(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
18 May 2017 (18.05.2017)

WIPO | PCT

(10) International Publication Number
WO 2017/081480 A1

(51) International Patent Classification:
A61K 47/10 (2017.01) *A61K 31/465* (2006.01)
A61K 9/08 (2006.01) *A24B 15/16* (2006.01)
A61K 31/352 (2006.01)

(21) International Application Number:
PCT/GB2016/053547

(22) International Filing Date:
11 November 2016 (11.11.2016)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
1520014.0 12 November 2015 (12.11.2015) GB

(71) Applicant: **JAYTEE BIOSCIENCES LIMITED** [GB/GB]; The Boulevard, Altira Business Park, Herne Bay Kent CT6 6GZ (GB).

(72) Inventors: **TILEY, John**; c/o Jaytee Biosciences Limited, The Boulevard, Altira Business Park, Herne Bay Kent CT6 6GZ (GB). **PACEY, Michael**; c/o Jaytee Biosciences Limited, The Boulevard, Altira Business Park, Herne Bay Kent CT6 6GZ (GB).

(74) Agent: **BRIDLE, Andrew**; Bridle Intellectual Property Limited, 6F Thomas Way, Lakesview Business Park, Canterbury Kent CT3 4JZ (GB).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

WO 2017/081480 A1

(54) Title: LIQUID FORMULATION

(57) Abstract: An electronic cigarette liquid formulation (e-liquid) comprising cannabidiol, a stabiliser and a liquid carrier; wherein the liquid carrier comprises 60-100% v/v propylene glycol, 0-40% v/v glycerol, and 0-40% v/v of one or more triglyceride compounds; and the stabiliser comprises a head portion and a tail portion, wherein the head portion includes one or more reducing moieties and the tail portion comprises a C_3-C_{20} straight or branched aliphatic chain, wherein the stabiliser is soluble or miscible with the liquid carrier.

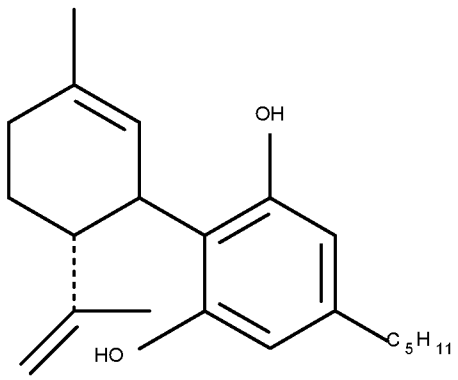
Liquid Formulation

The present invention relates to liquid formulations and in particular to liquid formulations containing cannabidiol. It also relates to e-cigarette liquids (vaping liquids or vaping formulations) containing cannabidiol.

Electronic cigarette (E-cigarette) liquids or formulations typically include nicotine in a liquid carrier comprising principally propylene glycol. However, it is proposed to replace some or all of the nicotine with cannabidiol.

Cannabidiol (2-[(1R, 6R)-6-isopropenyl-3-methylcyclohex-2-en-1yl]-5-pentylbenzene-1,3-diol) is one of at least 85 active cannabinoids found in cannabis. Cannabidiol (hereinafter referred to as "CBD") is considered to be a safer alternative to tetrahydrocannabinol (THC) as it produces less or no short term memory impairment in subjects. It is also considered not to generate the feelings of anxiety often associated with the use of THC.

The structure of CBD is as follows:



It will be appreciated that the two hydroxyl groups on the benzene ring may be readily oxidised. It has been found that formulations of CBD in a liquid carrier comprising propylene glycol result in the discolouration of the liquid. Without wishing to be bound by theory, this is believed to be a result of the oxidation of at least one of the hydroxyl groups of the CBD molecule, likely by the propylene glycol component.

Furthermore, it is known that CBD is largely insoluble in water, but it is soluble in organic solvents, including propylene glycol.

According to a first aspect of the invention, there is provided an electronic cigarette liquid formulation (e-liquid) comprising cannabidiol, a stabiliser and a liquid carrier; wherein the liquid carrier comprises 60-100% v/v propylene glycol, 0-40% v/v glycerol, and 0-40% v/v of one or more triglyceride compounds; and the stabiliser comprises a head portion and a tail portion, wherein the head portion includes one or more reducing moieties and the tail portion comprises a C_3-C_{20} straight or branched aliphatic chain, wherein the stabiliser is soluble or miscible with the liquid carrier.

Electronic cigarette liquid formulations may also be referred to as an e-cigarette liquid or simply an e-liquid. They are also sometime referred to as vaping liquids or vaping formulations.

It will be appreciated that the major component of the liquid carrier is propylene glycol, which comprises at least 60% by volume of the liquid carrier. Thus, reference to % v/v above refers to the percentage by volume of the liquid carrier. The liquid carrier may also contain glycerol and/or one or more triglyceride compounds. As triglyceride compounds tend to be derived from natural sources, they are typically provided in the form of a mixture of compounds. Further liquid components may be included in the liquid carrier.

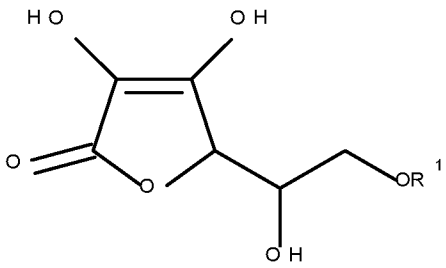
The head portion of the stabiliser is typically a stronger reducing agent than CBD and thus is preferentially oxidised. The head portion of the stabiliser therefore acts as an anti-oxidant for the CBD formulation.

The tail portion of the stabiliser is required to ensure that the stabiliser is soluble or miscible in the formulation. The aliphatic group may be a branched or straight chain alkyl (alkane) group, a branched or straight chain alkene group or a branched or straight chain alkyne group. In embodiments in which the aliphatic chain is unsaturated, it may be mono unsaturated or polyunsaturated.

The head portion of the stabiliser may be a hydroxyl substituted 5- or 6-membered carbocyclic or heterocyclic ring. In embodiments in which the ring is a heterocyclic ring, it may contain one or more heteroatoms each independently selected from oxygen, nitrogen and sulphur. Suitably, the heteroatom is an oxygen atom.

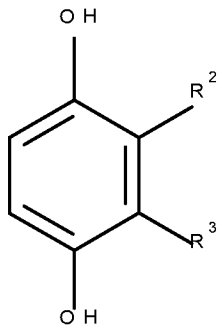
Examples of suitable head portions include:

Ascorbic acid derivatives, such as:



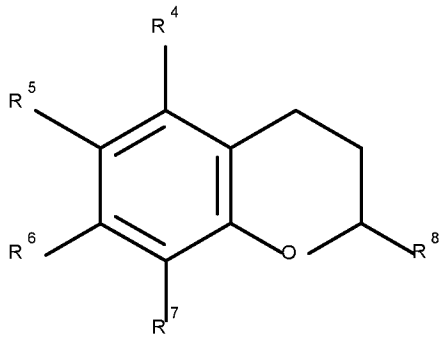
Wherein R^1 is a C_3-C_{20} aliphatic tail portion, optionally coupled to the head portion via a linker moiety.

Hydroquinone derivatives, such as:



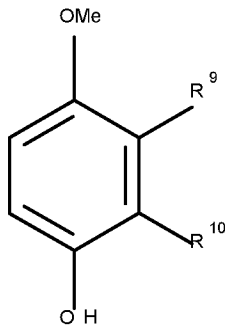
Wherein R^2 and R^3 are each independently selected from H, a C_1-C_6 alkyl group and a C_3-C_{20} aliphatic tail portion optionally coupled to the head portion via a linker moiety, provided that at least one of R^2 and R^3 comprises an aliphatic tail portion.

Hydroxychromane derivatives, such as:



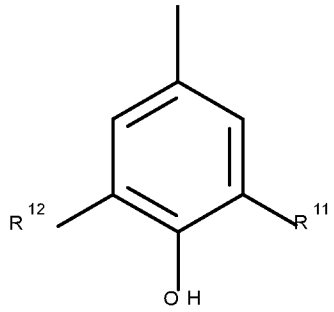
Wherein R^4, R^5, R^6 and R^7 are each independently selected from OH, H, and a C_1-C_3 alkyl group, wherein at least one of R^4, R^5, R^6 and R^7 is OH; and R^8 is a C_3-C_{20} aliphatic tail portion, optionally coupled to the head portion via a linker moiety.

Hydroxyanisole derivatives, such as:



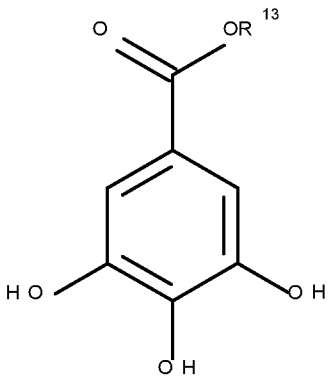
Wherein R^9 and R^{10} are each independently selected from H, a C_1-C_6 alkyl group and a C_3-C_{20} aliphatic tail portion, optionally coupled to the head portion via a linker moiety, provided that at least one of R^9 and R^{10} comprises an aliphatic tail portion.

Hydroxytoluene derivatives, such as:



Wherein R^{11} and R^{12} are each independently selected from H, a C_1-C_6 alkyl group and a C_3-C_{20} aliphatic tail portion, optionally coupled to the head portion via a linker moiety, provided that at least one of R^{11} and R^{12} comprises an aliphatic tail portion.

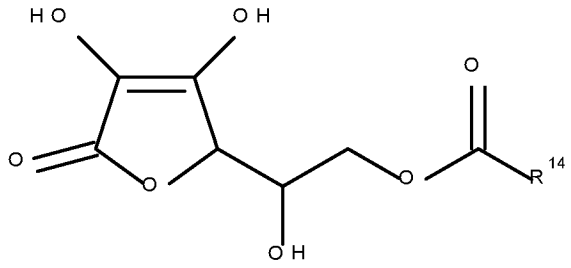
Gallic acid derivatives, such as:



Wherein R^{13} is a C_3-C_{20} aliphatic tail portion.

In the above examples, the linker group, where present, may be selected from –O-, -O(O)C-, -C(O)-, -N(H)C(O)- and -N(H)-. The aliphatic tail portion is suitably a branched or straight chain alkyl group containing 3 to 20, suitably 6 to 20, 7 to 20, 10 to 20 or 12 to 18 carbon atoms.

A suitable stabiliser comprises an ascorbic acid derivative as shown above, wherein R1 is a C_6-C_{20} straight or branched aliphatic chain connected to the ascorbic acid head group via a –C(O)- linker group:



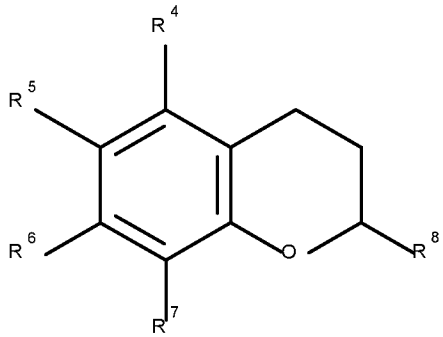
Wherein R^{14} is a C_3-C_{20} aliphatic tail portion. R^{14} may be a C_3-C_{20} branched or straight chain alkyl group, such as for example a C_6-C_{20} alkyl group, a C_{10}-C_{20} alkyl group or a C_{12}-C_{20} alkyl group. Thus, the stabiliser may be an ascorbate ester of a long chain fatty acid having from 6 to 20 carbon atoms, 7 to 20 carbon atoms, 8 to 18 carbon atoms or 10 to 16 carbon atoms. The long chain fatty acid may be unsaturated, monounsaturated or polyunsaturated. For example, the stabiliser may be an ascorbyl ester of palmitic acid, which has a chain comprising 16 carbon atoms.

As the formulation is intended for human consumption, suitably in the form of an e-cigarette formulation, the stabiliser may already be approved for human consumption and/or as an approved food additive. For example, it may already have an "E" number.

One such example of an approved food additive is ascorbyl palmitate which is also known as E304 and is approved in the EU, the US, Australia and New Zealand.

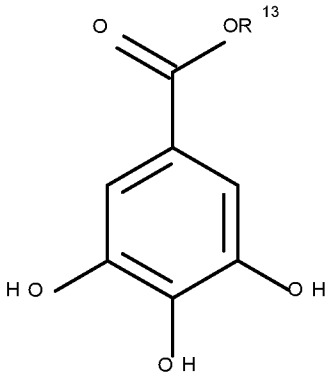
Further examples include:

Tocopherols (E306) which have the following formula:



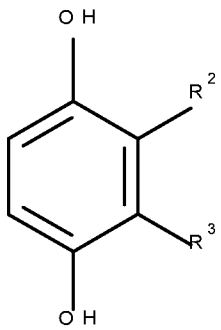
Wherein R^4 and R^6 are each independently H or CH_3; R^5 is OH; R^7 is CH_3; and R^8 is a C_{16} branched chain alkyl group;

Propyl gallate (E310):



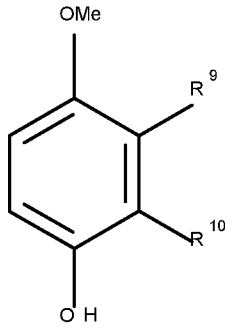
Wherein R^{13} is a propyl group;

Tertiary butylhydroquinone (E319):



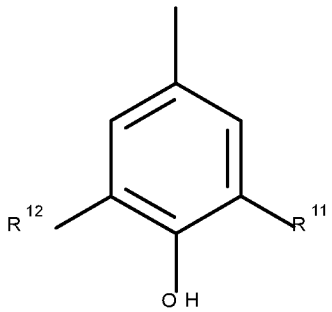
Wherein R^2 is a tertiary butyl group and R^3 is H;

Butylated hydroxyanisole (E320):



Wherein R^9 is a tertiary butyl group and R^{10} is H; and

Butylated hydroxytoluene (E321):



Wherein R^{11} and R^{12} are each independently a tertiary butyl group.

The CBD may be present in the formulation in an amount of 10mg/ml to 300mg/ml. The volume (ml) value refers to the volume of the liquid carrier. The lower limit on the amount of CBD in the formulation may be 15mg/ml, 20mg/ml, 25mg/ml, 30mg/ml, 35mg/ml. 40mg/ml, 45mg/ml or 50mg/ml. The upper limit on the amount of CBD present in the formulation may be 250mg/ml, 200mg/ml or 150mg/ml.

The amount of the stabiliser present in the formulation may be 0.5% to 5% by weight of the CBD content. For example, the stabiliser may be present in an amount of 0.5% to 2% by weight or 0.5 to 1.5% by weight of the CBD present in the formulation.

In other words, the ratio (weight/ml) of CBD to stabiliser in the formulation may be 200:1 to 50:1. In certain embodiments of the invention, the stabiliser may be present in the formulation in an

amount of 0.05mg/ml to 5mg/ml. Again, the volume (ml) refers to the volume of the liquid carrier.

As noted above, the liquid carrier may include glycerol and/or one or more glyceride compounds, suitably one or more plant-derived glyceride compounds. Glycerol and/or glyceride compounds are often present in E-cigarette liquid formulations and facilitate the formation of the vapour for inhalation when heated within the electronic cigarette.

The formulation may contain nicotine. In an embodiment of the invention, the CBD is intended to replace at least some of the nicotine. Accordingly, the formulation may contain less nicotine than would otherwise be present in an E-cigarette formulation.

Formulations according to the invention may be used to wean users away from nicotine. Accordingly, a number of different formulations may be available which contain a decreasing amount of nicotine. Thus, there may be provided a first formulation which contains CBD and a first amount of nicotine, and a second formulation which contains CBD and a second amount of nicotine, wherein the second amount of nicotine is less than the first amount of nicotine. Optionally, a third formulation may be provided, wherein the third formulation contains CBD and a third amount of nicotine, wherein the third amount of nicotine is less than the second amount of nicotine. Such formulations may be available separately or they may form part of a kit. Thus, an aspect of the invention provides a kit containing a first formulation which contains CBD and a first amount of nicotine and a second formulation which contains CBD and a second amount of nicotine, wherein the second amount of nicotine is less than the first amount of nicotine. In an embodiment of this aspect of the invention, there is provided a kit which further includes a third formulation which contains CBD and a third amount of nicotine, wherein and the third amount of nicotine is less than the second amount of nicotine. In this aspect of the invention, the formulations are as defined herein. The formulations discussed above are suitably formulations as defined in the first aspect of the invention, which also include nicotine. Accordingly, the first, second and optionally third formulations suitably comprise cannabidiol, nicotine, a stabiliser and a liquid carrier; wherein the liquid carrier comprises 60-100% v/v propylene glycol, 0-40% v/v glycerol, and 0-40% v/v of one or more triglyceride compounds; and the stabiliser comprises a head portion and a tail portion, wherein the head portion includes one or more reducing moieties and the tail portion comprises a C_3-C_{20} straight or branched aliphatic chain, wherein the stabiliser

is soluble or miscible with the liquid carrier. As noted above, the amount of nicotine in the first, second and third formulations decreases.

The amount of nicotine present in the formulations of the invention may be 0 to 50mg/ml. Thus, no nicotine may be present in the formulation or, where present, it may be present in an amount of for example 5 to 40mg/ml, such as 10 to 30mg/ml.

The formulation may further comprise a flavouring agent. Such flavouring agents are common in the field of E-cigarette liquid formulations. Additionally or alternatively, the formulation may include a scent agent which releases a desired scent when the liquid is heated. In embodiments in which the flavouring component and/or the scent component are liquids, the flavouring component and/or the scent component may be considered to form a part of the liquid carrier. Thus, the liquid carrier may further comprise 0-5% v/v of a liquid flavouring component and 0-5% v/v of a scent component. Suitably the liquid carrier comprises 0-2% v/v of a liquid flavouring component and 0-2% v/v of a scent component.

On the basis that there are numerous legal restrictions associated with tetrahydrocannabinol (THC), the formulation is suitably substantially free from THC. By the term "substantially free", it is meant that the formulation suitably includes less than 0.1 wt% THC, suitably less than 0.01 wt% or less than 0.001 wt% THC. Optionally, the term "substantially free" means that THC is not detectable in the formulation by HPLC.

A further aspect of the invention provides a cartridge containing an electronic cigarette liquid formulation as defined hereinabove. Such cartridges are suitably configured for location in an electronic cigarette.

A yet further aspect of the invention provides an electronic cigarette including an electronic cigarette liquid formulation as defined herein.

Examples:

Comparative Example 1

A 20% w/v solution of CBD in propylene glycol with no stabiliser was prepared by dissolving 2g of CBD in 8ml of propylene glycol. The solution was placed in an open glass vial and monitored over a period of time. The colour of the solution was monitored during this time and the results are set out below:

Day	Colour of solution
0	Colourless
6	Pink
12	Dark pink
13	Dark pink
14	Orange pink
21	Orange
33	Orange

It is believed that the colouration of the solution was due to the presence of an oxidised species of the CBD, wherein the CBD was being oxidised by the propylene glycol carrier. The oxidised species is thought to be a quinone derivative of CBD.

Comparative Example 2

A 5% w/v solution of CBD was prepared having the following formula:

2.5ml of the 20% w/v CBD solution of Comparative Example 1
3ml vegetable glycerine
4.1ml propylene glycol
0.4 ml menthol solution (200mg menthol in 1ml propylene glycol)

The solution was placed in an open glass vial and monitored over a period of time. The colour of the solution was monitored during this time and the results are set out below:

Day	Colour of solution
0	Colourless
1	Light pink

2	Light pink
3	Light pink
4	Pink
8	Pink
10	Pink
21	Pink

Example 1

A stabilised CBD solution was prepared by adding 0.2% w/v butylated hydroxyanisole (BHA) to the solution of Comparative Example 1 (2g CBD and 20mg BHA in 8ml propylene glycol). The solution was placed in an open glass vial and monitored over a period of time. The colour of the solution was monitored during this time and the results are set out below:

Day	Colour of solution
0	Colourless
3	Slight pink
4	Slight pink
5	Pink
6	Pink
7	Pink
11	Pink
13	Pink
24	Dark pink

As can be seen, the rate of oxidation of the CBD in solution is significantly slowed by the addition of the BHA.

Example 2

A stabilised CBD solution was prepared by adding 0.05% w/v 6-O-palmitoyl-L-ascorbic acid (6-O-AP) to the solution of Comparative Example 1 (2g CBD and 5mg 6-O-AP in 8ml propylene glycol).

The solution was placed in an open glass vial and monitored over a period of time. The colour of the solution was monitored during this time and the results are set out below:

Day	Colour of solution
0	Colourless
1	Slight pink
2	Slight pink
3	Slight pink
4	Slight pink
8	Slight pink
10	Slight pink
21	Pale orange

Example 3

A stabilised CBD solution was prepared by adding 0.2% w/v 6-O-palmitoyl-L-ascorbic acid (6-O-AP) to the solution of Comparative Example 1 (2g CBD and 20mg 6-O-AP in 8ml propylene glycol). The solution was placed in an open glass vial and monitored over a period of time. The colour of the solution was monitored during this time and the results are set out below:

Day	Colour of solution
0	Colourless
3	Colourless
4	Colourless
5	Very pale pink
6	Slight pink
7	Slight pink
11	Slight pink
13	Slight pink
24	Pale yellow

Example 4

A stabilised CBD solution was prepared by adding 0.05% w/v 6-O-AP to the solution of Comparative Example 2 to provide a solution having the following formulation:

2.5ml of the 20% w/v CBD solution of Example 3 (2g CBD and 20mg 6-O-AP in 8ml propylene glycol)
3ml vegetable glycerine
4.1ml propylene glycol
0.4 ml menthol solution (200mg menthol in 1ml propylene glycol)

The solution was placed in an open glass vial and monitored over a period of time. The colour of the solution was monitored during this time and the results are set out below:

Day	Colour of solution
0	Colourless
1	Colourless
2	Colourless
3	Colourless
4	Colourless
8	Colourless
10	Colourless
21	Colourless

It can be seen that the addition of a stabiliser as defined herein can reduce, slow down or prevent the oxidation of a solution of CBD in propylene glycol.

Claims:

1. An electronic cigarette liquid formulation (e-liquid) comprising cannabidiol, a stabiliser and a liquid carrier; wherein the liquid carrier comprises 60-100% v/v propylene glycol, 0-40% v/v glycerol, and 0-40% v/v of one or more triglyceride compounds; and the stabiliser comprises a head portion and a tail portion, wherein the head portion includes one or more reducing moieties and the tail portion comprises a C_3-C_{20} straight or branched aliphatic chain, wherein the stabiliser is soluble or miscible with the liquid carrier.

2. An electronic cigarette liquid formulation according to Claim 1, wherein the head portion of the stabiliser includes a hydroxy substituted 5- or 6-membered carbocyclic or heterocyclic ring

3. An electronic cigarette liquid formulation according to Claim 2, wherein the head portion of the stabiliser is derived from ascorbic acid, hydroquinone, hydroxychromane, hydroxyanisole, hydroxytoluene or gallic acid.

4. An electronic cigarette liquid formulation according to any of Claims 1 to 3, wherein the aliphatic tail of the stabiliser is directly bonded to the head portion or is bonded via a linker group selected from –O-, -O(O)C-, -C(O)-, -N(H)C(O)- and -N(H)-.

5. An electronic cigarette liquid formulation according to Claim 1, wherein the stabiliser comprises a head group derived from ascorbic acid, a tail group which is a C_6-C_{20} straight or branched aliphatic chain, and the tail group is connected to the head group via a carboxylate linker group.

6. An electronic cigarette liquid formulation according to Claim 5, wherein the stabiliser is an ascorbate ester of a C_7-C_{20} long chain acid.

7. An electronic cigarette liquid formulation according to Claim 6, wherein the stabiliser is an ascorbate ester of palmitic acid.

8. An electronic cigarette liquid formulation according to any of Claims 1 to 7, wherein the cannabidiol is present in the formulation in an amount of 10mg/ml to 300mg/ml.

9. An electronic cigarette liquid formulation according to Claim 8, wherein the cannabidiol is present in an amount of 30mg/ml to 250mg/ml.

10. An electronic cigarette liquid formulation according to Claim 9, wherein the cannabidiol is present in an amount of 50mg/ml to 200mg/ml.

11. An electronic cigarette liquid formulation according to any of Claims 1 to 10, wherein the stabiliser is present in an amount of 0.05mg/ml to 5mg/ml.

12. An electronic cigarette liquid formulation according to any of Claims 1 to 11, wherein the ratio of cannabidiol to stabiliser in the mixture is 200:1 to 50:1.

13. An electronic cigarette liquid formulation according to any of Claims 1 to 12, wherein the or each triglyceride compound, where present, is derived from a plant source.

14. An electronic cigarette liquid formulation according to any of Claims 1 to 13, wherein the formulation further includes nicotine.

15. An electronic cigarette liquid formulation according to any of Claims 1 to 14, wherein the formulation further includes a flavouring agent and/or a scent agent.

16. An electronic cigarette liquid formulation according to any of Claims 1 to 15, wherein the formulation is substantially free from tetrahydrocannabinol (THC).

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2016/053547

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61K47/10 A61K9/08 A61K31/352 A61K31/465 A24B15/16
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61K A24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, BIOSIS, CHEM ABS Data, EMBASE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CHRISTIAN GIROUD ET AL: "E-Cigarettes: A Review of New Trends in Cannabis Use", INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH, vol. 12, no. 8, 21 August 2015 (2015-08-21), pages 9988-10008, XP055343694, DOI: 10.3390/ijerph120809988 page 9997, lines 12-14, paragraph 4.2 ----- -/--	1-16

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 February 2017	01/03/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Madalinska, K

3

Form PCT/ISA/210 (second sheet) (April 2005)

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Krampus: "Vaping CBD Juice and the Effects of CBD Oil", Krampus Botanicals , 18 September 2015 (2015-09-18), XP002766908, Retrieved from the Internet: URL:http://krampusbotanicals.com/vaping-cbd-juice-and-the-effects-of-cbd-oil/ [retrieved on 2017-02-09] the whole document	1-16
Y	WO 2015/116463 A1 (LARSON RAYMOND LOUIS [US]) 6 August 2015 (2015-08-06) abstract; claims 1,5,13,17	1-16
Y	US 2009/047234 A1 (TOUITOU ELKA [IL] ET AL) 19 February 2009 (2009-02-19) abstract; examples 52-54	1-16
Y	US 2011/306660 A1 (GOSKONDA VENKAT R [US] ET AL) 15 December 2011 (2011-12-15) sentences 22-24, paragraph 50 paragraphs [0065] - [0068]	1-16
Y	DE 10 2012 105063 A1 (THC PHARM GMBH [DE]) 12 December 2013 (2013-12-12) abstract; claim 1; example 1 paragraphs [0005] - [0008], [0010], [0014], [0021] - [0022]	1-16
Y	WO 2010/127033 A1 (ALLTRANZ INC [US]; STINCHCOMB AUDRA LYNN [US]; BANKS STAN LEE [US]) 4 November 2010 (2010-11-04) claims 1-2,9-13; examples 6-18	1-16
A	GB 2 450 753 A (GW PHARMA LTD [GB]) 7 January 2009 (2009-01-07) examples 4, liquid C	1-16
A	US 2015/231108 A1 (HEARN ALEX [GB] ET AL) 20 August 2015 (2015-08-20) abstract; claims 1-22; examples 1-4	1-16
T	Anonymous: "Delta Liquids CBD E Liquids - GREEN LABEL", LegalHerbalShop , 2017, XP002766909, Retrieved from the Internet: URL:https://www.legalherbalshop.com/delta-liquids-cbd-e-liquids-green-label.html [retrieved on 2017-02-20] the whole document	

3

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2016/053547

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2015116463 A1	06-08-2015	US 2014209109 A1	31-07-2014
		WO 2015116463 A1	06-08-2015
US 2009047234 A1	19-02-2009	AU 2008234535 A1	09-10-2008
		CA 2683217 A1	09-10-2008
		CN 101720220 A	02-06-2010
		CN 102743740 A	24-10-2012
		EA 200901319 A1	30-08-2010
		EP 2139449 A2	06-01-2010
		JP 2010522741 A	08-07-2010
		US 2009047234 A1	19-02-2009
		WO 2008120207 A2	09-10-2008
US 2011306660 A1	15-12-2011	NONE	
DE 102012105063 A1	12-12-2013	NONE	
WO 2010127033 A1	04-11-2010	CA 2760460 A1	04-11-2010
		EP 2424525 A1	07-03-2012
		JP 5801794 B2	28-10-2015
		JP 2012525416 A	22-10-2012
		US 2010273895 A1	28-10-2010
		WO 2010127033 A1	04-11-2010
GB 2450753 A	07-01-2009	CA 2692539 A1	15-01-2009
		CN 101932314 A	29-12-2010
		EP 2173332 A1	14-04-2010
		GB 2450753 A	07-01-2009
		JP 2010532781 A	14-10-2010
		US 2010317729 A1	16-12-2010
		WO 2009007697 A1	15-01-2009
US 2015231108 A1	20-08-2015	NONE	