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PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Flavoring Methods and Novel Compositions

5 We, INTERNATIONAL FLAVORS & FRAGRANCES INC., a corporation organised under the laws of the State of New York, United States of America, located at 521 West 57th Street, New York, State of New York, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

Abstract of the Disclosure

15 Methods for preparing foodstuffs and flavoring compositions utilizing alkyl-substituted pyrazines to produce a rounded flavor and/or aroma quality in connection with flavors such as chocolate and cocoa, as well as the foodstuffs and flavoring compositions themselves.

Background of the Invention

20 There is a need for materials and processes which can impart a desired flavor and/or aroma to foodstuffs or which can be used to enhance or alter the naturally occurring flavors in foodstuffs. Chocolate- and cocoa-flavored foodstuffs are very popular, and a great deal of effort has gone into the preparation of materials which have a natural chocolate or cocoa flavor and into efforts to improve the chocolate and cocoa flavors of certain types of natural materials.

25 In the past, it was found that substitute chocolate and cocoa flavoring materials lacked certain characteristics found in quality chocolate and cocoa, and the products made from such materials were deficient in flavor and/or aroma. As used herein, a flavoring composition is a combination of ingredients added to a foodstuff to impart a flavor to, or enhance an existing flavor in, the foodstuff.

The Invention

40 The invention comprises the novel compositions and component mixtures comprised in such compositions, as well as the novel processes and steps of processes according to which such compositions may be manufactured, specific embodiments of which are described hereinafter by way of example only and in accordance with what is now considered to be the preferred manner of practicing the invention.

50 Briefly, this invention provides a process which comprises adding alkyl substituted pyrazines to foodstuffs to improve their flavor and aroma characteristics. The invention also provides alkyl substituted pyrazine compositions useful in improving or enhancing the flavor of foodstuffs, as well as foodstuffs having such improved flavors.

60 Many food flavors, especially chocolate and cocoa materials, lack of certain flavor and aroma note, and this lack substantially detracts from their overall organoleptic impression. It has been found that a particular missing flavor note in chocolate and cocoa flavors is one which can be characterized as affording a fuller, more rounded flavor impression to the product. The flavor note afforded by this invention is required in a suitable degree for all chocolate and cocoa flavors, and its lack results in chocolate flavors which may be characterized as "thin" and "harsh".

75 This full or rounded flavor and aroma note is supplied to chocolate and cocoa flavors according to the present invention, by the addition of alkyl substituted pyrazine, more specifically mono- and polyalkyl substituted pyrazines, to foodstuffs and/or flavoring compositions for foodstuffs. As used herein, polyalkyl substituted means that two, three or

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four alkyl groups can be substituent on the carbon atoms in the pyrazine ring.

The alkyl substituents are defined herein as methyl and/or ethyl groups, i.e. when there is more than one alkyl group substituent on the pyrazine ring they can be either the same or different. The required interesting rounded, full flavor can in some uses be found among the ethyl substituted pyrazines to a somewhat greater degree than provided by pyrazines which are substituted only with methyl groups, and in certain embodiments of this invention it is preferred that one or more ethyl groups be substituents on the pyrazine.

As disclosed above, alkyl pyrazines having from one to four methyl and/or ethyl groups can be satisfactorily used in carrying out the present invention, i.e. the alkyl pyrazines used are the mono-, di-, tri-, and tetraalkyl pyrazines wherein the alkyl groups are methyl and ethyl. In the case of polyalkyl substituted pyrazines, it will be understood that the alkyl groups can be all methyl, all ethyl or a mixture of the two groups. For optimum rounding of chocolate and cocoa flavors, it is especially preferred to use the monosubstituted pyrazines i.e. methyl pyrazine or ethyl pyrazine, disubstituted pyrazines such as 2,3-dimethyl pyrazine, 2,3 - diethyl pyrazine, 2,5-dimethyl pyrazine, 2,6-dimethyl pyrazine, 2,6-diethyl pyrazine and 2-ethyl-3-methyl pyrazine, trisubstituted pyrazines such as trimethyl pyrazine, 2-ethyl-3,5-dimethyl pyrazine, and 2-ethyl-3,6-dimethyl pyrazine, and tetrasubstituted pyrazines such as tetramethyl pyrazine, tetraethyl pyrazine, and ethyl trimethyl pyrazine. Depending upon the flavor note to be imparted, mixtures of the various pyrazines will produce optimum results in some flavors, enhancers, or food compositions, while single pyrazines can suffice in other flavors, enhancers, or compositions.

When mixtures of such pyrazines are used, their proportions can be varied to suit the particular foodstuff to be flavored and will depend upon whether the invention is being utilized to enhance or fortify the flavor of a chocolate, cocoa, or other foodstuff which already has some desirable flavor and aroma characteristics or whether substantially the entire flavor and/or aroma are to be supplied by the addition of a flavoring composition. It has been found when preparing chocolate and cocoa flavors, for example, that a good blend is obtained by using a mixture of about 10—20% of monoalkyl pyrazine, about 40—50% of dialkyl pyrazine, about 10—20% of trialkyl pyrazine, and about 20—30% of tetraalkyl pyrazine. It will be understood that these ratios can be varied as necessary to supply, enhance, modify or fortify the flavor, of the foodstuffs. All parts, proportions, ratios and percentages herein are by weight unless otherwise indicated.

Those pyrazines used in the practice of

this invention are in some instances commercially available and all can be synthesized to provide the desired type and disposition of alkyl substituent by methods such as are described below. It is desirable to use materials having a relatively high purity, and it is necessary that the alkyl substituted pyrazines used in the practice of this invention not be so impure as to impart undesirable foreign flavors and aromas to the compositions or foodstuffs obtained according to this invention.

The pyrazines used in practicing the invention can be derived by modification of commercially available pyrazines or they can be synthesized to provide the appropriate type and distribution of alkyl substituents on the pyrazine carbon atoms. Thus, a desired alkyl pyrazine can be obtained from an alkyl pyrazine having fewer carbon atoms by treating the latter with sodium in liquid ammonia and subsequently reacting the sodium treated alkyl pyrazine with an alkyl halide having the number of carbon atoms required to obtain the desired alkyl pyrazine.

A number of routes are also useful for synthesizing alkyl pyrazines. Diacetyl can be allowed to react with ethylene diamine hydrate in ether to yield 2,3 - dimethyl - 5,6 - dihydropyrazine which is dehydrogenated to the 2,3 - dimethyl pyrazine by refluxing the dihydromaterial in alcoholic KOH. 2,3 - Dimethyl - 5,6 - dihydropyrazine can also be dehydrogenated in the vapor phase to 2,3 - dimethylpyrazine over copper chromite, cadmium phosphate, ferric oxide, titanium dioxide, acid clay, or alumina-silica catalysts. Propylene diamine in alcoholic KOH can be reacted with pentane-2,3-dione to obtain 2-ethyl-3,5-dimethyl dihydropyrazine which can thereupon be dehydrogenated in the presence of, say, a 40% palladium on carbon catalyst to yield 2-ethyl-3,5-dimethyl pyrazine.

The amount of alkyl substituted pyrazine which is used should be sufficient to impart a rounded flavor and aroma note to the ultimate foodstuff in which the pyrazines are used. Thus, a small but effective amount of pyrazine is used sufficient to round out the cocoa, chocolate, or other flavor note in the ultimate foodstuff. The amount will vary depending upon the ultimate foodstuff to be flavored; for example, more may be required in providing a full, rounded chocolate flavor to unflavored material and less may be required when this invention is used to enhance or fortify a chocolate or cocoa foodstuff or flavoring material which is deficient in the natural flavor or aroma.

Those skilled in the art will appreciate that the amount of pyrazine derivative can be varied over a range to establish the desired flavor and aroma. The use of too little of the pyrazines according to this invention will not give the full benefit, while too much pyrazine

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will make the flavor compositions and food-stuffs needlessly costly and in extreme cases will unbalance the flavor and aroma so that optimum results are not obtained.

- 5 It is accordingly preferred that the ultimate food composition contain at least about one part per million (ppm) of alkyl pyrazine, and it is not generally desirable to use more than about 200 ppm in the finished composition.
- 10 Accordingly, the desirable range for use in the practice of this invention is from about one to about 200 ppm of the alkyl substituted pyrazine or pyrazines. When the pyrazines are added to the foodstuff in the form of chocolate, cocoa, or other flavor composition, the amount should be sufficient to impart the requisite flavor note to the composition so that the flavor and aroma will be balanced in the finished footstuff.

- 20 The alkyl substituted pyrazines can be used according to this invention as flavor fortifiers or enhancers or as components of flavor compositions. Accordingly, the flavoring compositions and fortifiers of this invention contain from about 20 to about 100% of the alkyl substituted pyrazine or pyrazines. It will be understood that a flavor fortifier is a composition which provides some flavor and/or aroma notes in addition to the pyrazine material so as to supply deficiencies in a product, and such a fortifier is not itself a complete flavor.

- 25 The alkyl substituted pyrazines thus are added to the foodstuffs either alone or as flavor compositions formed by admixture of such pyrazines with conventional chocolate, cocoa, or other "heavy" flavor and aroma adjuvant ingredients such as alcohols, acids, esters, ketones, aldehydes, and materials which are related to or associated with the desired flavor or are principles in the desired flavor. Thus, in the preparation of chocolate and cocoa flavor compositions and food-stuffs, the alkyl substituted pyrazine material can be admixed with such components as 35 vanillin, ethyl vanillin, diacetyl, phenethyl 2-furoate, maltol, neryl butyrate, methyl sulfide, linalool, lactic acid, methyl disulfide, acet-aldehyde, isovaleraldehyde, isoamyl alcohol, acetic acid, lactones, isoamyl esters including the acetate, butyrate, and octanoate, isobutyl phenyl alcohol, amyl octanoate, isoamyl-2-furan butyrate, benzoic acid, pyridine, phenyl-acetic acid, isobutyl phenethyl alcohol, cin- 50 namyl esters such as the propionate, cinnamyl phenyl acetate, 4 - phenyl - 3 - butene - 2 - one, chocolate liquor or cocoa liquor, distillates of chocolate liquor or cocoa liquor, cocoa bean particles, "bitterness principles" such as theobromin, caffeine, and naringin, and 60 "astringency principles" such as tannins, quebraco, and theotannates. These are combined in proportions requisite to obtain the desired effect as illustrated further herein- 65 below.

The flavouring compositions of this invention can also contain other adjuvants which act to provide a convenient physical form for the compositions or assist the compositions to be more readily incorporated with food-stuffs to form edible compositions according to the present invention. Thus, the flavor compositions of this invention can also contain vehicles in which the alkyl substituted pyrazine, and other components if desired, can be dissolved, emulsified, or dispersed, or solid carrier upon which the pyrazine material (and said other components) can be deposited, absorbed, or adsorbed or in which the pyrazine material (and said other components) can be incorporated or encapsulated. Thus, the alkyl substituted pyrazine flavoring composition can also include adjuvants such as vehicles including ethanol, propylene, glycol, benzyl alcohol, furfuryl alcohol, water and aqueous liquids, animal and vegetable fats and oils, sorbitol, mannitol, corn syrup, and triacetin, thickeners including sodium carboxymethyl cellulose, carrageenen, alginate, gelatin, and pectin, emulsifiers and surface active carriers including lecithin, glycerol monostearate and "Tween (Registered Trade Mark) 60" and "Tween 80" polyoxyethylene sorbitan fatty acid esters; solid materials including skim milk powder, gums including arabic and tragacanth, glucose and/or other hexoses and pentoses, disaccharides, e.g., sucrose, corn syrup solids, starches, encapsulating agents, and freshness preservers including butylated hydroxyanisole, butylated hydroxytoluene and propyl gallate. It will be appreciated from the foregoing disclosure that in some instances the vehicle, carrier, or other material may also contribute to the overall flavor and aroma impression of the flavoring compositions and edible compositions of this invention or can serve two or more functions.

The flavoring compositions of this invention can be added to the foodstuffs by conventional methods known in the art. For example, in the preparation of a chocolate frosting mix, the flavoring compositions can be incorporated with the fat, sugar, thickeners, and freshness preservers, and admixed in a conventional blender to obtain the desired consistency. Alternatively, the flavor material of this invention, together with any other liquids if desired, can be admixed with a carrier, such as gum arabic, gum tragacanth, and carrageenen, and spray-dried to obtain a particulate solid flavoring material.

When a powdered prepared cocoa mix is being made, the dried milk solids, sugar and flavoring compositions or pyrazines of this invention are mixed together in a dry blender to attain uniformity. In the case of such prepared dry mixes, the flavor agents of the present invention can be distributed on one or more of the solid ingredients or any portion thereof, for example the dried milk

solids, and subsequently blended with the other ingredients.

When liquid materials are involved in the preparation of foodstuffs, for example, cake batters and chocolate milk, the flavoring materials of this invention can be combined with either the liquid to be used in the finished composition, or alternatively they can be added with a liquid carrier in which they are dissolved, emulsified, or otherwise dispersed as disclosed above.

The following Examples are given to illustrate embodiments of the invention as it is now preferred to practice it. It will be understood that these examples are illustrative, and the invention is not to be considered as restricted thereto except as indicated in the appended claims.

EXAMPLE I

Sodium is added to anhydrous liquid ammonia, an ink blue solution being obtained, and 2-methyl pyrazine is added to the sodium solution over a period of about one-quarter hour during which time the solution turns red. The anhydrous liquid ammonia is maintained at atmospheric pressure in a bath of solidified carbon dioxide in isopropanol, and over a half hour an amount of methyl iodide equimolar to the pyrazine is added. The mixture is stirred for a half hour after addition of the methyl iodide, and then ethyl ether is added to the ammonia.

The liquid ammonia is evaporated and the reaction mixture is heated in a steam bath until the ether refluxes. The ether is then stripped off to obtain a clear liquid.

The clear liquid is treated by gas liquid phase chromatography to separate the 2-ethyl pyrazine product from the unreacted methyl pyrazine.

EXAMPLE II

A mixture of potassium hydroxide in ether is prepared and propylene diamine is added so that there is approximately a four times molar excess of the hydroxide. A solution of pentane-2,3-dione in ether is added to the diamine solution over a period of a half hour at 25—30° C. and the reaction mixture is refluxed for a half hour.

The mixture so obtained is filtered, and the ether is stripped off. The dihydrotrialkyl pyrazine so formed is then distilled to purify it. The purified dihydro material is dehydrogenated by refluxing in the presence of a 40% palladium on charcoal catalyst. The liquid is then filtered and distilled to obtain a mixture of 2-ethyl-3,5-dimethyl pyrazine and 2-ethyl-3,6-dimethyl pyrazine. 2-Ethyl-3-methyl pyrazine is prepared in the same manner.

EXAMPLE III

A commercial cocoa mix is used to prepare two different batches of beverage. The

first batch is evaluated without any further additive, while 2-methyl pyrazine is added to the second batch in the ratio of 40 mg of the pyrazine to each kilogram of cocoa beverage. The beverage without pyrazine gives a rather harsh flavor impression, while the beverage containing pyrazine according to the present invention has a fuller, richer cocoa flavor.

EXAMPLE IV

A basic cocoa flavor material is prepared by admixing the following ingredients:

Compound	Amount (grams)	
Acetaldehyde	20.0	
Isobutyraldehyde	16.0	
Isovaleraldehyde	40.0	
Methyl sulfide	0.35	
Methyl disulfide	0.44	
Isobutyl acetate	0.12	
Isoamyl acetate	0.20	
Phenylethyl acetate	0.59	
Diacetyl	0.02	
Acetophenone	1.00	
Furfural (50%)	0.06	
Benzaldehyde	1.00	
Phenylacetaldehyde	0.58	
Isoamyl alcohol	0.18	
Phenylethyl alcohol	3.50	
γ -Butyrolactone	0.13	
	<u>84.17</u>	

A flavor material according to this invention is prepared by combining the following ingredients as shown:

Compound	Amount (grams)	
2-Methyl pyrazine	11.0	
2,6-Dimethyl pyrazine	27.0	
2,3,5,6-Tetramethyl pyrazine	20.0	
	<u>58.0</u>	

A first flavor composition is prepared by a 1.2% dilution of the basic cocoa flavor in propylene glycol/ethyl alcohol (v/v 80/20). It will be understood by those skilled in the art that "v/v" means the two components are mixed on a volume to volume basis. Vanillin is added in the ratio of 250 mg. per kilogram of solution. A second flavor composition is prepared by a 2% dilution of the basic cocoa flavor combined with the pyrazine flavor material (weight ratio 84.2:58.0) in propylene glycol/ethyl alcohol (v/v 80/20). Vanillin is added in the ratio of 250 mg. per kilogram of liquid.

The combined flavor (2% dilution) thus prepared is found to have an excellent cocoa flavor and aroma note, whereas the flavor without the alkyl pyrazines (1.2% dilution) is lacking the desirable full, rounded flavor.

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EXAMPLE V

The pyrazine containing flavor note material of Example IV is added to a commercially available chocolate flavored dessert containing skim milk, sugar, non-fat dry milk solids, and cocoa with a bland, thin cocoa flavor. The addition of 45 mg/kg increases the fullness of the flavor and improves the overall flavor.

It will be appreciated from this disclosure that ethyl substituted pyrazines can be used in lieu of or in addition to the methyl pyrazines of Example IV with excellent results. Thus, a mixture of ethyl pyrazine, 2,6-diethyl pyrazine, and tetraethyl pyrazine is similarly utilized. Pyrazine mixtures are further exemplified below.

EXAMPLE VI

A flavor composition according to this invention is prepared by combining the following materials as shown:—

Compound	Amount (grams)
2-Methyl pyrazine	6
2,6-Dimethyl pyrazine	15
2,3,5,6-Tetramethyl pyrazine	12
2-Ethyl pyrazine (according to Example I)	1
Mixture of 2-ethyl 3,5-dimethyl pyrazine and 2-ethyl 3,6-dimethyl pyrazine (prepared according to Example II)	4
	38

This pyrazine composition is added to a chocolate milk having a bland, thin cocoa flavor. Adding 30 mg/kg enhances the flavor and supplemental addition of 40 mg/kg of the basic cocoa flavor material as described in Example IV gives the chocolate milk and excellent cocoa flavor and aroma note.

EXAMPLE VII

An imitation cocoa flavor base is prepared by admixing the following ingredients in the indicated proportions:

Ingredient	Amount (grams)
Vanillin	6.0
Amyl phenyl acetate	4.5
Benzyl butyrate	0.25
Veratraldehyde	0.25
Cocoa flavor distillate	36.0
Propylene glycol	53.0

This imitation cocoa flavor is evaluated at a one percent dilution in 65% sugar solution. Evaluation shows that a full rich flavor note is lacking in the imitation flavor.

2 - Ethyl - 3 - pyrazine is added to the sugar solution of the cocoa flavor in the ratio of 50 mg. of pyrazine for each kilogram of the

flavor. Upon evaluation a fuller cocoa aroma is observed, and in addition the flavor is much truer.

EXAMPLE VIII

The procedure of Example VII is repeated by adding 2 - ethyl - 3,5,6 - trimethyl pyrazine in the ratio of 50 mg. for each kilogram of the cocoa flavor base. Upon evaluation a fuller, rounder cocoa aroma is observed, and the flavor is much truer.

EXAMPLE IX

A pyrazine flavor composition is prepared according to this invention by combining the following materials:

Ingredient	Amount (grams)
2-Methyl pyrazine	1.5
2,3 - Dimethyl pyrazine	0.5
2 - Ethyl - 5 - methyl pyrazine	0.5
2,3,5-Trimethyl pyrazine	1.0
2,5-Dimethyl pyrazine	1.0
2 - Ethyl - 3,5,6 - trimethyl pyrazine	0.5

This pyrazine mixture is gradually added to a chocolate liquor produced from Haiti cocoa beans. While the Haiti bean liquor has only a weak flavor, the addition of 50 mg. of the foregoing pyrazine mixture to a kilogram of the liquid gives an optimal flavor improvement. This pyrazine addition gives such an excellent chocolate flavor that the pyrazine-containing liquid compares favorably with liquors obtained from the highest quality Java or Ceylon beans.

EXAMPLE X

A chocolate flavored custard pudding mix is prepared with the following ingredients:

Ingredient	Amount
Granulated sugar	53 lb.
Corn starch	22 lb.
Tapioca starch	6 lb.
Cocoa powder	18 lb.
Salt	1 lb.
Vanillin	2 oz.

After thorough mixing the batch is packaged in individual units of four ounces each. A first pudding is prepared by combining a unit of powder with one pint of milk. The pudding so obtained has a cocoa flavor which is somewhat harsh and thin. To a second four-ounce unit of powder is added 4 mg. of 2 - ethyl - 3 - methyl pyrazine, and a custard pudding is prepared from this by cooking the powder with a pint of milk. The second pudding has a fuller, richer cocoa flavor.

EXAMPLE XI

A commercial chocolate cake mix is made into a batter and baked according to the

manufacturer's directions. A cake having a good crumb is obtained, but the chocolate flavor is somewhat harsh and flat.

- 5 A second mix is prepared as above according to the directions and subsequently baked. Prior to baking, however, 30 mg. of the pyrazine mixture of Example VI is added to the batter. A cake having a good crumb is obtained, and the chocolate flavor is full and rounded.

WHAT WE CLAIM IS:—

1. A process for enhancing the flavor of a foodstuff which comprises adding a small but effective amount of at least one methyl, ethyl, or methyl-ethyl substituted pyrazine to provide a full chocolate or cocoa flavor.

2. A process according to Claim 1 wherein a mixture of mono- and polyalkyl substituted pyrazines is added.

- 20 3. A process according Claim 1 or Claim 2 wherein the substituted pyrazine is 2-methyl pyrazine, 2-ethyl pyrazine, 2,3-dimethyl pyrazine, 2,3 - diethyl pyrazine, 2,5 - dimethyl pyrazine, 2,6 - dimethyl pyrazine, 2,6 - diethyl pyrazine, 2-ethyl-3-methyl pyrazine, trimethyl pyrazine, 2-ethyl-3,5-dimethyl pyrazine, 2-ethyl-3,6-dimethyl pyrazine, tetramethyl, pyrazine, tetraethyl pyrazine, or ethyl-trimethyl pyrazine.

- 30 4. A flavoring composition for incorporation into a foodstuff which comprises at least one adjuvant selected from the group consisting of liquid vehicles and solid carriers and at least one methyl, ethyl, or methyl-ethyl substituted pyrazine to provide a full chocolate or cocoa flavor to the composition.

- 35 5. A flavoring composition according to Claim 4 containing a mixture of mono- and polyalkyl substituted pyrazines.

- 40 6. A flavoring composition according to Claim 4 or Claim 5 wherein the substituted pyrazine is 2-methyl pyrazine, 2-ethyl pyrazine, 2,3-dimethyl pyrazine, 2,3-diethyl pyrazine, 2,5-dimethyl pyrazine, 2,6-dimethyl pyrazine, 2,6-diethyl pyrazine, 2-ethyl-3-methyl pyrazine, trimethyl pyrazine, 2-ethyl-

3,5-dimethylpyrazine, 2-ethyl-3,6-dimethyl pyrazine, tetramethyl pyrazine, tetraethyl pyrazine, or ethyltrimethyl pyrazine.

7. A flavoring composition according to any one of Claims 4 to 6 wherein one of the adjuvants is a chocolate flavoring material selected from the group consisting of alcohols, acids, esters, ketones, aldehydes, and chocolate principles.

8. A process for imparting a full chocolate or cocoa flavor note to a foodstuff which comprises adding a mixture of at least one adjuvant selected from the group consisting of liquid vehicles and solid carriers and at least one methyl, ethyl, or methyl-ethyl pyrazine to the foodstuffs to impart the full flavor.

9. An edible composition comprising a foodstuff and an amount of at least one methyl, ethyl, or methyl-ethyl pyrazine sufficient to impart a full chocolate or cocoa flavor note to said foodstuff.

10. An edible composition according to Claim 9 wherein the pyrazine is a mixture of mono- and polyalkyl substituted pyrazines.

11. An edible composition according to Claim 9 or Claim 10 wherein the substituted pyrazine is 2-methyl pyrazine, 2-ethyl pyrazine, 2,3-dimethyl pyrazine, 2,3-diethyl pyrazine, 2,5 - dimethyl pyrazine, 2,6-dimethyl pyrazine, 2,6-diethyl-pyrazine, 2-ethyl-3-methyl pyrazine, trimethyl pyrazine, 2-ethyl-3,5-dimethyl pyrazine, 2-ethyl-3,5-dimethyl pyrazine, tetramethyl pyrazine, tetraethyl pyrazine, or ethyltrimethyl pyrazine.

12. A process or composition for flavoring foodstuffs according to any of the preceding Claims described herein with reference to any one of the Examples.

13. Edible compositions in accordance with Claim 9 substantially as hereinbefore described in the Examples.

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manufacturer's directions. A cake having a good crumb is obtained, but the chocolate flavor is somewhat harsh and flat.

- 5 A second mix is prepared as above according to the directions and subsequently baked. Prior to baking, however, 30 mg. of the pyrazine mixture of Example VI is added to the batter. A cake having a good crumb is obtained, and the chocolate flavor is full and rounded.

WHAT WE CLAIM IS:—

1. A process for enhancing the flavor of a foodstuff which comprises adding a small but effective amount of at least one methyl, ethyl, or methyl-ethyl substituted pyrazine to provide a full chocolate or cocoa flavor.
2. A process according to Claim 1 wherein a mixture of mono- and polyalkyl substituted pyrazines is added.
- 20 3. A process according Claim 1 or Claim 2 wherein the substituted pyrazine is 2-methyl pyrazine, 2-ethyl pyrazine, 2,3-dimethyl pyrazine, 2,3 - diethyl pyrazine, 2,5 - dimethyl pyrazine, 2,6 - dimethyl pyrazine, 2,6 - diethyl pyrazine, 2-ethyl-3-methyl pyrazine, trimethyl pyrazine, 2-ethyl-3,5-dimethyl pyrazine, 2-ethyl-3,6-dimethyl pyrazine, tetramethyl, pyrazine, tetraethyl pyrazine, or ethyl-trimethyl pyrazine.
- 30 4. A flavoring composition for incorporation into a foodstuff which comprises at least one adjuvant selected from the group consisting of liquid vehicles and solid carriers and at least one methyl, ethyl, or methyl-ethyl substituted pyrazine to provide a full chocolate or cocoa flavor to the composition.
- 35 5. A flavoring composition according to Claim 4 containing a mixture of mono- and polyalkyl substituted pyrazines.
- 40 6. A flavoring composition according to Claim 4 or Claim 5 wherein the substituted pyrazine is 2-methyl pyrazine, 2-ethyl pyrazine, 2,3-dimethyl pyrazine, 2,3-diethyl pyrazine, 2,5-dimethyl pyrazine, 2,6-dimethyl pyrazine, 2,6-diethyl pyrazine, 2-ethyl-3-methyl pyrazine, trimethyl pyrazine, 2-ethyl-3-methyl pyrazine, 2-ethyl-3,5-dimethyl pyrazine, 2-ethyl-3,6-dimethyl pyrazine, tetramethyl pyrazine, tetraethyl pyrazine, or ethyltrimethyl pyrazine.
- 45 7. A flavoring composition according to any one of Claims 4 to 6 wherein one of the adjuvants is a chocolate flavoring material selected from the group consisting of alcohols, acids, esters, ketones, aldehydes, and chocolate principles.
8. A process for imparting a full chocolate or cocoa flavor note to a foodstuff which comprises adding a mixture of at least one adjuvant selected from the group consisting of liquid vehicles and solid carriers and at least one methyl, ethyl, or methyl-ethyl pyrazine to the foodstuffs to impart the full flavor.
9. An edible composition comprising a foodstuff and an amount of at least one methyl, ethyl, or methyl-ethyl pyrazine sufficient to impart a full chocolate or cocoa flavor note to said foodstuff.
10. An edible composition according to Claim 9 wherein the pyrazine is a mixture of mono- and polyalkyl substituted pyrazines.
11. An edible composition according to Claim 9 or Claim 10 wherein the substituted pyrazine is 2-methyl pyrazine, 2-ethyl pyrazine, 2,3-dimethyl pyrazine, 2,3-diethyl pyrazine, 2,5 - dimethyl pyrazine, 2,6-dimethyl pyrazine, 2,6-diethyl-pyrazine, 2-ethyl-3-methyl pyrazine, trimethyl pyrazine, 2-ethyl-3,5-dimethyl pyrazine, 2-ethyl-3,6-dimethyl pyrazine, tetramethyl pyrazine, tetraethyl pyrazine, or ethyltrimethyl pyrazine.
12. A process or composition for flavoring foodstuffs according to any of the preceding Claims described herein with reference to any one of the Examples.
13. Edible compositions in accordance with Claim 9 substantially as hereinbefore described in the Examples.

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