminated end' to force out the combined electronic/ battery/ atomiser unit. The atomiser unit was then cut free from the electronic/battery part by cutting the

connecting wires, and the atomiser was added to the glass filter funnel for solvent washing. The rod, steel tube and battery were the rinsed with pure solvent.

The electronic/battery part was allowed to air dry, while all other components rinsed with solvent were dried at 100°C for 30 min.

The Nicotine Assay

1. Sample Extraction for GC Nicotine Assay - Cartridge

All equipment was washed at least three times with pure acetone then air dried before use; this included the 50 ml graduated flask, glass filter funnel with integral glass sintered support plate, glass rod, and steel tweezers.

A single e-cigarette was slowly disassembled and each sub-component rinsed in turn with pure Propan-1-ol solvent, with all washing being collected using a glass funnel in a 50 ml graduated flask.

The nicotine solution was efficiently extracted from the 'atomiser felt' by careful washing with pure Propan-1-ol solvent 10 times, and subsequently collecting the washings in a 50 ml graduated flask and made up to the mark with pure Propan-1-ol. The flask was shaken 10 times to mix the contents prior to analysis.

2. Calibration of GC Nicotine Assay Method

A nicotine drug standard was obtained from Sigma-Aldrich with a concentration of 1,050 mg/l or 1.05 mg/ml of (-) Nicotine in methanol.

3. GC Nicotine Assay Method

The samples were analysed at LPD Lab Services Ltd to determine the nicotine concentration present by GC (Gas Chromatography).

Column:	Heliflex AT-1 Dimethylpolysiloxane Capillary Column – 30 m x 0.53 µm x 5 µm
Temperature:	150°C for 1 min, ramp 10°C/min to 260°C, 260°C for 18 min, 15 min equilibration
Analysis Time:	30min
Injection:	Split less
Carrier gas:	Helium

The GC method employed was of the '**external standard type**' where the detector response for the nicotine component was calibrated based on peak area, after injecting a set volume of standard (0.5 μ l). The detector response factor for Nicotine is evaluated and stored in the calibration file on the Chromatographic data processor.

The syringe used for injecting the samples was cleaned between samples using pure acetone.

Each 'unknown' sample is analysed by injecting an identical volume onto the GC system (0.5 μ l as when calibrating) and the integrated peak area is used to calculate the nicotine content of the cartridge by applying the detector response factor and the dilution factor to the integrated peak area for nicotine.

The nicotine concentration can be expressed directly in units as follows: -

- mg/ e-cigarette
- mg/ cartridge
- mg/ ml for liquid supplied in bottles

Provided that the weight of the nicotine solution extracted from each e-cigarette or cartridge is calculated, the nicotine content can be further expressed as either: -

- mg/ g or % w/w

Provided that the density of the nicotine solution can be estimated (g/ml) by weighing (for liquids supplied in bottle form), the nicotine content can be further expressed as: -

- mg/ g or % w/w

The Uncertainty of Measurement is estimated to $\pm 10\%$ of the reading relative.

4. GC Nicotine Assay Results

The nicotine standard was injected neat on to the GC system without any form of dilution. Each sample cartridge was subject to a dilution factor of fifty times prior to analysis.

Table 1 – Summary of GC nicotine Assay Data

Sample	Units	mg/ e-cigarette	mg/ cartridge	mg/ml	mg/g	% w/w
Nicotine Standard 1.05 mg/ml or (1050 mg/l)		N/A	N/A	1.05	N/A	N/A
10 Motives Electronic Cigarette 16 mg/g		8.17	N/A	N/A	13.98	1.40

5. Discussion

The nicotine solution in the electronic cigarette '**E-cigarette**' has been investigated by **LPD Lab Services Ltd**, in order to confirm the quantity of nicotine currently found within the nicotine solution formulation, and suggest a classification of the preparation according to the hazards identified.

- The nicotine solution in the **10 Motives Electronic Cigarette** has been determined as **1.40 % w/w**, and it is suggested that this cartridge should be classified as "**Toxic**".

6. CHIP Regulations

The nicotine levels have been determined for each e-cigarette '**Cartridge**', and the classification has been suggested below.

Suggested Classification: -

- ✓ "Toxic" - for preparations containing nicotine at concentrations is $\geq 1\%$ but $< 7\%$

For any product containing nicotine for use by the general public such as e-cigarettes, it is recommended that an 'expert packaging company' that has a full understanding of the current CHIP regulations and any possible forthcoming changes to regulations be consulted so that the e-cigarettes are packaged and labelled correctly for Trading Standards purposes prior to going on sale.

Such an 'expert packaging company' may be found at: -
www.chemsoft.co.uk or via neil.smith@chemsoft.co.uk

7. References

- a) Chemicals (Hazard Information and Packaging for Supply) Regulations 2009

"This Test Report is a Replacement to the original Test Report F378"

Analysts Name: Mike Ellicott
Function: Senior Applications Scientist

Signature: (hard copy only) _____

End of Report