SOLUBLE COFFEE PRODUCT AND METHOD

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442031 (62585/69) 33.8

The following statement is a full description of this invention, including the best method of performing it known to US.

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This invention relates to dried coffee extracts and the manufacture thereof.

Spray dried coffee has been the subject of much investigation in an attempt to improve its flavor and aroma in the direction of roasted and ground coffee. To date no commercial spray drying processes are known which do not eliminate or degrade most of the desirable volatiles. Freeze dried coffee is known to contain many more of these desirable volatiles since the low temperature freeze drying operation does not deteriorate liquid coffee extract as much as spray drying; however, freeze drying is considerably more expensive than spray drying.

It has been proposed, such as in United States Patent Nos. 3,244,533 to Clinton et al., 3,493,388 to Hair and 3,493,389 to Hair et al. to produce a soluble coffee product by blending together a spray dried and a freeze dried coffee fraction. In this manner the soluble product will contain some of the desirable volatiles but could be prepared relatively cheaply. Such a composite product could be a spray dried coffee which was agglomerated and blended with freeze dried coffee which has comparable particle sizes and bulk densities,

It has been found that many consumers of coffee beverages highly regard the attribute of "clean" tasting. This clean taste is characterized by the absence of the
"dirty" off-taste described by Sevitz, Coffee Processing Technology, Vol. 2 page 73 (AVI Publishing Co., Inc., 1963) as being "an undesirable fuzzy taste that dominates the coffee flavor background." The use of "clean" tasting coffee products has previously been employed as a component of bulk-ed soluble coffee products which also contain synthetic coffee flavors e.g. powdered ice coffee beverage mixes; however, the production of 100% soluble coffee products which produce clean tasting beverages has not been commercialized prior to this invention.

It has now been found that a soluble coffee product can be prepared by combining a freeze dried coffee fraction, at about 25 - 75% by weight; with a spray dried and preferably agglomerated coffee fraction at about 75 to 25% by weight. The freeze dried component is characterized as capable of producing a clean tasting coffee beverage and is obtained from high grade Milds coffees or coffee blends containing at least 80% by weight Milds coffees (e.g. Medellin, Manizales, Coatepecs, Costa Rica, Guatemalas, Armenian and the like) wherein the Milds have been roasted to a roast color (70 ± 2) significantly lighter than the roast color of 55 which is considered optimum in the trade for producing soluble coffee in this country from high grade Milds coffee (60 is considered optimum for producing roasted and ground coffee products in this country). The spray dried and preferably agglomerated component is characterized as capable of producing a bland tasting coffee beverage and is obtained from low grade coffees (i.e. Robustas) or coffee blends containing at least 80% by weight Robustas coffees wherein the Robustas have been roasted to about their optimum roast color (80).
According to the invention there is provided a soluble coffee product consisting of from 25 to 75% by weight of a freeze dried coffee which has a clean taste and is the extract of a roasted and ground coffee containing at least 80% Milds coffees roasted to a color significantly lighter than the roast color considered optimum in the trade and from 75 to 25% agglomerated spray dried coffee which has a bland taste and is the extract of roasted and ground coffee containing at least 80% Robustas coffees roasted to about their optimum roast color.

There is also provided a method for producing a soluble coffee product comprising:

(a) roasting a high grade coffee fraction containing at least 80% Milds coffees to a roast color significantly lighter than the roast color considered optimum in the trade,

(b) extracting a liquid coffee extract from the roasted high grade coffee fraction to obtain a roasted yield of from 36 to 39% by weight, without the use of excessive heat,

(c) freeze drying the extract of step (b) to a terminal moisture content between 0.5% and 1.5% by weight,

(d) roasting a low grade coffee fraction containing at least 80% Robustas coffee to about the optimum roast color,

(e) preparing a liquid coffee extract from the roasted low grade coffee fraction,

(f) spray drying and agglomerating the extract of (e), and

(g) blending the freeze dried and spray dried, agglomerated coffee at a level of from 25 to 75% by weight.
An additional feature of this invention is the manner in which the extract to be freeze dried is obtained from the high grade coffee fraction. A relatively high yield is generally to be obtained from the roasted and ground high grade coffee without producing burnt or bitter taste notes in the freeze dried coffee powder. Relatively low extraction temperatures and relatively high draw-off ratios permit the extraction of blend-tasting carbohydrates from the roasted and ground coffee, thereby obtaining the desired high yield without the disadvantages of burnt and/or cooked flavor notes associated with the use of high temperatures.

The term "optimum" roast color as used in this specification and the claims thereof is determined on the basis of broad spectrum consumer preference data for coffee beverages prepared from soluble coffee obtained from the roasted coffee the most generally available data refers to U.S.A. consumer preference but appropriate modifications can be made for preferences of other countries. This optimum color will vary depending on the variety of coffee roasted, but is relatively fixed for a given variety. It has been found that the ordinary consumer can visually and organoleptically detect a difference of three or four color units, the term color unit referring to a system of color measurement which uses light reflectance as a measure of color.

The color of roasted coffee is determined by fine grinding air cooled roasted coffee and screening it through a United States standard sieve #50 and is retained on the pan.
as collected, placed in a container of 1-3/4" diameter and 1/8" deep and pressed under 1500 psi by a 1-3/8" ram for 5 seconds. The pressed coffee is placed beneath a photoelectric search unit of a color measuring device.

The color measuring device is a photoelectric reflection meter model 610 having a model y search unit, manufactured by the Photovolt Company. The device transmits light from an incandescent bulb through an amber tristimulus filter (595 mu maximum transmittance) onto the surface of the pressed sample. The reflected light is detected by the device's sensing photocell. A standard unglazed brown ceramic tile is employed as a typical color reference. This tile exhibits the following reflectance characteristics when measured on a calibrated Hunter color difference meter; of Journal of the Optical Society of America, Vol. 48, No. 12, pp 985-995, December 1958.

<table>
<thead>
<tr>
<th><strong>90° Value</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L = 32.5</td>
<td>32.4</td>
</tr>
<tr>
<td>a = 10.0</td>
<td>9.9</td>
</tr>
<tr>
<td>b = 11.5</td>
<td>11.5</td>
</tr>
</tbody>
</table>

** Tile rotated 90° on a vertical axis to compensate for any tile non-conformity.

In use, this tile has been arbitrarily assigned a value of 86.5 on the Photovolt meter scale (Photovolt is a tradename) to facilitate measuring smaller color differences in coffee samples. Color numbers specified are those within the 0-86.5 range. Thus, a color reading of 40 would signify the number unit comparison of reflected filtered light relative to the aforesaid brown color standard.

Extraction of the high grade coffee or coffee
blend is carried out in order to obtain as high a yield as possible without use of excessive heat such as would develop burnt or bitter-tasting notes. This high yield is obtained by means of a high draw-off ratio (e.g. fraction of extract weight taken from the percolator over weight of roasted and ground coffee present in the percolator) and excessive heat is avoided by use of relatively low temperature (below 350°F) feed water into the percolator set, preferably without the use of any intercolumn heaters. Temperatures in excess of 350°F are conventionally used for the commercial production of soluble coffee. A roasted yield of 36 to 39% by weight, preferably about 37% is preferred in the practice of this invention, and this can be obtained without excessive heat by the use of draw-off ratios between 1.3 and 1.7, preferably about 1.5. Conventional extraction of high grade blends employs a draw-off ratio of 1.0 to 1.2 with a resulting roasted yield of about 33% by weight.

It has also been found desirable to deviate from conventional freeze drying practice in preparing the freeze dried component of this invention by drying to a terminal moisture content of between 0.5 and 1.5% by weight, preferably about 1.0%. It is felt that drying to these low levels serves to remove material from the coffee which might impart an undesirable taste to the coffee beverage. Commercial freeze dried products are typically dried to about 2.5% moisture.

The techniques of roasting, extracting, spray drying and agglomerating employed in obtaining the agglomerated powder for use in this invention may be performed according to standard techniques well-known to those skilled in the
The critical feature of this invention which is not taught by the prior art is the production of a soluble coffee product which is a combination of freeze dried and spray dried material, the freeze dried coffee being obtained by extracting with a high yield but without excessive heat, a high grade coffee or coffee blend which has a roast color significantly lighter than its optimum roast color (i.e. the roast color that would be preferred by the largest percentage of consumers if the high grade coffee or coffee blend were used as the exclusive source for a coffee beverage.

This invention is further described but not limited by the following example.

**EXAMPLE**

A blend of 100% Robusta coffee is roasted to an 80 roast color which is considered to be the optimum roast color. This roasted coffee is ground, extracted in a semi-continuous, counter-current, multi-stage extraction battery, the resulting extract then being spray dried and agglomerated, all in accordance with known techniques.

A blend of 100% Milds (high-grown Colombians) coffee is roasted to a 70 roast color. 55 R.C. being considered optimum in the trade. This roasted coffee is ground, extracted in a semi-continuous, counter-current, multi-stage extraction battery, to a 37% roasted yield using a draw-off ratio of 1.5 and a feed water temperature of 345°F. The resulting extract is then frozen, ground and freeze dried to a terminal moisture content of 1.0% by weight all in accordance with known techniques.

A uniform blend of the freeze dried and spray dried powder, each component being plated with 0.25% expressed
coffee oil, was prepared at 35% by weight freeze dried material. This blend when dissolved in hot (180°F) water at convention levels (1.2% soluble solids) produce a beverage which is characterized as mild, smooth, clean with no unpleasant after taste. A similarly prepared product which employs a 55 roast color for the 100% milks coffee produces beverages which are noted as burnt, slightly harsh and with a bitter after-taste.
The claims defining the invention are as follows:

1. A soluble coffee product consisting of from 25 to 75% by weight of a freeze dried coffee which has a clean taste and is the extract of a roasted and ground coffee containing at least 80% Milds coffees roasted to a color significantly lighter than the roast color considered optimum in the trade and from 75 to 25% agglomerated spray dried coffee which has a bland taste and is the extract of roasted and ground coffee containing at least 80% Robustas coffees roasted to about their optimum roast color.

2. A coffee product according to claim 1, wherein the freeze dried extract of Milds coffees roasted to a roast color of from 68 to 72, the optimum roast color being about 55.

3. A coffee product according to claim 2, wherein the Robustas coffees have about an 80 roast color.

4. A product according to any one of claims 1 to 3, wherein the freeze dried coffee has a moisture content of from 0.5 to 1.5% by weight.

5. A soluble coffee product substantially as hereinbefore described in the Example.

6. A method for producing a soluble coffee product comprising:
   (a) roasting a high grade coffee fraction containing at least 80% Milds coffees to a roast color significantly lighter than the roast color considered optimum in the trade,
   (b) extracting a liquid coffee extract from the...
roasted high grade coffee fraction to obtain a roasted yield of from 36 to 39% by weight, without the use of excessive heat,

(c) freeze drying the extract of step (b) to a terminal moisture content between 0.5% and 1.5% by weight,

(d) roasting a low grade coffee fraction containing at least 80% Robustas coffee to about the optimum roast color,

(e) preparing a liquid coffee extract from the roasted low grade coffee fraction,

(f) spray drying and agglomerating the extract of (e), and

(g) blending the freeze dried and spray dried, agglomerated coffee at a level of from 25 to 75% by weight freeze dried material.

7. A method according to claim 6, wherein the Milds coffees are roasted to a roast color of 68 to 72, the optimum roast color being 55.

8. A method according to either of claims 6 and 7, wherein the Robustas coffees are roasted to about an 80 roast color.

9. A method according to any one of claims 6 to 8, wherein the high grade coffee fraction is extracted using a draw-off ratio of from 1.3 to 1.7.

10. A method according to any one of claims 6 to 9, wherein the roasted yield is about 37% and the draw-off factor is about 1.5.

11. A method for producing a soluble coffee product substantially as hereinbefore described in the Example.

12. A soluble coffee product when produced by a method as claimed in any one of claims 6 to 11.

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DATED this THIRD day of OCTOBER, 1973
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