MEDICINAL CANNABIS UNIFORM IN FOOD

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ABSTRACT
The invention is a product and a process wherein cannabinoids such as Medicinal Δ9-THC and/or other substances associated with medicinal cannabis, including yet not necessarily limited to cannabidiols, cannabinergol are contained or processed into foodstuffs or medicinal compounds in controlled ways and with specific characteristics. First a medicinal substance with a known about of medicinal cannabis is mixed into a foodstuff such that the medicinal cannabis is distributed uniformly in the foodstuff. Foodstuffs consistent with this invention include baked goods, hard candies, ice cream, bases, ice cream, and yogurt. The product is characterized by a controlled amount of cannabinoids per unit volume of the foodstuff. Another provision of the invention is providing controlled amounts or ratios of Δ9-THC as compared to CBD in a foodstuff.
MEDICINAL CANNABIS UNIFORM IN FOOD

CROSS REFERENCE TO RELATED APPLICATIONS


FEDERAL SUPPORT STATEMENT

[0002] Not Applicable

SEQUENCE LISTING

[0003] Not Applicable

BACKGROUND OF THE INVENTION

[0004] Raw cannabis contains tetrahydrocannabinol carboxylic acid (THC-COOH); this substance is also referred to as THC acid, Δ9-THC acid, THCA-A, or THCA.

[0005] The article that appears in the Journal of Chromatography “Innovative development and validation of an HPLC/DAD method for the qualitative determination of major cannabinoids in cannabis plant material” reference [1], see section 1.1; this article reports that THC-B is another form of THC acid that appears only in trace amounts in raw cannabis. This article also reports other substances in raw cannabis, including cannabidiolic acid (CBDA) and cannabigerolic acid (CBGA); a substance cannabinol (CBN) is also reported present in aged cannabis.

[0006] THC acid may be converted into the psychoactive substance tetrahydrocannabinol (THC), also known as (Δ9-THC) through processes that decarboxylate the THC acid. Decarboxylation is a chemical reaction that converts an acid to a phenol and releases carbon dioxide (CO2); a carbon atom is removed from a carbon chain.

[0007] Reference [1] also discusses and shows the decarboxylation of THC acid into Δ9-THC, the decarboxylation of cannabidiolic acid (CBDA) into cannabidiol (CBD), and the decarboxylation of cannabigerolic acid (CBGA) into cannabigerol (CBG). Decarboxylation occurs when cannabis is exposed to heat, light, cofactors or solvents.

[0008] Historical and anecdotal reports of the medicinal use of cannabis date back for millennia; in recent decades the psychoactive ingredient Δ9-THC has been extracted through a verity of processes; to date processes that decarboxylate of THC-A into psychoactive Δ9-THC in controlled ways use toxic solvents; frequently a distillation process such as fractional distillation is then used to separate the toxic or flammable solvents from the active ingredient after decarboxylation.

[0009] THCA-A decarboxylated into Δ9-THC in controlled ways using toxic or flammable solvents:

[0010] Related U.S. Pat. Nos. 6,365,416 B1 [2], 6,730,519 [3]; and patent publication US 2002/0039795 A1 [4] by Elsby et. al. isolates Δ9-THC from cannabis base material using toxic non-polar organic solvents such as hexane, heptane, or isooctane. U.S. Pat. No. 6,730,519 [3] was sponsored by a National Institute for Drug Abuse, Small Business Innovative Research grant; Related U.S. Pat. Nos. 6,365,416 [2] and 6,730,519 [3] in their Background of the Invention section provide excellent details regarding the medical use of Δ9-THC; the inventors conclude that extracting Δ9-THC from raw cannabis material is more cost effective than synthetically created FDA approved medicinal THC, and they reference prior art dating from 1942 through 1972 that relate to THC extraction or analysis of hashish and “red oil”; the processes referenced frequently use toxic or flammable elements such as carbon tetrachloride, benzene, N-dimethylformamide/cyclohexane, or hexane.

[0011] U.S. Pat. Nos. 7,524,881 B2 [5], and 7,592,468 B2[6] Goodwin et. Al. discloses processes that extract Δ9-THC from raw cannabis; this process converts THC acid into salt using non-polar solvents such as pentane, hexane, heptane, or octane; again toxic or flammable solvents are used.

[0012] GW pharmaceuticals of Great Britain has created a vaporized form of medicinal Δ9-THC called Savitex.

[0013] Savitex is administered with an inhaler, similar to an inhaler used to administer asthma medication. Information regarding the therapeutic use and mechanisms of action of Savitex can be found on GW pharmaceuticals website. Savitex is currently being studied for affectivity by patients with multiple sclerosis, cancer pain, and neuropathic pain.

[0014] GW pharmaceuticals reports that the human body has receptors to frequently called CB1 and CB2 and that Δ9-THC bonds to CB1 (cannabinoid type 1) receptors located in the human brain, where cannabinoids bonds to CB2 (cannabinoid type 2) receptors located in the human lymphatic system. The URLs below link to reports on GW pharmaceuticals website, they describe that Savitex is being used medically and describe some of the mechanisms of action of medicinal cannabis; these reports have also been combined into reference [7]:


[0019] The science related to how these various substances affect the human body is in its infancy, even so GW pharmaceuticals of Great Britain reports that the human body has receptors CB1 and CB2 to which Δ9-THC and CBD (cannabinol) bond respectively. They also report that the human body has CB1 receptors predominately located in the human brain, and CB2 receptors located predominantly in the human lymphatic system.

[0020] Most reports indicate that psychoactive substance Δ9-THC is the primary active medicinal substance derived from cannabis; other substances contained within cannabis may however also have medicinal qualities. Some researchers suspect that cannabidiol (CBD) may mitigate pain; more scientific research is needed to understand how the various substances derived from cannabis affect the human body. GW Pharmaceuticals also state in their Mechanisms of Action “The combination of THC, CBD and essential oils in cannabis-based medicinal extracts may produce a therapeutic preparation whose benefits are greater than the sum of its parts”.

[0021] Reference [8] “Effects of cannabidiol on schizophrenia-like symptoms in people who use cannabis”; from The British Journal of Psychiatry (2008) reports that Δ9-THC tends to “elevate levels of anxiety and psychotic symptoms in healthy individuals. In contrast, cannabidiol (CBD), another major constituent of some strains of cannabis, has been found to be anxiolytic and to have antipsychotic properties, and may be neuroprotective in humans.”
A key finding of this study [8]: “The TCH only group showed higher levels of positive schizophrenia-like symptoms compared with the no cannabinoid and the THC-only CBD groups . . . This provides evidence of the divergent properties of cannabinoids and has important implications for research into the link between cannabis use and psychosis”.

Reference [9]: Therapeutic Potential of Non-Psychotropic Cannabidiol in Ischemic Stroke, Hayakawa, Mishima, & Fujisawa; Dept. of Neuropharmacology, Faculty of Pharmaceutical Sciences, Fukuoka University, Published Jul. 8, 2010. Δ²-THC. This reference reviews various substances found within cannabis, states in its introduction that “Cannabis contains over 60 different terpeno-phenol compounds that have been identified so far but the role and importance of many of these has yet to be fully understood”.

Reference [9] also states “cannabidiol (CBD), cannabinol (CBG), and cannabivarin (CBDV) are known as non-memorizable components of cannabis. These compounds have shown anti-inflammatory, immunosuppressive, analgesic, anti-inflammatory and anti-cancer effects”. This reference also discusses the neuroprotective abilities of CBD in stroke victims.

The above mentioned references [7], [8], and [9] demonstrate that Δ²-THC is not the only substance contained within medicinal cannabis with therapeutic benefits to people. All of these references recommend additional study or mention that the effect of the substances contained within cannabis on humans is not fully understood. Variations of ratios of substances contained within medicinal cannabis are reported to have different effects; as in reference [8], adjusting the ratio Δ²-THC to CBD is shown to be critical in limiting anxiety and psychotic symptoms associated with the intake of high concentrations of Δ²-THC as compared to CBD. New substances and therapeutic uses of substances derived from cannabis are likely to be discovered as research in this field continues.

Reference [10]: “Isolation of Δ²-THCA-A from hemp and analytical aspects concerning the determination of Δ²-THCA in cannabis products”; Dussi, et al. Institute of Legal Medicine, Basel Switzerland, available online Aug. 18, 2004. This reference quantifies the amount of THC acid (THCA-A) that is converted into Δ²-THC when cannabis is smoked under various conditions: Section 2 reviews cannabis reduced into a concentrated THC acid (THCA-A) solution using solvents. Samples of the concentrate are then decahydroxylated at various temperatures in a Gas Chromatography (GC) oven; some samples are then analyzed using High Performance Liquid Chromatography (HPLC). This discussion discloses how various substances within medicinal cannabis may be transformed at different temperatures:

Partial decahydroxylation of concentrated THC-A in solution at 120 degrees C.

Significant decahydroxylation of concentrated THC-A in solution at 140 degrees C.

Nearly complete decahydroxylation of concentrated THC-A in solution at 160 degrees C. along with some degradation of Δ²-THC into cannabinoil and dihydrocannabinoil at 160 degrees C.

A significant percentage of Δ²-THC being degraded into cannabinoil and dihydrocannabinoil at 180 degrees C.

The decahydroxylation of concentrated THC-A in solution at 180 degrees C., and the degradation of Δ²-THC into cannabinoil and dihydrocannabinoil are shown to vary with temperature. Temperature controls are therefore one mechanism for controlling ratios of certain substances in medicinal cannabis.

Concentration ratios of THC acid (THCA-A) to cannabidiolic acid (CBD-A) vary with the types cannabis selected; THC-A decarboxylates into Δ²-THC, and CBD-A decarboxylates into CBD.

Reference [11] is an example of cannabis related material available to the general public Wikipedia under “Cannabidiol” in August 2010. Many of the same substances discussed in previous references are also reviewed in reference [11].

Reference [12]: Cannabis and Cannabis Extracts: Greater Than the Sum of Their Parts?, by John M. McPherland and Ethan B. Russo; 2001 The Haworth Press, Inc. This reference reports the boiling temperature of cannabis related substances, the boiling temperatures reported include: Δ⁹-THC 157 degrees C., cannabidiol (CBD) 160-180 degrees C., cannabinoil (CBN) 185 degrees C., and Δ⁸-THC 175-178 degrees C.


Reference [14]: a drawing from www.Cannabis-Science.com showing chemical structures in cannabis related materials. The drawing is entitled “Cannabinoids”; the drawing shows an important aspect of cannabinoid science, Cannabidiol (CBD) can be converted into Δ⁹-THC. The chemical structures are very similar, they have the same molecular weight and the same chemical formula. Reference [15]: patent application publication US 2008/0221339 by Webster et al. published Sep. 11, 2008 discusses the conversion of Cannabidiol (CBD) to Δ⁹-THC and Δ⁸-THC are discussed in; various toxic or flammable solvents are used in these processes; one cannabis related substance is converted another through a chemical process.

Reference [16]: Hemp Husbandry, an excerpt from Chapter 6 Cannabinoid Chemistry: Robert A. Nelson, Copyright 2000; another excellent review of the chemistry of cannabis.

Uncontrolled Crude Processes:

Other processes have been used to extract Δ⁹-THC from raw cannabis in uncontrolled ways, some of these processes use toxic materials and others do not; frequently such processes attempt to produce a final product in a single uncontrolled crude step. Examples of such processes include the use of butane, a toxic solvent, to make the cannabis “red oil” commonly called hash oil. A method found on the internet reference [17]: “How To Make Hash Oil from Marijuana” reviews the use of butane, here raw cannabis is saturated in butane, the butane reduces the raw cannabis into an oil that is separated from the plant material, the butane evaporates continuously during the process of reduction; a paper filter is used to separate the oil from plant material. The author also recommends a secondary process of mixing the oil with isopropyl alcohol, then evaporating the isopropyl alcohol overnight by letting it sit. The author of this reference believes that the isopropyl alcohol reduces the photosensitivity of THC contained within the oil. The process disclosed has no scientific controls, and shows disregard for laws relating to treating cannabis as a controlled substance or preparation of food.
products. The disclosure is provided as an example of uncontrolled methods that are available to the public.

[0040] In contrast, uncontrolled crude processes that use no toxic chemicals include simply baking cannabis into cookies or bread, or making a tea by steeping cannabis in hot water. Cannabis infused dairy butter can be made by melting dairy butter in a pot, adding raw cannabis and cooking the mixture for a period of time, up to 24 hours.

[0041] Hashish may be made without the use of toxic chemicals, "How to Make Wicked Hash" by Lisa Scannel and Blaine Sind [17] reviews various methods for separating THC acid infused trichomes from cannabis plant materials, forming it into blocks that are then covered in paper, and then heated in fry pan until the blocks melt; the processes reviewed are uncontrolled, and have no scientific controls, they include: “Flat Screening”, “Drum Machines”, “the blender method”, and “ice-water filtration” methods are reviewed. This reference is also provided as another example of uncontrolled crude methods that are available to the public. This disclosure also shows some disdain for laws relating to cannabis as a controlled substance.

[0042] Smoking, in the form of a cigarette or pipe, is the most frequently used uncontrolled process for decarboxylating cannabis.

[0043] The processes discussed above that rely on temperature simply use temperature yet do not control temperature; if the temperature is too low decarboxylation will be incomplete, if temperatures are too high decarboxylated substances within cannabis will be lost to evaporation. Temperature control is therefore characteristic of a process that relies on temperature to decarboxylate. This is why the “uncontrolled” processes reviewed above that rely on temperature are truly uncontrolled.

[0044] Processes discussed above that use toxic or flammable solvents in “uncontrolled” ways rely on saturating available cannabis with the toxic or flammable solvent then filtering oil from plant parts.

[0045] The process sprays a solvent through a tube filled with a volume of cannabis as described in reference [18] implies that more or less solvent will be required will be required to remove all of the trichomes from available cannabis; even small variables, such as how the cannabis is prepared will affect the efficiency of the solvent’s ability to reduce cannabis uniformly.

[0046] For example as the raw cannabis material density varies per unit length of the tube, the solvent’s efficiency of reducing cannabis will vary because butane evaporates very quickly; the process simply is not capable of controlling how much solvent contacts a given volume of cannabis before it evaporates; thus the process is uncontrolled in at least this one way.

[0047] Reference [19] Patent Application Publication US 2008/0241339, "Hemp Food Product Base and Processes", by Mitchell et al. Publication Date Oct. 2, 2008. The reference heats hemp seeds in water and then mills or grinds the seeds, the seeds are then added into soups, beverages, and foods; the seeds are reported to have no Δ²-THC or medicinal cannabis.

[0048] Recently, with the legalization of medical cannabis in 14 states, various edible cannabis products have become available; such products include cookies, biscuits, cooking oil, and dairy butter. These products are made without scientific controls by small producers because pharmaceutical companies do not produce edible cannabis products. Products like cookies or biscuits are eaten as is; products like cooking oil or dairy butter are usually added or cooked into other foods. Each one of these individual edible products have limitations the most significant one is uncontrolled dosage, cookies or biscuits contain cannabis fiber that often makes them green in color, and dairy products such as dairy butter spoil at room temperature.

**Brief Summary of the Invention**

[0049] Provisional Patent application No. 61/401,824 filing date Aug. 19, 2010 Medicinal Cannabis in a Fatty Foodstuff and Utility patent application Ser. No. 13/065,980 filing date Apr. 4, 2011 Medicinal Cannabis Fatty Foodstuff in a Package Mold are hereby incorporated by reference into this specification.

[0050] The invention is a product and a process wherein cannabinoids such as Medicinal Δ²-THC and/or other substances associated with medicinal cannabis, including yet not necessarily limited to cannabidiol, cannabinol are contained or processed into foodstuffs or medicinal compounds in controlled ways and with specific characteristics. First a medicinal substance with a known amount of medicinal cannabis is mixed into a foodstuff such that the medicinal cannabis is distributed uniformly in the foodstuff. Foodstuffs consistent with this invention include baked goods, hard candies, ice cream, bases, ice cream, and yogurt. The product is characterized by a controlled amount of cannabinoids per unit volume of the foodstuff. Another provision of the invention is providing controlled amounts or ratios of Δ²-THC as compared to CBD in a foodstuff.

[0051] An intermediate product containing medicinal cannabis, typically an extract containing cannabinoids in a known volume is mixed into a known volume of a foodstuff.

[0052] The intermediate product, an extract has a known concentration of Δ²-THC, CBD, and other cannabinoids are known because a sample of it is measured at a scientific laboratory prior to incorporation into a food or it is produced by a process that guarantees a known concentration of medicinal cannabis per unit volume. Related provisional patent application No. 61/401,824 describes how such an intermediate product may be made through controlled decarboxylation. Such a process using a cannabis variety with known cannabinoid ratios would produce an extract with known rations. One gram of an intermediate product or extract that is 45% Δ²-THC and 10% CBD would contain 45 milligrams of Δ²-THC and 10 milligrams of CBD.

[0053] In one embodiment of the invention the recipe for making a baked good is modified in two ways first of all an intermediate product or extract containing a known amount of medicinal cannabis is mixed with one or more ingredients of a baked good, and then subsequently mixed with other ingredients of the baked good before baking. The second way that recipes for making baked goods are modified is by limiting the baking temperature to a temperature less than the vaporization temperature of medicinal cannabis. Since Δ²-THC begins to vaporize at 157 degrees C. or 315 degrees F., the baked goods should not be baked at a temperature that exceeds 315 degrees F.

[0054] In a second embodiment of the invention an extract with a known amount of medicinal cannabis is incorporated into a hard candy with a known amount of medicinal cannabis per unit volume of the hard candy. Here again modifications of the process for making a food guarantee that a known amount of medicinal cannabis per unit volume of the food. In
this instance an intermediate product or extract is incorpo-
rated into candy when it is in a molten state and mixed
thoroughly. Care must be taken to keep the temperature of
the candy below 157 degrees C. or 315 degrees F. to prevent
vaporization of the medicinal cannabis.

[0055] A third embodiment of the invention relates to
incorporating medicinal cannabis into an ice cream base, an
ice cream or yogurt. Here again an intermediate product or
extract is uniformly blended into an ingredient for a food
yielding a known concentration per unit volume of the food.

DETAILED DESCRIPTION OF THE INVENTION

[0056] Provisional Patent application 61/401,824 filing
date Aug. 19, 2010 Medicinal Cannabis in a Fatty Foodstuff
and Utility patent application Ser. No. 13/065,980 filing date
Apr. 4, 2011 Medicinal Cannabis Fatty Foodstuff in a Pack-
age Mold are hereby incorporated by reference into this
specification.

[0057] The invention is a product and a process wherein
 cannabinoids such as Medicinal Δ9-THC and/or other sub-
stances associated with medicinal cannabis, including yet not
necessarily limited to cannabinoids, cannabinerol are con-
tained or processed into foodstuffs or medicinal compounds
in controlled ways and with specific characteristics. First a
medicinal substance with a known about of medicinal can-
nabis is mixed into a foodstuff such that the medicinal can-
nabis is distributed uniformly in the foodstuff. Foodstuffs
consistent with this invention include baked goods, hard can-
dies, ice cream, bases, cream, and yogurt. The product is
caracterized by a controlled amount of cannabinoids per unit
volume of the foodstuff. Another provision of the invention is
providing controlled amounts or ratios of Δ9-THC as com-
pared to CBD in a foodstuff.

[0058] An intermediate product containing medicinal can-
nabis, typically an extract containing cannabinoids in a
known concentration in a known volume is mixed into a
known volume of a foodstuff.

[0059] The intermediate product, an extract has a known
concentration of Δ9-THC, CBD, and other cannabinoids are
known because a sample of it is measured at a scientific
laboratory prior to incorporation into a food or it is produced
by a process that guarantees a known concentration of
medicinal cannabis per unit volume. Related provisional
patent application No. 61/401,824 describes how such an
intermediate product may be made through controlled decar-
bossylation using a cannabis variety with known cannabinoid
ratios. One gram of an intermediate product or extract that is
45% Δ9-THC and 10% CBD would contain 45 milligrams of
Δ9-THC and 10 milligrams of CBD.

[0060] In one embodiment of the invention the recipe for
making a baked good is modified in two ways first of all an
intermediate product or extract containing a known amount
of medicinal cannabis is mixed with one or more ingredients
of a baked good, and then subsequently mixed with other in-
gredients of the baked good before baking. The second way
that recipes for making baked goods are modified is by limiting
the baking temperature to a temperature less than the vapor-
ization temperature of medicinal cannabis. Since Δ9-THC
begins to vaporize at 157 degrees C. or 315 degrees F., the
baked goods should not be baked at a temperature that
exceeds 315 degrees F.

[0061] Examples of how baked good recipes may be modi-
fied such that a baked good with a known amount of medicinal
cannabis per unit volume of the baked good is created are
shown below. In each example first an original recipe is
shown, followed by a modified recipe where a known amount
of total other ingredients producing a food with a known con-
centration of medicinal cannabis per unit volume of the food.
Baked goods include cookies, cakes, pies, and pastries.

Original Rum Cake Ingredients:

[0062] 1 cup chopped walnuts; 1/2 cup water; 1/2 cup vegetable oil;
1/2 cup dark rum; 1/2 cup butter; 1/2 cup water; 1 cup white
sugar; 1/2 cup dark rum

Original Rum Cake Directions:

chopped nuts evenly over the bottom of the pan.

[0064] 2. In a large bowl, combine cake mix and pudding mix. Mix in the eggs, 1/2 cup water, oil and 1/2 cup rum.
Blend well. Pour butter over chopped nuts in the pan.

[0065] 3. Bake in the preheated oven for 60 minutes, or
until a toothpick inserted into the cake comes out clean.
Let sit for 10 minutes in the pan, and then turn out onto
serving plate. Brush glaze over top and sides. Allow cake
to absorb glaze and repeat until all glaze is used.

[0066] 4. To make the glaze: in a saucepan, combine
butter, 1/2 cup water and 1 cup sugar. Bring to a boil over
medium heat and continue to boil for 5 minutes, stirring
constantly. Remove from heat and stir in 1/2 cup rum.

Modified Rum Cake Ingredients:

[0067] 1 cup chopped walnuts; 1/2 cup water; 1/2 cup vegetable oil;
1/2 cup dark rum; 1/2 cup butter; 1/2 cup water; 1 cup white
sugar; 1/2 cup dark rum; a known amount of medicinal
cannabis with a known weight cannabinoids.

Modified Rum Cake Directions:

Sprinkle chopped nuts evenly over the bottom of the pan.

[0069] 2. In a large bowl, combine an intermediate prod-
uct or extract containing a known amount of medicinal
cannabis with oil, blend well, then add eggs and blend
directly.

[0070] 3. Add Cake mix and pudding mix, 1/2 cup water,
and 1/2 cup rum. Blend well. Pour butter over chopped
nuts in the pan.

[0071] 4. Bake in the preheated oven for 70 minutes, or
until a toothpick inserted into the cake comes out clean.
Let sit for 10 minutes in the pan, and then turn out onto
serving plate. Brush glaze over top and sides. Allow cake
to absorb glaze and repeat until all glaze is used.

[0072] 5. To make the glaze: in a saucepan, combine
butter, 1/4 cup water and 1 cup sugar. Bring to a boil over
medium heat and continue to boil for 5 minutes, stirring
constantly. Remove from heat and stir in 1/2 cup rum.

[0073] In the example above the baking temperature of the
original recipe has been reduced to a temperature not to
exceed 315 degrees F. (157 degrees C.), a known amount
of medicinal cannabis has been mixed with oil, then eggs, and
then mixed with other ingredients of the cake and poured into a pan and cooked. Once cooked the cake has a known amount of cannabis per unit volume of the cake.

Below is an example of modifying the recipe for soft oatmeal cookies to make oatmeal cookies with a known amount of medicinal cannabis per unit volume of the cookie

**Original Oatmeal Cookie Ingredients:**

- 1 cup butter, softened; 1 cup white sugar; 1 cup packed brown sugar; 2 eggs; 1 teaspoon vanilla extract; 2 cups all-purpose flour; 1 teaspoon baking soda; 1 teaspoon salt; 1½ teaspoons ground cinnamon; 3 cups quick cooking oats.

**Original Oatmeal Cookie Directions:**

1. In a medium bowl, cream together butter, white sugar, and brown sugar. Beat in eggs one at a time, and then stir in vanilla. Combine flour, baking soda, salt, and cinnamon; stir into the creamed mixture. Mix in oats. Cover, and chill dough for at least one hour.
2. Preheat the oven to 375 degrees F. (190 degrees C.). Grease cookie sheets. Roll the dough into walnut sized balls, and place 2 inches apart on cookie sheets. Flatten each cookie with a large fork dipped in sugar.
3. Bake for 8 to 10 minutes in preheated oven. Allow cookies to cool on baking sheet for 5 minutes before transferring to a wire rack to cool completely.

**Modified Oatmeal Cookie Ingredients:**

- 1 cup butter, softened; 1 cup white sugar; 1 cup packed brown sugar; 2 eggs; 1 teaspoon vanilla extract; 2 cups all-purpose flour; 1 teaspoon baking soda; 1 teaspoon salt; 1½ teaspoons ground cinnamon; 3 cups quick cooking oats; a known amount of medicinal cannabis with a known weight cannabinoids.

**Modified Oatmeal Cookie Directions:**

1. In a medium bowl, cream together butter, with an intermediate product containing a known amount of medicinal cannabis, then add white sugar and brown sugar; mix well. Beat in eggs one at a time, then stir in vanilla. Combine flour, baking soda, salt, and cinnamon; stir into the creamed mixture. Mix in oats. Cover, and chill dough for at least one hour.
2. Preheat the oven to no hotter than 315 degrees F. (157 degrees C.). Grease cookie sheets. Roll the dough onto a sheet and flatten with a spatula dipped in sugar sheet with uniform thickness and then cut out a plurality of cookies of identical size; and then place 2 inches apart on cookie sheets.
3. Bake for 12 to 15 minutes in preheated oven. Allow cookies to cool on baking sheet for 5 minutes before transferring to a wire rack to cool completely.

An example of making hard candy by modifying an existing recipe is shown below, first the original ingredients and directions are shown, and then modified ingredients and directions are shown.

**Original Hard Candy Ingredients:**

- 3¼ cups white sugar; 1½ cups light corn syrup; 1 cup water; 1 tablespoon orange; or other flavored extract; ½ teaspoon food coloring (optional); ¼ cup confectioners’ sugar for dusting.

**Original Hard Candy Directions:**

1. In a medium saucepan, stir together the white sugar, corn syrup, and water. Cook, stirring, over medium heat until sugar dissolves, then bring to a boil. Without stirring, heat to 300 to 310 degrees F. (149 to 154 degrees C.), or until a small amount of syrup dropped into cold water forms hard, brittle threads.
2. Remove from heat and stir in flavored extract and food coloring, if desired. Pour onto a greased cookie sheet, and dust the top with confectioners’ sugar. Let cool, and break into pieces. Store in an airtight container.

**Modified Hard Candy Ingredients:**

- 3¼ cups white sugar; 1½ cups light corn syrup; 1 cup water; 1 tablespoon orange; or other flavored extract; ½ teaspoon food coloring (optional); ¼ cup confectioners’ sugar for dusting; a known amount of medicinal cannabis with a known weight cannabinoids.

**Original Hard Candy Directions:**

1. In a medium saucepan, stir together the white sugar, corn syrup, and water. Cook, stirring, over medium heat until sugar dissolves, then bring to a boil. Without stirring, heat to 300 to 310 degrees F. (149 to 154 degrees C.), or until a small amount of syrup dropped into cold water forms hard, brittle threads.
2. Check or monitor the temperature of the molten hard candy and make sure the temperature does not exceed 315 degrees F. (157 degrees C.), and then add an intermediate product containing a known amount of medicinal cannabis, mix thoroughly.
3. Remove from heat and stir in flavored extract and food coloring, if desired. Pour onto molds of a
desired size, and dust the top with confectioners' sugar. Let cool and then package or store in an airtight container.

[0094] Then example above shows one embodiment of how a known amount of medicinal cannabis per unit volume is added into a hard candy recipe. Once again temperature control and the mixing in of a known amount of medicinal cannabis are important characteristics of the invention. The preferred intermediate product containing a known amount of medicinal cannabis is a cannabis extract, and may be an oily cannabis extract.

[0095] A third embodiment of the invention relates to incorporating medicinal cannabis into an ice cream base, an ice cream, or into yogurt. Here again an intermediate product or extract is uniformly blended into an ingredient for a food yielding a known concentration per unit volume of the food. In this instance the food requires refrigeration.

[0096] Three examples follow immediately below are examples of how recipes may be modified to make an ice cream base, ice cream, or yogurt with a known amount of medicinal cannabis per unit volume of the food: The first example shows how a recipe for an ice cream base may be modified to contain a known amount of medicinal cannabis per unit volume of the ice cream base. The second example shows how a recipe for peach ice cream may be modified to contain a known amount of medicinal cannabis per unit volume of the ice cream. The third example shows how a recipe for making yogurt can be modified to make a yogurt with a known amount of medicinal cannabis per unit volume of the yogurt.

Ice Cream Base Example:

Original Ice Cream Base Ingredients:

- 1 cup heavy cream; 3 cups half-and-half cream; 8 egg yolks; 1 cup white sugar; ¼ teaspoon salt

Original Ice Cream Base Directions:

- Pour the heavy cream and half-and-half cream into a heavy saucepan, place over medium-low heat, and heat until barely simmering, stirring frequently. Turn the heat down to low.
- Whisk together the egg yolks, sugar, and salt in a large bowl until thoroughly combined.
- Slowly pour about ½ cup of hot cream mixture into the egg yolk mixture, whisking constantly. Repeat three times more, whisking thoroughly before adding each additional ½ cup of hot cream to the egg yolk mixture. Pour the egg yolk mixture back into the saucepan with the remaining hot cream, and whisk constantly over medium-low heat until the mixture thickens and will coat the back of a spoon, 5 to 8 minutes. Do not let mixture boil.
- Pour the ice cream base into a bowl and allow to cool for about 20 minutes; place in refrigerator and chill overnight. The next day, pour into an ice cream maker, and freeze according to the manufacturer's directions. Remove the ice cream, pack into a covered container, and freeze for 2 hours or overnight before serving.

Peach Ice Cream Example:

Original Peach Ice Cream Ingredients:

- 6 eggs, beaten; 3½ cups white sugar; 10 fresh peaches, pitted and chopped; 4 cups heavy cream; 2 cups half-and-half cream; 2 teaspoons vanilla extract; ¼ teaspoon salt

Original Peach Ice Cream Directions:

- In large bowl, mix together eggs and sugar until smooth; puree peaches in blender or food processor and stir 5 cups of puree into egg mixture. Stir in cream, half-and-half, vanilla and salt and mix well.

Modified Peach Ice Cream Ingredients:

- 6 eggs, beaten; 3½ cups white sugar; 10 fresh peaches, pitted and chopped; 4 cups heavy cream; 2 cups half-and-half cream; 2 teaspoons vanilla extract; ¼ teaspoon salt; a known amount of medicinal cannabis with a known weight cannabinoids.

Modified Peach Ice Cream Directions:

- In large bowl, mix together eggs and sugar until smooth; puree peaches in blender or food processor and stir 5 cups of puree into egg mixture.

- In another bowl mix cream, Stir in cream, half-and-half, a known amount of medicinal cannabis, vanilla and salt and mix well.

- Combine and mix the contents of the two bowls.
4. Pour mixture into freezer canister of ice cream maker and freeze according to manufacturer’s instructions.

Yogurt Example:

Original Yogurt Ingredients:

- 4 cups water, divided; ½ tablespoons plain yogurt with active cultures; 1/4 cups dry milk powder

Original Yogurt Directions:

1. Pour 2 cups of water into a sealable 1 quart container, and stir in the yogurt until dissolved. Whisk in powdered milk until completely blended. Fill with remaining water, and stir. Close the lid, and set in a warm place or on a heating pad for 12 to 15 hours. Refrigerate, until chilled before serving.

The three examples immediately above are examples of how particular recipes for an ice cream base, for ice cream, and for making yogurt may be modified such that the ice cream base, the ice cream, or how yogurt contains a known amount of medicinal cannabis per unit volume of the food.

The invention is not limited to the precise recipe modifications shown in any of the examples shown above. They are examples showing how recipes for various foods, baked goods, hard candy, ice cream base, ice cream, and yogurt may be modified to contain a known amount of medicinal cannabis per unit volume of a food.

Specific concentrations of various cannabinoids may be rendered into a specific volume of a foodstuff. For example an extract containing predominantly tetrahydrocannabinol (Δ9-THC) may be rendered into a specific volume of a food producing a medicinal with maximum psychoactive effect. In another example a mixture of tetrahydrocannabinol (Δ9-THC) and cannabidiol (CBN) in desired ratios could be rendered into a fatty foodstuff producing a medicinal with a balance of psychoactive and body effects.

Cannabis extracts contain a combination of cannabinoids and other materials including flavonoids, and waxy plant materials. Preferred extracts contain about 5% cannabinoids; in this instance 100% of the cannabinoids contained within the extract constitute 56% of the extract. Of that 100% of cannabinoids 33.33% might consist of tetrahydrocannabinol (Δ9-THC), 33.33% might contain cannabidiol (CBN), and 33.33% might contain other cannabinoids. Various combinations of cannabinoids may be contained within an extract from a certain type of cannabis plant, and extracts from different cannabis strains may be mixed to produce an extract with known amounts of cannabinoids per unit volume of the combined extract. Mixing extracts from known plant strains or cannabis extracts that have been analyzed in a laboratory can be performed for controlling the amount of tetrahydrocannabinol (Δ9-THC), cannabidiol (CBN), and other cannabinoids in the combined extract.

Concentrations of cannabinoids contained within the fatty foodstuff are controlled by knowing the concentration of cannabinoids in the extract, the volume of the extract, and the volume of the fatty foodstuff. Ratios of cannabinoids of interest include yet are not limited to:

- A high percentage of tetrahydrocannabinol (Δ9-THC) as compared to other cannabinoids, where more than 80% of cannabinoids in an extract consist of Δ9-THC.

A mixture of tetrahydrocannabinol (Δ9-THC), and cannabidiol (CBN) in desired ratios.

An equal percentage of tetrahydrocannabinol (Δ9-THC), and cannabidiol (CBN).

A mixture of tetrahydrocannabinol (Δ9-THC), cannabidiol (CBN), and other cannabinoids in desired ratios.

Two or more extracts from different plant material may be mixed forming a cannabis extract with an average proportional concentration of the various cannabinoids per unit volume of extract. For example if two extracts of the same volume were mixed where cannabinoids in a first extract consisted of 95% of all cannabinoids were Δ9-THC and 5% of all cannabinoids were CBN, and where cannabinoids in the second extract consisted of 35% Δ9-THC, 35% consisted of CBN, and 30% consisted of other cannabinoids; the combined extract would contain: (95+35)y 1/2 Δ9-THC; (5+35)/2 CBN; and 30/2 other cannabinoids: or 65% Δ9-THC; 20% CBN; and 15% other cannabinoids.

Example 2 of mixing extracts:

Extract 1: Volume 2 fluid oz comprised of 40% flavonoids & waxy materials: 60% total cannabinoids (95% of total cannabinoids are Δ9-THC, and 5% of total cannabinoids are CBN)

Extract 2: Volume 4 fluid oz, comprised of 40% flavonoids & waxy materials: 60% total cannabinoids (58% of total cannabinoids are Δ9-THC, and 42% of total cannabinoids are CBN)

Mixed cannabinoid content: Volume 6 fluid oz;

- (95*0.33333+58*0.66666) Δ9-THC;
- (5*0.33333+42*0.66666) CBN=(31.67+38.67) Δ9-THC;
- (1.66+28) CBN=70.34% Δ9-THC; 29.66% CBN.

Please note that the extracts do not consist of 100% cannabinoids, in the example above only 60% of the extracts consist of cannabinoids and 40% of the extracts above consist of flavonoids and waxy materials. Please also note that the calculations above have been normalized to a total cannabinoid content of 100%.

Therefore the total content of the mixed extract in Example 2 are 40% flavonoids and waxy materials; and 60% total cannabinoids (70.34%Δ9-THC and (29.66%Δ9-THC CBN)=40% flavonoids and waxy materials; and 42.204Δ9-THC; 17.795% CBN.

This means that the 6 fluid ounce mixed extract contains (6*0.42204) fluid ounces of Δ9-THC; and (6*0.17.795) fluid ounces of CBN=2.33 fluid ounces of Δ9-THC; and 1.07 fluid ounces of CBN. Extracts of this nature allow foods to be fabricated with desired amounts of specific cannabinoids in specific proportions to be fabricated.

Extracts may be mixed at temperatures less than 315 degrees F. before incorporation into a food, or they may be mixed with ingredients of the food when making the food. Extracts may be warmed before mixing.

BRIEF DESCRIPTION OF THE MANY VIEWS OF THE DRAWINGS

FIG. 1 shows Basic Cannabinoid Structures:

THCA-A (THC acid), Decarboxylation is the loss of CO2 from a molecular structure; when THCA-A decarboxylates the psychoactive substance Δ9-THC is formed; Δ9-THC is depicted in FIG. 1.

CBN (cannabinol) is also depicted, CBN is formed by degeneration of Δ9-THC.
CBDA (cannabidiolic acid) and CBD (cannabidiol) are also depicted in FIG. 1. When CBDA is decarboxylated CBD is formed.

Since CBD may be transformed into Δ²-THC, FIG. 1 also depicts that this Transformation relates to a small change in chemical structure.

Notes regarding the chemical formula and molecular weight of depicted cannabinoid structures:

- CBDA and Δ²-THC have the identical chemical formula C₂₀H₄₀O₂.
- CBDA has a chemical formula C₂₂H₃₀O₄; molecular weight 358.5.
- CBN has a chemical formula C₂₁H₂₆O₂; molecular weight 310.4.

References:

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1. The process of mixing of a medicinal cannabis intermediate product with a known weight of cannabinoids into ingredients of one or more baked goods, hard candies, ice cream base, ice cream, or yogurt at temperatures that do not exceed the vaporization temperature of tetrahydrocannabinol producing one or more baked goods, hard candies, ice cream base, ice cream or yogurt with a known concentration of medicinal cannabis per unit volume of said one or more baked goods, hard candies, ice cream base, ice cream or yogurt.

2. The process of claim 1 further comprising mixing of at least a second medicinal cannabis intermediate product with a known weight of cannabinoids into said ingredients of said one or more baked goods, hard candies, ice cream base, ice cream, or yogurt, at temperatures that do not exceed the vaporization temperature of tetrahydrocannabinol producing one or more baked goods, hard candies, ice cream base, ice cream or yogurt with an adjusted known concentration of medicinal cannabis per unit volume of said one or more baked goods, hard candies, ice cream base, ice cream or yogurt.

3. A product comprising one or more baked goods with a known concentration of medicinal cannabis per unit volume of said one or more hard candies.

4. A product comprising one or more hard candies with a known concentration of medicinal cannabis per unit volume of said one or more hard candies.

5. A product comprising one or more ice cream base, ice cream, or yogurt with a known concentration of medicinal cannabis per unit volume of said ice cream base, ice cream, or yogurt.