

SPECIFICATION

Fruit Juices and Drinks and Additives for them

This invention relates to fruit juices and drinks.

5 Suspended fruit pulp in acid fruit juice and fruit drinks, particularly citrus fruit juice and fruit
drinks, tends to settle on standing producing a non-homogeneous product having a fruit solids
flocculate at the bottom and an opaque supernate or cloud. Attempts to maintain a more uniform
product by adding a suspending and thickening agent such as CMC have been unsuccessful, while
adding a thickening agent such as xanthan gum results in cloud destabilization and pulp flocculation.
10 Citrus and other acid fruit juice solids in a reconstituted dry mix also flocculate and precipitate in the
presence of xanthan gum which is used as a bodying agent.

The present invention is based on the discovery that the appearance, taste, mouthfeel and
stability of acid fruit juices and fruit drinks, particularly citrus fruit juices and citrus fruit drinks, are
improved by adding small amounts of both xanthan gum and sodium carboxymethyl cellulose (CMC).
The pulp suspension is thereby improved.

15 In accordance with the present invention, there is provided an acid fruit juice or a fruit drink
containing an acid fruit juice in which is incorporated, based on the total weight of the fruit juice or
fruit drink, from 0.01 to 0.1 weight % of xanthan gum, and from 0.01 to 0.14 weight % of CMC having
a degree of substitution of at least 0.7, whereby the fruit juice or fruit drink has enhanced stability and
homogeneity.

20 The xanthan gum used is food-grade xanthan gum while the CMC is food-grade CMC having a
degree of substitution (DS) of at least about 0.7. In general, the higher the DS of the CMC, the lower
the amount of CMC used.

The amount of xanthan gum used is preferably from 0.01 to 0.06, particularly 0.02 to 0.06,
weight per cent of the fruit juice or drink; the amount of CMC is preferably from 0.02 to 0.14,
25 particularly 0.04 to 0.14, weight per cent of the fruit juice or drink.

The present invention also provides a non-dairy acid-fruit-product-thickening blend consisting
essentially of xanthan gum and CMC having a degree of substitution of at least 0.7, in which the ratio
by weight of xanthan gum to CMC ranges from 1:1 to 1:14, preferably about 1:2.33.

30 The appearance, taste and stability of fruit juice or of a fruit drink containing an acid fruit juice or
fruit solids may be improved according to the present invention. Examples of fruit whose juice or solids
may be used are the citrus fruits orange, grapefruit, tangerine, lemon and lime, and pineapple.

The xanthan gum and CMC may be added to the whole fruit juice or fruit drink, to the fruit juice or
fruit drink concentrate, to the pasteurized fruit juice, to the reconstituted fruit juice or fruit drink or to
dry mixes containing the fruit solids.

35 The following examples illustrate but do not limit the present invention.

Example 1
Formulation (grams)

	Ingredient	A B C D			
40	Xanthan gum	—	0.40	—	0.40
	CMC	—	—	0.80	0.80

The foregoing formulations are hydrated separately in about 800 ml of water to which 2.4 g. of citric
acid is added, and preservatives if desired. Then 74.7 g. of 76° Brix invert sugar syrup and 103.2 g of
58° Brix frozen orange juice concentrate are added and the total volume is brought to one liter by
addition of water. After standing for 24 hours the formulations appear as follows:

- 45 A nonuniform, pulp settling to bottom
B nonuniform, clear layer at top, pulp agglomerates formed
C nonuniform, pulp settling to bottom
D uniform, homogeneous

Example 2

50 A series of orange juice drinks are prepared similar to formulation D of Example 1, but containing
the following weight % of xanthan gum and CMC.

	Formulation	Xanthan Gum		CMC	Xanthan Gum: CMC ratio
55	E	0	0		
	F	0.02	0		
	G	0.02	0.02		1:1
	H	0.02	0.025		1:1.25
	I	0.02	0.03		1:1.5
	J	0.02	0.035		1:1.75
60	K	0.02	0.04		1:2
	L	0.02	0.045		1:2.25

Equal volumes of the formulations are stored for 14 days at 2°C in equal dimension containers and the clear supernatant layer which forms is measured and expressed as a % of the height of the juice drink, with the following results:

Supernatant Layer as % of Liquid Height

Formulation	Day				
	2	4	7	11	14
E	76	88	81	83	83
F	46	53	61	66	67
G	43	47	48	59	63
H	40	46	52	57	63
I	34	37	43	50	54
J	36	39	46	—	53
K	23	33	40	44	49
L	0	0	0	52	58

The foregoing data show that at low levels of xanthan gum, a level of CMC at least about twice that of the xanthan gum is required for stability.

Example 3

Four lemon flavored drinks are prepared by adding the following ingredients to 1 liter of cold water and hand stirring for 30 seconds.

	Grams			
	A	B	C	D
Sugar	86.299	86.179	86.059	85.939
Lemon juice powder	8.0	8.0	8.0	8.0
Citric acid	2.8	2.8	2.8	2.8
Monocalcium phosphate	1.4	1.4	1.4	1.4
Clouding agent	0.75	0.75	0.75	0.75
Lemon essence, encapsulated	0.5	0.5	0.5	0.5
Lemon oil, encapsulated	0.25	0.25	0.25	0.25
Coloring, FD & C yellow No. 5	0.001	0.001	0.001	0.001
xanthan gum	—	0.012	—	0.12
CMC	—	—	0.24	0.24
	100.0	100.0	100.0	100.0

After storage for 16 hours at 2°C, the following results are observed:

- A homogeneous appearance, solids settled to bottom, watery body, unsatisfactory mouthfeel
- B agglomerated solid particles settled to bottom, partial cloud destabilization, thicker body than A, satisfactory mouthfeel
- C homogeneous appearance, solids settled to bottom, watery body, mouthfeel better than A but poorer than B
- D homogeneous appearance, least solids settled to bottom, thicker body than A, satisfactory mouthfeel.

Claims

1. An acid fruit juice or a fruit drink containing an acid fruit juice in which is incorporated, based on the total weight of the fruit juice or fruit drink, from 0.01 to 0.1 weight % of xanthan gum, and from 0.01 to 0.14 weight % of CMC having a degree of substitution of at least 0.7, whereby the fruit juice or fruit drink has enhanced stability and homogeneity.

2. A citrus fruit juice or drink in accordance with Claim 1.

3. A fruit juice or fruit drink according to Claim 1 or 2 containing from 0.01 to 0.06 weight % of xanthan gum.

4. A fruit juice or fruit drink according to Claim 3 containing from 0.02 to 0.06 weight % of xanthan gum.

14



Equal volumes of the formulations are stored for 14 days at 2°C in equal dimension containers and the clear supernatant layer which forms is measured and expressed as a % of the height of the juice drink, with the following results:

		Supernatant Layer as % of Liquid Height						
5	Formulation	Day						5
		2	4	7	11	14		
10	E	76	88	81	83	83	10	
	F	46	53	61	66	67		
	G	43	47	48	59	63		
	H	40	46	52	57	63		
	I	34	37	43	50	54		
15	J	36	39	46	—	53	15	
	K	23	33	40	44	49		
	L	0	0	0	52	58		

The foregoing data show that at low levels of xanthan gum, a level of CMC at least about twice that of the xanthan gum is required for stability.

Example 3

Four lemon flavored drinks are prepared by adding the following ingredients to 1 liter of cold water and hand stirring for 30 seconds.

		Grams					
		A	B	C	D		
25	Sugar	86.299	86.179	86.059	85.939		25
	Lemon juice powder	8.0	8.0	8.0	8.0		
	Citric acid	2.8	2.8	2.8	2.8		
	Monocalcium phosphate	1.4	1.4	1.4	1.4		
30	Clouding agent	0.75	0.75	0.75	0.75		30
	Lemon essence, encapsulated	0.5	0.5	0.5	0.5		
	Lemon oil, encapsulated	0.25	0.25	0.25	0.25		
	Coloring, FD & C yellow No. 5	0.001	0.001	0.001	0.001		
35	xanthan gum	—	0.012	—	0.12		35
	CMC	—	—	0.24	0.24		
		100.0	100.0	100.0	100.0		

After storage for 16 hours at 2°C, the following results are observed:

- A homogeneous appearance, solids settled to bottom, watery body, unsatisfactory mouthfeel
- B agglomerated solid particles settled to bottom, partial cloud destabilization, thicker body than A, satisfactory mouthfeel
- C homogeneous appearance, solids settled to bottom, watery body, mouthfeel better than A but poorer than B
- D homogeneous appearance, least solids settled to bottom, thicker body than A, satisfactory mouthfeel.

Claims

1. An acid fruit juice or a fruit drink containing an acid fruit juice in which is incorporated, based on the total weight of the fruit juice or fruit drink, from 0.01 to 0.1 weight % of xanthan gum, and from 0.01 to 0.14 weight % of CMC having a degree of substitution of at least 0.7, whereby the fruit juice or fruit drink has enhanced stability and homogeneity.

2. A citrus fruit juice or drink in accordance with Claim 1.

3. A fruit juice or fruit drink according to Claim 1 or 2 containing from 0.01 to 0.06 weight % of xanthan gum.

4. A fruit juice or fruit drink according to Claim 3 containing from 0.02 to 0.06 weight % of xanthan gum.

5. A fruit juice or fruit drink according to Claim 3 or 4 containing from 0.02 to 0.14 weight % of CMC.
6. A fruit juice or fruit drink according to Claim 5 containing from 0.04 to 0.14 weight % of CMC.
7. A non-dairy acid-fruit-product-thickening blend consisting essentially of xanthan gum and CMC having a degree of substitution of at least 0.7, in which the ratio by weight of xanthan gum to CMC ranges from 1:1 to 1:14.
8. A blend according to Claim 7 in which the ratio is about 1:2.33.
9. A fruit juice or drink according to Claim 1 substantially as hereinbefore described in Example 1, 2 or 3.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1982. Published by the Patent Office,
25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.



* C L M S *