AUSTRALIA

Patents Act

DECLARATION FOR A PATENT APPLICATION

▼ INSTRUCTIONS
(a) Insert "Convention" if applicable
(b) Insert FULL name(s) of applicant(s)

In support of the (a) Convention application made by (b)

THE COCA-COLA COMPANY

(c) Insert "of addition" if applicable
(d) Insert TITLE of invention

(hereinafter called "applicant(s)" for a patent (c) for an invention entitled (d)

PROCESS FOR THE PRODUCTION OF CANNED COFFEE

(e) Insert FULL name(s) AND address(es) of declarant(s) (See headnote*)

I/~~We~~ (e) W. Dexter Brooks,
Senior Patent Counsel of THE COCA COLA COMPANY
of 310 North Avenue, Atlanta, Georgia 30313, U.S.A.
do solemnly and sincerely declare as follows:

1. ~~I/We are the applicant(s)~~
(or, in the case of an application by a body corporate)
1. I am/~~We are~~ authorized to make this declaration on behalf of the applicant(~~s~~).
2. ~~I/We are the actual inventor(s) of the invention.~~
(or, where the applicant(s) is/are not the actual inventor(s))
2. (f) Masahiro KOYAMA: 5-13-23, Shoto, Sakae-ku, Yokohama-shi, Kanagawa-ken, Shigeo SHINKAWA: Towa Livetown Kibogaoka No.309, 198-1, Higashikibogaoka, Asahi-ku, Yokohama-shi, Kanagawa-ken, all respectively in Japan

(f) Insert FULL name(s) AND address(es) of actual inventor(s)

~~is~~/are the actual inventor(s) of the invention and the facts upon which the applicant(~~s~~) is/~~are~~ entitled to make the application are as follows:

(g) Recite how applicant(s) derive(s) title from actual inventor(s) (See headnote**)

(g) Applicant is the assignee of the invention from the said actual inventors.

(Note: Paragraphs 3 and 4 apply only to Convention applications)

3. The basic application(s) for patent or similar protection on which the application is based is/~~are~~ identified by **country, filing date, and basic applicant(s)** as follows:

(h) Insert country, filing date, and basic applicant(s) for the/or EACH basic application

(h) JAPAN, 27 June, 1989 - THE COCA-COLA COMPANY

4. The basic application(~~s~~) referred to in paragraph 3 hereof was/~~were~~ the first application(s) made in a Convention country in respect of the invention the subject of the application.

(k) Insert PLACE of signing

(l) Insert DATE of signing

(m) Signature(s) of declarant(s)

Note: No legalization or other witness required

Declared at (k) Atlanta, Georgia U.S.A.

Dated (l) 14 May 1991

(m) X W. Dexter Brooks

W. Dexter Brooks, Senior Patent Counsel
for THE COCA-COLA COMPANY

To: The Commissioner of Patents

P18/7/78

PHILLIPS ORMONDE & FITZPATRICK
Patent and Trade Mark Attorneys
367 Collins Street
Melbourne, Australia

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(71) Applicant(s)
THE COCA-COLA COMPANY

(72) Inventor(s)
MASAHIRO KOYAMA; SHIGEO SHINKAWA

(74) Attorney or Agent
PHILLIPS ORMONDE & FITZPATRICK , 367 Collins Street, MELBOURNE VIC 3000

(56) Prior Art Documents
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(57) Disclosed is a process for the production of canned coffee, comprising: (1) preparing a cold extract of coffee by rapidly cooling a coffee extract at a temperature no higher than about 20°C; (2) adding at least one antioxidant selected from the group consisting of erythorbic acid, ascorbid acid and water-soluble salts thereof to said cold extract, optionally followed by diluting the resulting mixture; (3) filling the cold extract containing the at least one antioxidant in a can without heating; and (4) replacing air contained in the can with a mixed gas comprising at least two members selected from the group consisting of steam, carbon dioxide gas, and nitrogen gas.

CLAIM

1. A process for the production of canned coffee, comprising:

(1) preparing a cold extract of coffee with water by rapidly cooling a coffee extract at a temperature no higher than about 20°C;

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(71) Applicant *(for all designated States except US)*: THE COCA-COLA COMPANY [US/US]; 310 North Avenue, Atlanta, GA 30313 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)* : KOYAMA, Masahiro [JP/JP]; 5-13-23, Shoto, Sakae-ku, Yokohama-shi, Kanagawa 247 (JP). SHINKAWA, Shigeo [JP/JP]; Towa Livetown Kibogaoka 309, 198-1, Higashikibogaoka, Asahi-ku, Yokohama-shi, Kanagawa 241 (JP).

(74) Agent: ODAJIMA, Heikichi; Odajima Patent Office, Nippon Jitensha Bldg., 9-15, Akasaka 1-chome, Minato-ku, Tokyo 107 (JP).

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(54) Title: PROCESS FOR THE PRODUCTION OF CANNED COFFEE

(57) Abstract

Disclosed is a process for the production of canned coffee, comprising: (1) preparing a cold extract of coffee by rapidly cooling a coffee extract at a temperature no higher than about 20°C; (2) adding at least one antioxidant selected from the group consisting of erythorbic acid, ascorbic acid and water-soluble salts thereof to said cold extract, optionally followed by diluting the resulting mixture; (3) filling the cold extract containing the at least one antioxidant in a can without heating; and (4) replacing air contained in the can with a mixed gas comprising at least two members selected from the group consisting of steam, carbon dioxide gas, and nitrogen gas.

* See back of page

DESCRIPTION

PROCESS FOR THE PRODUCTION OF CANNED COFFEE

Technical Field

The present invention relates to a process for the production of canned coffee drink. More particularly, it relates to a process for the production of canned coffee drink which has good flavor, taste and color of coffee and retains fresh-brewed aroma.

Background Art

Conventionally, various proposals have been made on the process for the production of canned drink as described below.

Japanese Patent Publication (Kokai) No. Sho 51-85881 discloses a process for the prevention of putrefaction of a liquid content in a container by sealing a container filled with a liquid content in an atmosphere of steam to prevent the penetration of air and contamination of bacteria which exist in air as being entrained therein.

Japanese Patent Publication (Kokai) No. Sho 58-31939 discloses a process for the long-term retention of a coffee extract without deteriorating its aroma by incorporating carbon dioxide gas or dry ice in a container filled with a coffee extract to establish a carbon dioxide atmosphere and refrigerating the extract at a temperature of about 10°C.

Japanese Patent Publication (Kokai) No. Sho 61-124361 discloses a process for the production of canned drink contained in a can in which negative pressure nitrogen gas is sealed, and which can has a degree of vacuum of no lower than 10 cmHg at 40°C after sealing and is suitable for tapping tests, by replacing at least a portion of oxygen in the head space of the can and in the drink with nitrogen gas.

Japanese Patent Publication (Kokai) No. Sho

61-190403 discloses a process for the production of canned drink by filling spumous drink containing no carbon dioxide in a metal can at a temperature near room temperature and then replacing air in the head space of the can with carbon dioxide gas.

Japanese Patent Publication (Kokai) No. Sho 62-14777 discloses a process for the production of canned alcoholic drink containing 0.005 to 0.3% by weight of ascorbic acid, erythorbic acid or water-soluble salt thereof.

Japanese Patent Publication (Kokai) No. Sho 62-44137 proposes the production of a coffee extract which has excellent aroma and storage stability by adding an alkali metal salt of L-ascorbic acid to a coffee extract.

Japanese Patent Publication (Kokai) No. Sho 63-84466 discloses a process for filling food or drink in cans by filling contents in cans at a sterilization temperature such as 60 to 100°C, and then supplying a mixed gas comprising nitrogen gas and carbon dioxide gas in the head space in the cans, followed by sealing to obtain a desired degree of vacuum.

However, as the result of intensive investigation by the present inventors, it has now been revealed that none of the above-described processes is always capable of sufficiently developing or retaining fresh-brewed aroma (flavor and taste) of coffee, particularly after long-term retention of the drink at either elevated temperatures or at room temperature.

Disclosure of Invention

Therefore, it is an object of the present invention to provide a process for the production of canned coffee drink which has fresh-brewed aroma of coffee.

It is another object of the present invention to provide a process for the production of canned coffee

canned coffee drink which overcomes or at least alleviates one or more of the disadvantages of the prior art.

Other objects and features of the present invention will be apparent from the following description.

According to the present invention, the above-described objects and features are accomplished by a process for the production of canned coffee, comprising:

(1) preparing a cold extract of coffee with water by rapidly cooling a coffee extract at a temperature no higher than about 20°C;

(2) adding at least one antioxidant selected from the group consisting of erythorbic acid, ascorbic acid and water-soluble salts thereof to the cold extract, optionally followed by diluting the resulting mixture with water;

(3) filling the cold extract containing the at least one antioxidant in a can without heating such that a small headspace is left in said can after filling; and

(4) replacing air contained in the can with a mixed gas comprising at least two members selected from the group consisting of steam, carbon dioxide gas, and nitrogen gas.

In one embodiment of the present invention coffee powder of roasted and pulverized coffee beans is extracted with hot water to obtain coffee extract at a high temperature, which then is rapidly cooled down to a temperature no higher than about 20°C, for instance, usually at a temperature in the range of from 10 to 20°C. Any means may be used for the rapid cooling of the high temperature coffee extract. For example, the rapid cooling can be performed efficiently by using a

cooler which is called a "plate cooler".

Then, at least one antioxidant selected from the group consisting of erythorbic acid, ascorbic acid and water-soluble salts thereof is added to the cooled extract thus prepared. The cooled extract may if desired be diluted appropriately until its concentration reaches a level which is suitable for drinking. It is preferred that the antioxidant be added to the extract having a concentration suitable for drinking in a concentration of about 0.1 to 0.01% by weight.

In addition thereto, the coffee extract may contain various additives such as pH adjusters, sugar and milk, if desired. The additives, if added, can be added to the coffee extract advantageously in the same step as that in which the antioxidant is added in order to minimize complicated operations.

A preferred example of the pH adjuster which can be used is sodium bicarbonate.

The cooled extract thus adjusted and containing the antioxidant is then filled in a container for canning as it is without heating in contrast to ordinary filling techniques in which cooled extracts are heated again to elevated temperatures before filling.

The container for canning filled with the coffee extract is then subjected to replacing of air therein with a mixed gas. The mixed gas comprises at least two members selected from the group consisting of steam, carbon dioxide gas and nitrogen gas. The use of the mixed gas enables reduction of the amount of air remaining in the hermetically seamed can to a level as low as possible, thereby preventing oxidation of the coffee extract with oxygen in the air remaining in the can. In addition, after the hermetical seaming, a portion of the mixed gas is dissolved in the coffee extract in the can to form appropriate negative pressure in the can, which makes it possible to perform tapping tests

after the hermetical seaming advantageously.

The replacement of air in the can with the mixed gas is performed by continuously passing containers for canning one after another under a nozzle which is spouting the mixed gas. Thereafter, the cans are tightly seamed rapidly. The tightly seamed cans containing coffee drink are usually subjected to sterilization treatment (for example, at 115°C for 20 minutes), cooled and shipped as final beverage products.

The present invention will be described in greater detail with reference to examples which should in no way be construed as limiting the present invention.

Example 1

Roasted, pulverized coffee (96 kg) was charged in an extractor and extracted with sprayed hot water at 98°C. The extract was rapidly cooled down to about 18°C and supplied to a mixing tank in which 1 kg of erythorbic acid, 1 kg of sodium bicarbonate and 15 kg of sugar and water were added to prepare 2,000 liters of coffee extract.

The coffee extract was filled in a can (250 ml, three piece necked in TFS can) as it is without heating and air in the head space was replaced with either one of a mixed gas composed of nitrogen gas and steam, a mixed gas composed of nitrogen gas and carbon dioxide gas, or a mixed gas composed of carbon dioxide gas and steam. Immediately thereafter, the can was sealed and sterilized by retorting at 115°C for 20 minutes, followed by cooling to produce canned coffee drink.

In the above-described process, the filling of the coffee extract, replacement of air with the mixed gas and sealing of the can were performed continuously at a speed of 515 cans/minute.

Table 1 shows conditions of replacing air in the head space (kind and flow rate of mixed gases) and degree of pressure reduction (cmHg) immediately after the

production of canned coffee drink (final beverage product) as well as the total amount (ml/100 ml) of oxygen in the can, in the case where mocha blend was used as the coffee.

Table 2 shows conditions similar to those shown in Table 1 above and results obtained in the case where kirimanjaro blend was used as the coffee.

It should be noted that Runs Nos. Mo-1 and Mo-11 in Table 1 and Runs Nos. Ki-1 and Ki-11 are comparative examples, respectively.

Table 1

Run No.	Mixed Gas Used				Canned Coffee Drink (Immediately After Production)	
	Kind	Flow Rate (ℓ/minute)	Kind	Flow Rate (ℓ/minute)	Degree of Pressure Reduction (cmHg)	Total Amount of Oxygen in the Can (mℓ/100mℓ)
Mo-1	steam	150	-	-	30	0.42
Mo-2	"	"	CO^2	50	36	0.24
Mo-3	"	"	"	100	37	0.21
Mo-4	"	"	"	150	38	0.19
Mo-5	"	400	N^2	10	30	0.25
Mo-6	"	"	"	25	30	0.20
Mo-7	"	"	"	50	28	0.15
Mo-8	CO^2	120	"	80	16	0.15
Mo-9	"	160	"	40	27	0.16
Mo-10	"	180	"	20	32	0.14
Mo-11*1	-	-	-	-	27	0.74

*1 Coffee extract was filled at 88°C but replacement of air with the mixed gas was not performed.

Table 2

Run No.	Mixed Gas Used				Canned Coffee Drink (Immediately After Production)	
	Kind	Flow Rate (ℓ/minute)	Kind	Flow Rate (ℓ/minute)	Degree of Pressure Reduction (cmHg)	Total Amount of Oxygen in the Can (mℓ/100mℓ)
Ki-1	-	-	CO^2	100	25	0.31
Ki-2	steam	80	"	"	28	0.23
Ki-3	"	160	"	"	30	0.25
Ki-4	"	240	"	"	32	0.25
Ki-5	"	400	N^2	10	31	0.31
Ki-6	"	"	"	25	26	0.19
Ki-7	"	"	"	50	26	0.15
Ki-8	CO^2	120	"	80	18	0.17
Ki-9	"	160	"	40	25	0.17
Ki-10	"	180	"	20	31	0.19
Ki-11*1	-	-	-	-	32	0.71

*1 Coffee extract was filled at 88°C but replacement of air with the mixed gas was not performed.

Example 2

The degree of vacuum and pH of canned coffee drink corresponding to the respecitve run numbers obtained in Example 1 were examined chronologically.

The results obtained are shown in Tables 3 and 4.

Table 3

Run No.	Degree of Vacuum				pH			
	Room Temperature After 1 week	55°C, After 3 days	55°C, After 1 week	Room Temperature After 1 month	Room Temperature After 1 week	55°C, After 3 days	55°C, After 1 week	Room Temperature After 1 month
Mo-1	31	27	31	26	5.6	5.4	5.4	5.5
Mo-2	33	30	30	29	"	"	"	"
Mo-3	35	31	32	30	"	"	"	"
Mo-4	34	31	29	31	"	"	5.3	"
Mo-5	30	24	30	28	"	"	"	"
Mo-6	27	23	27	27	"	"	"	"
Mo-7	31	23	22	26	"	"	"	"
Mo-8	16	13	14	14	"	"	"	"
Mo-9	25	21	23	24	"	"	"	"
Mo-10	29	26	27	27	"	5.3	"	5.4
Mo-11	39	38	27	37	5.3	5.2	5.2	5.3

Table 4

Run No.	Degree of Vacuum				pH			
	Room Temperature After 1 week	55°C, After 3 days	55°C, After 1 week	Room Temperature After 1 month	Room Temperature After 1 week	55°C, After 3 days	55°C, After 1 week	Room Temperature After 1 month
Ki-1	21	19	20	18	5.3	5.2	5.1	5.3
Ki-2	23	19	21	20	"	"	"	"
Ki-3	25	22	24	22	5.4	"	"	"
Ki-4	27	24	26	25	"	"	"	"
Ki-5	30	27	29	28	"	"	"	"
Ki-6	24	23	22	21	5.3	"	"	"
Ki-7	24	19	25	22	"	"	"	"
Ki-8	17	14	15	17	5.4	"	"	"
Ki-9	21	18	21	22	5.3	"	"	"
Ki-10	30	25	27	23	"	5.1	"	5.2
Ki-11	38	36	27	37	5.2	"	5.0	"

Example 3

The total amount of oxygen in the can and transmittance of canned coffee drink samples corresponding to the respective run numbers obtained in Example 1 were examined periodically.

The results obtained are shown in Table 5 and 6.

Table 5

Run No.	Total Amount of Oxygen in the Can (mℓ/100mℓ)				Transmittance (660nm)							
	Immediately After Production	55°C, After 3 days	55°C, After 1 week	Room Temperature After 1 month	Room Temperature After 1 week		55°C, After 3 days		55°C, After 1 week		Room Temperature After 1 month	
					%	ΔT*	%	ΔT*	%	ΔT*	%	ΔT*
Mo-1	0.42	0.03	0.04	0.03	36.5	6.6	40.0	10.1	35.3	5.4	39.6	9.7
Mo-2	0.24	0.04	0.05	0.04	38.1	8.2	41.1	11.1	35.8	5.9	40.3	10.4
Mo-3	0.21	0.05	0.06	0.04	38.7	8.8	41.8	11.9	35.7	5.8	40.4	10.5
Mo-4	0.19	0.03	0.05	0.03	37.8	7.9	41.5	11.6	35.8	5.9	39.7	9.8
Mo-5	0.25	0.04	0.05	0.04	37.4	7.5	40.2	10.3	35.1	5.2	38.7	8.8
Mo-6	0.20	0.04	0.03	0.04	37.2	7.3	40.6	10.7	34.8	4.9	38.3	8.4
Mo-7	0.15	0.03	0.04	0.04	37.0	7.1	40.2	10.3	32.8	2.1	38.3	8.4
Mo-8	0.15	0.03	0.04	0.04	37.4	7.5	39.3	[illegible]	32.4	2.5	38.9	9.0
Mo-9	0.16	0.04	0.03	0.04	37.4	7.5	39.8	9.9	32.8	2.9	38.2	8.3
Mo-10	0.14	0.03	0.04	0.04	37.3	7.4	40.0	10.1	34.0	4.1	38.7	8.8
Mo-11	0.74	0.06	0.07	0.05	29.9	-	31.2	1.3	29.1	-0.8	38.3	0.4

* Values of Δ T are each a difference between transmittance measured and that of Mo-11 obtained after 1 week at room temperature.

Table 6

Run No.	Total Amount of Oxygen in the Can (m ℓ/100m ℓ)				Transmittance (660nm)							
	Immediately After Production	55°C, After 3 days	55°C, After 1 week	Room Temperature After 1 month	Room Temperature After 1 week		55°C, After 3 days		55°C, After 1 week		Room Temperature After 1 month	
					%	Δ T*	%	ΔT*	%	ΔT*	%	Δ T*
Ki-1	0.31	0.05	0.04	0.05	30.5	15.3	33.9	18.7	29.5	14.3	34.6	19.4
Ki-2	0.23	0.05	0.04	0.04	32.6	17.4	34.2	19.0	29.5	14.3	35.3	20.1
Ki-3	0.25	0.05	0.04	0.03	31.0	15.8	33.7	18.5	30.1	14.9	33.7	18.5
Ki-4	0.25	0.05	0.04	0.04	32.3	17.1	34.5	19.3	26.5	11.3	34.3	19.1
Ki-5	0.31	0.05	0.05	0.04	30.0	14.8	34.4	19.2	28.9	13.7	32.7	17.5
Ki-6	0.19	0.04	0.04	0.04	29.1	13.9	35.1	19.9	28.0	12.8	32.1	16.9
Ki-7	0.15	0.03	0.04	0.03	28.9	13.7	33.7	18.5	28.3	13.1	27.8	12.8
Ki-8	0.17	0.03	0.04	0.03	30.3	15.1	32.4	17.2	29.5	14.3	30.0	14.8
Ki-9	0.17	0.03	0.04	0.03	30.4	15.2	33.4	18.2	26.9	11.7	30.1	14.9
Ki-10	0.19	0.04	0.04	0.04	26.2	11.0	31.2	16.0	25.6	10.4	27.0	11.8
Ki-11	0.71	0.05	0.07	0.05	15.2	-	21.0	5.8	20.8	5.6	15.2	0

* Values of Δ T are each a difference between transmittance measured and that of Ki-11 obtained after 1 week at room temperature.

Example 4

The color of canned coffee drink samples corresponding to the respective run numbers obtained in Exmaple 1 ere examined periodically according to the standard L, a and b of Hunter scale.

Table 7

Run No.	Room Temperature After 1 week				55°C, After 3 days				55°C, After 1 week				Room Temperature After 1 month			
	L	a	b	*ΔE	L	a	b	*ΔE	L	a	b	*ΔE	L	a	b	*ΔE
Mo-1	37.2	21.3	25.4	8.57	38.4	21.5	26.2	10.01	36.2	20.5	24.8	6.14	38.5	21.7	26.3	10.16
Mo-2	37.2	21.3	25.5	8.63	39.0	21.5	26.6	10.74	37.0	20.4	25.3	6.95	39.0	21.7	26.6	10.75
Mo-3	38.1	21.4	26.1	9.71	39.3	21.6	26.9	11.16	36.7	20.5	25.2	8.24	39.1	21.7	26.7	10.88
Mo-4	37.5	21.3	25.7	8.99	39.1	21.5	26.7	10.88	36.7	20.5	25.0	7.96	38.8	21.7	26.5	10.52
Mo-5	37.5	21.1	25.7	8.99	38.2	21.7	26.1	9.80	36.3	20.4	24.8	7.53	38.1	21.7	26.0	9.66
Mo-6	37.5	21.4	25.6	8.93	38.4	21.5	26.2	10.02	36.0	20.4	24.6	7.17	37.9	21.7	25.9	9.44
Mo-7	37.6	21.2	25.7	9.07	38.4	21.4	26.3	10.07	34.9	20.1	23.9	5.93	38.3	21.7	26.2	9.94
Mo-8	37.3	21.4	25.6	8.77	38.1	21.4	26.1	9.71	35.3	20.1	24.1	6.36	38.3	21.7	26.2	9.94
Mo-9	37.3	21.3	25.5	8.71	38.4	21.5	26.3	10.07	35.4	20.1	24.2	6.50	38.0	21.7	26.0	9.58
Mo-10	37.2	21.5	25.4	8.58	38.4	21.5	26.2	10.02	36.0	20.5	24.6	7.16	37.9	21.6	25.9	9.44
Mo-11	30.1	21.2	20.6	-	30.7	21.2	21.0	0.72	29.7	20.5	20.3	0.86	30.9	21.4	21.2	1.02

* Values of ΔE are each a difference between the value obtained and L, a or b of Mo-11 as a standard value.

Table 8

Run No.	Room Temperature After 1 week				55°C, After 3 days				55°C, After 1 week				Room Temperature After 1 month			
	L	a	b	*ΔE	L	a	b	*ΔE	L	a	b	*ΔE	L	a	b	*ΔE
Ki-1	32.7	21.7	22.4	14.13	33.4	21.5	22.9	14.89	31.1	20.4	21.3	11.91	33.6	22.0	23.0	15.49
Ki-2	33.1	21.6	22.7	15.30	33.8	21.6	23.1	15.28	30.9	20.3	21.2	11.67	34.2	22.1	23.4	15.97
Ki-3	32.3	21.5	22.1	13.60	33.5	21.5	23.0	15.03	31.6	20.5	21.6	12.49	33.3	21.8	22.8	14.85
Ki-4	33.4	21.7	22.9	14.95	33.5	21.4	22.9	14.94	29.2	19.6	20.0	9.49	33.5	22.0	23.0	15.12
Ki-5	31.7	21.2	21.8	12.88	33.6	21.5	23.0	15.10	30.9	20.2	21.2	11.65	32.8	21.6	22.5	14.24
Ki-6	31.8	21.0	21.8	12.90	34.0	21.6	23.3	15.61	30.3	20.0	20.7	10.81	32.6	21.4	22.4	13.97
Ki-7	31.5	20.9	21.6	12.53	33.5	21.4	22.9	14.94	30.2	19.8	20.7	10.72	30.6	20.5	21.0	11.38
Ki-8	33.0	21.4	22.6	15.11	32.7	21.2	22.4	13.79	30.9	20.0	21.1	11.54	31.7	21.1	21.7	12.79
Ki-9	32.3	21.2	22.1	14.34	33.4	21.4	22.9	14.87	29.9	19.7	20.5	10.35	31.5	21.0	21.6	12.55
Ki-10	29.9	20.4	20.5	10.53	32.0	21.3	21.9	13.19	28.5	19.5	19.6	8.70	29.8	19.4	20.4	10.14
Ki-11	22.3	17.3	13.9	-	23.6	19.3	16.2	3.31	23.2	17.1	15.9	2.84	20.3	17.4	13.9	2.00

* Values of ΔE are each a difference between the value obtained and L, a or b of Ki-11 as a standard value.

Example 5

Organoleptic tests by a panel of 15 experienced examiners were performed on the canned coffee drink samples, i.e., Runs Nos. Mo-3, Mo-5 and Mo-10 (Table 1), Runs Nos. Ki-3, Ki-5 and Ki-10 (Table 2) and Runs Nos. Mo-11 and Ki-11 as comparison, each prepared in Example 1. Tables 9 and 10 show results obtained on the canned coffee drink samples immediately after the production thereof.

Table 9 (Immediately After Production)

Sample \ Evaluation		In comparison with Mo-11				
		Very Good	Good	Equivalent	Poor	Very Poor
Total	Mo-3	2 persons	9 persons	3 persons	1 person	0
	Mo-5	5 "	8 "	0	2 persons	0
	Mo-10	3 "	10 "	2 persons	0	0
Flavor	Mo-3	2 persons	8 persons	2 persons	3 persons	0
	Mo-5	4 "	7 "	2 "	2 "	0
	Mo-10	5 "	5 "	5 "	0	0
Taste	Mo-3	3 persons	7 persons	5 persons	0	0
	Mo-5	4 "	5 "	4 "	2 persons	0
	Mo-10	4 "	8 "	2 "	0	0

Table 10 (Immediately After Production)

Sample \ Evaluation		In comparison with Ki-11				
		Very Good	Good	Equivalent	Poor	Very Poor
Total	Ki-3	3 persons	7 persons	1 person	4 persons	0
	Ki-5	2 "	8 "	2 persons	2 "	1 person
	Ki-10	3 "	7 "	0	5 "	0
Fla-vor	Ki-3	0	8 "	2 persons	5 persons	0
	Ki-5	2 persons	9 "	2 "	1 person	1 person
	Ki-10	4 "	6 "	0	5 persons	0
Taste	Ki-3	3 persons	6 persons	2 persons	4 "	0
	Ki-5	2 "	7 "	4 "	1 person	1 person
	Ki-10	3 "	5 "	3 "	4 persons	0

Furthermore, the above-described canned coffee drink samples were each in an incubator at 55°C for 1 week and at room temperature for 1 month and evaluated in the same manner as above in comparsion with a control sample which was stored in a refrigerator as a standard.

Tables 11 to 14 show the results.

Table 11 (55°C, After 1 week)

Sample \ Evaluation		In comparison with Mo-11 Stored in a Refrigerator				
		Very Good	Good	Equivalent	Poor	Very Poor
Total	Mo-3	1 person	6 persons	7 persons	1 person	0
	Mo-5	1 "	6 "	8 "	0	0
	Mo-10	1 "	8 "	6 "	0	0
	Mo-11	0	1 person	9 "	5 persons	0
Flavor	Mo-3	1 person	7 persons	7 "	0	0
	Mo-5	1 "	8 "	6 "	0	0
	Mo-10	2 persons	8 "	4 "	1 person	0
	Mo-11	0	1 person	9 "	5 persons	0
Taste	Mo-3	1 person	5 persons	7 "	2 "	0
	Mo-5	1 "	6 "	7 "	1 person	0
	Mo-10	1 "	8 "	7 "	0	0
	Mo-11	0	2 "	7 "	6 persons	0

Table 12 (55°C, After 1 week)

Sample \ Evaluation		In comparison with Ki-11 Stored in a Refrigerator				
		Very Good	Good	Equivalent	Poor	Very Poor
Total	Ki-3	2 persons	9 persons	3 persons	1 person	0
	Ki-5	1 person	10 "	4 "	0	0
	Ki-10	0	8 "	7 "	0	0
	Ki-11	0	3 "	8 "	4 persons	0
Flavor	Ki-3	1 person	7 "	7 "	0	0
	Ki-5	0	9 "	6 "	0	0
	Ki-10	0	7 "	8 "	0	0
	Ki-11	0	2 "	8 "	5 persons	0
Taste	Ki-3	1 person	6 "	7 "	0	0
	Ki-5	1 "	11 "	3 "	0	0
	Ki-10	0	6 "	9 "	0	0
	Ki-11	0	2 "	8 "	5 persons	0

Table 13 (Room Temperature After 1 week)

Sample \ Evaluation		In comparison with Mo-11 Stored in a Refrigerator				
		Very Good	Good	Equivalent	Poor	Very Poor
Total	Mo-3	3 persons	9 persons	3 persons	0	0
	Mo-5	0	12 "	2 "	1 person	0
	Mo-10	2 persons	10 "	3 "	0	0
	Mo-11	0	2 "	9 "	4 persons	0
Flavor	Mo-3	2 persons	10 "	3 "	0	0
	Mo-5	1 person	11 "	3 "	0	0
	Mo-10	1 "	11 "	3 "	0	0
	Mo-11	0	2 "	9 "	4 persons	0
Taste	Mo-3	2 persons	9 "	4 "	0	0
	Mo-5	1 person	10 "	3 "	1 person	0
	Mo-10	2 persons	8 "	5 "	0	0
	Mo-11	0	2 "	9 "	3 persons	1 person

Table 14 (Room Temperature After 1 month)

Sample \ Evaluation		In comparison with Ki-11 Stored in a Refrigerator				
		Very Good	Good	Equivalent	Poor	Very Poor
Total	Ki-3	2 persons	7 persons	6 persons	0	0
	Ki-5	2 "	10 "	3 "	0	0
	Ki-10	3 "	9 "	3 "	0	0
	Ki-11	0	2 "	10 "	3 persons	0
Flavor	Ki-3	2 persons	7 "	6 "	0	0
	Ki-5	1 person	8 "	6 "	0	0
	Ki-10	1 "	9 "	5 "	0	0
	Ki-11	0	2 "	11 "	2 persons	0
Taste	Ki-3	2 persons	7 "	6 "	0	0
	Ki-5	2 "	12 "	1 person	0	0
	Ki-10	3 "	9 "	3 persons	0	0
	Ki-11	0	2 "	10 "	3 persons	0

As will be apparent from the results shown in Tables 11 to 14, the canned coffee drink of the present invention is superior in storage stability at elevated temperature (Tables 11 and 12) and also in stability after long-term retention at room temperature (Tables 13 and 14) to the comparison product filled with coffee extract at 88°C.

Industrial Applicability

The present invention provides an improved process for the production of canned coffee drink which has good flavor, taste and color of fresh-brewed coffee and retains intrinsic fresh-brewed aroma after long-term retention and which is suitable for impact testing for the examination of the degree of vacuum in the sealed cans.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A process for the production of canned coffee, comprising:

(1) preparing a cold extract of coffee with water by rapidly cooling a coffee extract at a temperature no higher than about 20°C;

(2) adding at least one antioxidant selected from the group consisting of erythorbic acid, ascorbic acid and water-soluble salts thereof to said cold extract, optionally followed by diluting the resulting mixture with water;

(3) filling said cold extract containing said at least one antioxidant in a can without heating such that a small headspace is left in said can after filling;

(4) replacing air contained in said can with a mixed gas comprising at least two members selected from the group consisting of steam, carbon dioxide gas, and nitrogen gas; and

(5) hermetically sealing said can.

2. The process of claim 1, substantially as herein described with reference to any one of the Examples.

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PHILLIPS ORMONDE & FITZPATRICK
Attorneys for:
THE COCA-COLA COMPANY

David B Fitzpatrick

INTERNATIONAL SEARCH REPORT

International Application No PCT/JP 90/00828

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[5]: A 23 F 5/24

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[5]	A 23 F

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category [10]	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
Y	Patent Abstracts of Japan, vol. 11, no. 232 (C-437)(2679), 29 July 1987, & JP, A, 6244137 (MEIJI MILK PROD CO., LTD) 26 February 1987 see abstract (cited in the application)	1
Y	DE, A, 3339839 (ASAHI BREWERIES) 9 August 1984 see claims 1,2,7,11	1
A	DE, A, 3538810 (JUJO PAPER CO., LTD) 22 May 1986 see claims 1,2; page 4, lines 14-20; example 2	1

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* Special categories of cited documents: [10]

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

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"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

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"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

"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

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
4th September 1990	26 SEP. 1990
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	MISS T. TAZELAAR

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	GB, A, 2089191 (TOYO SEIKAN KAISHA) 23 June 1982 see claims 1,2,5,10; examples 2-7; page 2, line 64 - page 3, line 13	1
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A	Patent Abstracts of Japan, vol. 7, no. 108 (C-165)(1253), 11 May 1983, & JP, A, 5831939 (KIYOUDOU NIYUUGIYOU K.K.) 24 February 1983 see abstract (cite in the application)	1

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. JP 9000828 SA 37811

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 21/09/90
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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DE-A- 3339839	09-08-84	JP-A- 59152194	30-08-84
		GB-A- 2134496	15-08-84
DE-A- 3538810	22-05-86	JP-A- 61115856	03-06-86
		JP-A- 61115818	03-06-86
		FR-A- 2572708	09-05-86
		US-A- 4869047	26-09-89
		US-A- 4805768	21-02-89
GB-A- 2089191	23-06-82	JP-A- 57204833	15-12-82
		JP-A- 57104534	29-06-82