U.S. CUSTOMS LABORATORY METHODS

USCL METHOD 20-08

Fruit Juices and Fruit Syrups: Identity and Degree of Concentration

SAFETY STATEMENT

This USCL Method cannot fully address safety issues that may arise from its use. The analyst is responsible for assessing potential safety issues associated with a given method at its point of use.

Before using this method, the analyst will consider all general laboratory safety precautions. In particular, the analyst will identify and implement suitable health and safety measures and will comply with all pertinent regulations.

METHOD UNCERTAINTY

The uncertainty of measurement for this method is specific to each laboratory.

0. INTRODUCTION

Chapter 20 of the *Harmonized Tariff Schedule of the United States* (*HTSUS*) requires the identification and determination of the degree of concentration of fruit juices and syrups for classification purposes. *HTSUS* Heading 2009 covers unfermented fruit juices whether or not containing added sugar or other sweetening matter.

1. SCOPE AND FIELD OF APPLICATION

This method may be used to determine the degree of concentration of fruit juices based on soluble solids (Brix).

Commercially, the degree of concentration of fruit juices is based principally on the soluble solids (Brix) determined from the refractive index, corrected for the amount of citric acid contained in the concentrate.

Annex II lists degrees of concentrations for various juices at varying Brix values.

Generally, high performance liquid chromatography (HPLC) will serve to indicate whether or not the sample is sweetened.

2. REFERENCES

2.1 *AOAC 925.35.* "Sucrose in Fruits and Fruit Products."

2.2 *AOAC 925.36.* "Sugars (Reducing) in Fruits and Fruit Products."

2.3 *USCL 04-10/AOAC 977.20*. "Separation of Sugars in Honey: Liquid Chromatographic Method."

2.4 *USCL 22-07/AOAC 983.13.* "Alcohol in Wines: Gas Chromatographic Method."

2.5 *AOAC 920.57.* "Alcohol in Wines: By Volume from Specific Gravity."

2.6 *AOAC 913.02.* See "Appendix C: Reference Tables," for conversion of specific gravity measured at 20° C to percent alcohol by volume.

2.7 *AOAC 942.33.* See "Appendix C: Reference Tables," for conversion of degrees Brix to specific gravity.

2.8 *AOAC 990.35A.* See "Appendix C: Reference Tables," for conversion of refractive index to degrees Brix.

3. REAGENTS AND MATERIAL

During the analysis, unless otherwise stated, use only reagents of recognized analytical grade and only distilled or deionized water.

3.1 Reagents.

3.1.1 Standard solution of sodium hydroxide (0.1N).

3.1.2 Phenolphthalein indicator: 1-g phenolphthalein per 100 ml of ethyl alcohol.

3.2 Materials.

3.2.1 Muslin, 12 to 13 inches square, washed and dried, a metal screen of appropriate mesh size to remove fruit pulp, or glass wool.

4. APPARATUS

4.1 Abbé Refractometer or equivalent.

4.2 Bath, constant temperature, capable of maintaining a temperature of 20° C ±0.1°C.

4.3 Analytical Balance, accurate to ±0.1 mg.

5. SAMPLE PREPARATION

5.1 Shake thoroughly and filter, if necessary, through a muslin square, wire mesh screen, or glass wool.

6. PROCEDURE

6.1 Preliminary Observations: Note the color, odor, and consistency of the sample as a means of identifying the type of fruit from which it was derived.

6.2 Alcohol Content: Determine the percentage of alcohol by volume at 20° C following *USCL 22-07/AOAC 983.13* or *AOAC 920.57* and *913.02* (**2.4**, **2.5**, **2.6**).

6.3 Acid as Citric: Accurately weigh to ±0.1 mg a 10-g sample of an unconcentrated juice or a 2-g sample of a concentrated juice. Transfer to a 500-ml Erlenmeyer flask and dilute to 250 ml with deionized water or recently boiled water. Titrate to an end point with a standard solution of sodium hydroxide (0.1N) using either a pH meter for end point detection or by adding approximately 1 ml of phenolphthalein indicator and titrating to a faint pink end point. Record the volume to ±0.05-ml. Calculate the percentage of acid as citric acid by **7.1**.

6.4 Soluble Solids (Brix) and Specific Gravity: Determine the refractive index or Brix of the sample at 20°C with an Abbé refractometer or equivalent. Read the Brix or refractive index directly from the scale. If reading refractive index, convert to degrees Brix by use of *AOAC Table 990.35A* (**2.8**).

NOTE: The Brix reading of the concentrated juice must be adjusted for the effect of any added sweetening materials.

Correct the obtained Brix reading for the amount of acid contained in the concentrate by adding the appropriate correction corresponding to the percentage of anhydrous citric acid using Annex I of this method. Calculate the percent (%) soluble solids (Brix value) by **7.2**.

Convert the Brix value to specific gravity by means of *AOAC Table 942.33* (**2.7**).

7. EXPRESSION OF RESULTS

7.1 Acid as anhydrous citric acid:

$$\% \ Acid = \frac{V \times 0.640}{W}$$

Where

V is the volume in milliliters of 0.1N alkali used. (For other concentrations of alkali, the factor becomes N x 6.4.)

W is the weight in grams of sample.

7.2 Soluble Solids (Brix value) and Specific Gravity:

$$\% \ Soluble \ Solids = B + F$$

Where

B is the Brix reading (read directly**,** or sucrose value obtained from *AOAC Table 990.35A* (**2.8**) corresponding to refractometer reading). **NOTE**: The Brix reading of the concentrated juice must be adjusted to compensate for the effect of any added sweetening materials.

F is the correction for citric acid content (from Annex I of this method).

Specific Gravity equals a value corresponding to (corrected) degrees Brix (Brix value) from *AOAC Table 942.33*. (**2.7**)

7.3 Degree of Concentration on a volume basis:

For juices and corresponding Brix values (Brix readings corrected for citric acid (**7.2**) and any added sweeteners, as defined in *HTSUS* Chapter 20, Additional U.S. Note 1 c) listed in Annex II, the degree of concentration may be read directly.

For juices or concentrations not listed in Annex II, the degree of concentration may be calculated as follows:

$$C = \frac{B_c \times S_c}{B_r \times S_r}$$

Where

C is the degree of concentration.

B_c is Brix value of concentrated juice (degrees Brix of concentrated juice corrected for acid and any added sweetening material.) (**7.2**).

B_r is Brix value of unconcentrated juice (**Annex II**, **8.3**).

S_c is specific gravity corresponding to the Brix value of the concentrated juice at 20/20 (**7.2**, **2.7**).

S_r is specific gravity corresponding to the Brix value of the unconcentrated juice at 20/20 (**Annex II**, **8.3**, **2.7**).

8. BIBLIOGRAPHY

8.1 Stevens, J.W. and Baier, W.E. "Refractometric Determination of Soluble Solids in Citrus Juices," in *Industrial and Engineering Chemistry* (Analytical Edition). Vol.11. 1939. P. 447.

8.2 Directive Number 099 3820-008, December 18, 1992. "Determination of the Brix Value of Fruit Juices."

8.3 *19 CFR Part 151.91*, Chapter 1 Subpart G – "Fruit Juices."

9. ANNEXES

9.1 Annex I. Corrections for obtaining Brix from refractometer reading based on citric acid content of citrus juices or other acid-containing sugar solutions.

9.2 Annex II. Degrees of concentration at varying Brix values.

~~A~~NNEX I

CORRECTIONS FOR OBTAINING BRIX VALUES FROM REFRACTOMETER READINGS (8.1)

(Based on citric acid content of citrus juices or other acid-containing sugar solutions)

CITRIC ACID ANHYDROUS, PERCENT BY WEIGHT	CORRECTIONS TO BE ADDED TO REFRACTOMETER SUCROSE VALUE TO OBTAIN BRIX	CITRIC ACID ANHYDROUS, PERCENT BY WEIGHT	CORRECTIONS TO BE ADDED TO REFRACTOMETER SUCROSE VALUE TO OBTAIN BRIX	CITRIC ACID ANHYDROUS, PERCENT BY WEIGHT	CORRECTIONS TO BE ADDED TO REFRACTOMETER SUCROSE VALUE TO OBTAIN BRIX
0.00	0.00	20.0	3.70	40.00	7.23
0.20	0.04	20.2	3.73	40.20	7.27
0.40	0.08	20.4	3.77	40.40	7.31
0.60	0.12	20.6	3.80	40.60	7.34
0.80	0.16	20.8	3.84	40.80	7.38
1.00	0.20	21.0	3.88	41.00	7.41
1.20	0.24	21.2	3.91	41.20	7.45
1.40	0.28	21.4	3.95	41.40	7.48
1.60	0.32	21.6	3.99	41.60	7.52
1.80	0.36	21.8	4.02	41.80	7.55
2.00	0.39	22.0	4.05	42.00	7.59
2.20	0.43	22.2	4.09	42.20	7.62
2.40	0.47	22.4	4.13	42.40	7.66
2.60	0.51	22.6	4.17	42.60	7.70
2.80	0.54	22.8	4.20	42.80	7.73
3.00	0.58	23.0	4.24	43.00	7.77
3.20	0.62	23.2	4.27	43.20	7.80
3.40	0.66	23.4	4.30	43.40	7.84
3.60	0.70	23.6	4.34	43.60	7.87
3.80	0.74	23.8	4.38	43.80	7.91
4.00	0.78	24.0	4.41	44.00	7.94
4.20	0.81	24.2	4.44	44.20	7.98
4.40	0.85	24.4	4.48	44.40	8.02
4.60	0.89	24.6	4.51	44.60	8.05
4.80	0.93	24.8	4.54	44.80	8.09
5.00	0.97	25.0	4.58	45.00	8.12
5.20	1.01	25.2	4.62	45.20	8.16
5.40	1.04	25.4	4.66	45.40	8.19
5.60	1.07	25.6	4.69	45.60	8.23
5.80	1.11	25.8	4.73	45.80	8.26
6.00	1.15	26.0	4.76	46.00	8.30
6.20	1.19	26.2	4.79	46.20	8.33
6.40	1.23	26.4	4.83	46.40	8.37
6.60	1.27	26.6	4.86	46.60	8.41
6.80	1.30	26.8	4.90	46.80	8.44
7.00	1.34	27.0	4.94	47.00	8.48
7.20	1.38	27.2	4.97	47.20	8.51
7.40	1.42	27.4	5.00	47.40	8.55
7.60	1.46	27.6	5.03	47.60	8.58
7.80	1.50	27.8	5.06	47.80	8.62
8.00	1.54	28.0	5.10	48.00	8.65
8.20	1.58	28.2	5.14	48.20	8.69

CITRIC ACID ANHYDROUS, PERCENT BY WEIGHT	CORRECTIONS TO BE ADDED TO REFRACTOMETER SUCROSE VALUE TO OBTAIN BRIX	CITRIC ACID ANHYDROUS, PERCENT BY WEIGHT	CORRECTIONS TO BE ADDED TO REFRACTOMETER SUCROSE VALUE TO OBTAIN BRIX	CITRIC ACID ANHYDROUS, PERCENT BY WEIGHT	CORRECTIONS TO BE ADDED TO REFRACTOMETER SUCROSE VALUE TO OBTAIN BRIX
8.40	1.62	28.40	5.18	48.40	8.73
8.60	1.66	28.60	5.22	48.60	8.76
8.80	1.69	28.80	5.25	48.80	8.80
9.00	1.72	29.00	5.28	49.00	8.83
9.20	1.76	29.20	5.31	49.20	8.87
9.40	1.80	29.40	5.35	49.40	8.90
9.60	1.83	29.60	5.39	49.60	8.94
9.80	1.87	29.80	5.42	49.80	8.97
10.00	1.91	30.00	5.46	50.00	9.01
10.20	1.95	30.20	5.49	50.20	9.04
10.40	1.99	30.40 [a]	5.53	50.40	9.08
10.60	2.03	30.60	5.57	50.60	9.12
10.80	2.06	30.80	5.60	50.80	9.15
11.00	2.10	31.00	5.64	51.00	9.19
11.20	2.14	31.20	5.67	51.20	9.22
11.40	2.18	31.40	5.71	51.40	9.26
11.60	2.21	31.60	5.74	51.60	9.29
11.80	2.24	31.80	5.78	51.80	9.33
12.00	2.27	32.00	5.81	52.00	9.36
12.20	2.31	32.20	5.85	52.20	9.40
12.40	2.35	32.40	5.89	52.40	9.44
12.60	2.39	32.60	5.92	52.60	9.47
12.80	2.42	32.80	5.96	52.80	9.51
13.00	2.46	33.00	5.99	53.00	9.54
13.20	2.50	33.20	6.03	53.20	9.58
13.40	2.54	33.40	6.06	53.40	9.61
13.60	2.57	33.60	6.10	53.60	9.65
13.80	2.61	33.80	6.13	53.80	9.68
14.00	2.64	34.00	6.17	54.00	9.72
14.20	2.68	34.20	6.20	54.20	9.75
14.40	2.72	34.40	6.24	54.40	9.79
14.60	2.75	34.60	6.28	54.60	9.83
14.80	2.78	34.80	6.31	54.80	9.86
15.00	2.81	35.00	6.35	55.00	9.90
15.20	2.85	35.20	6.38	55.20	9.93
15.40	2.89	35.40	6.42	55.40	9.97
15.60	2.93	35.60	6.45	55.60	10.00
15.80	2.97	35.80	6.49	55.80	10.04
16.00	3.00	36.00	6.52	56.00	10.07
16.20	3.03	36.20	6.56	56.20	10.11
16.40	3.06	36.40	6.60	56.40	10.15
16.60	3.09	36.60	6.63	56.60	10.18
16.80	3.13	36.80	6.67	56.80	10.22
17.00	3.17	37.00	6.70	57.00	10.25
17.20	3.21	37.20	6.74	57.20	10.29
17.40	3.24	37.40	6.77	57.40	10.32
17.60	3.27	37.60	6.81	57.60	10.36
17.80	3.31	37.80	6.84	57.80	10.39

CITRIC ACID ANHYDROUS, PERCENT BY WEIGHT	CORRECTIONS TO BE ADDED TO REFRACTOMETER SUCROSE VALUE TO OBTAIN BRIX	CITRIC ACID ANHYDROUS, PERCENT BY WEIGHT	CORRECTIONS TO BE ADDED TO REFRACTOMETER SUCROSE VALUE TO OBTAIN BRIX	CITRIC ACID ANHYDROUS, PERCENT BY WEIGHT	CORRECTIONS TO BE ADDED TO REFRACTOMETER SUCROSE VALUE TO OBTAIN BRIX
18.00	3.35	38.00	6.88	58.00	10.43
18.20	3.38	38.20	6.91	58.20	10.46
18.40	3.42	38.40	6.95	58.40	10.50
18.60	3.46	38.60	6.99	58.60	10.54
18.80	3.49	38.80	7.02	58.80	10.57
19.00	3.53	39.00	7.06	59.00	10.61
19.20	3.56	39.20	7.09	59.20	10.64
19.40	3.59	39.40	7.13	59.40	10.68
19.60	3.63	39.60	7.16	59.60	10.71
19.80	3.67	39.80	7.20	59.80	10.75

[a] Values for correction for 30.40-59.80% citric acid calculated according to the following formula as extracted from the original data in (**8.1**):

Brix correction = (0.1775 x % anhydrous citric acid) + 0.1343

ANNEX II

DEGREE OF CONCENTRATION

Table should be used only if adjustments have been made to Brix reading to compensate for the effect of any added sweetening materials and corrected for acid.

DEGREE OF CONCENTRATION[a]	APPLE (13.3)	APRICOT (14.3)	BILBERRY (13.4)
Unconcentrated	-19.45	-20.88	-19.60
1.5	19.46 - 22.42	20.89 - 24.04	19.61 - 22.58
2.0	22.43 - 28.15	24.05 - 30.13	22.59 - 28.35
2.5	28.16 - 33.61	30.14 - 35.93	28.36 - 33.85
3.0	33.62 - 38-83	35.94 - 41.45	33.86 - 39.10
3.5	38.84 - 43.84	41.46 - 46.73	39.11 - 44.14
4.0	43.85 - 48.65	46.74 - 51.78	44.15 - 48.96
4.5	48.66 - 53.26	51.79 - 56.62	48.97 - 53.60
5.0	53.27 - 57.69	56.63 - 61.27	53.61 - 58.05
5.5	57.70 - 61.97	61.28 - 65.74	58.06 - 62.35
6.0	61.98 - 66.09	65.75 - 70.05	62.36 - 66.49
6.5	66.10 - 70.07	70.06 - 74.20	66.50 - 70.49
7.0	70.08 - 73.92	—	70.50 - 74.36

DEGREE OF CONCENTRATION[a]	BLACK CURRANT (15.0)	BLACKBERRY (10.0)	BLACK RASPBERRY (11.1)
Unconcentrated	-21.87	-14.71	-16.30
1.5	21.88 - 25.17	14.72 - 17.01	16.31 - 18.83
2.0	25.18 - 31.51	17.02 - 21.47	18.84 - 23.72
2.5	31.52 - 37.53	21.48 - 25.78	23.73 - 28.43
3.0	37.54 - 43.26	25.79 - 29.94	28.44 - 32.95
3.5	43.27 - 48.73	29.95 - 33.96	32.96 - 37.32
4.0	48.74 - 53.94	33.97 - 37.85	37.33 - 41.53
4.5	53.95 - 58.94	37.86 - 41.62	41.54 - 45-59
5,6	58.95 - 63.73	41.63 - 45.26	45.60 - 49.52
5.5	63.74 - 68.33	45.27 - 48.80	49.53 - 53.32
6.0	68.34 - 72.76	48.81 - 52.24	53-33 - 57.00
6.5	72.77 - 77.06	52.25 - 55.57	57.01 - 60.57
7.0	—	55.58 - 58.82	60.58 - 64-03

DEGREE OF CONCENTRATION[a]	BLUEBERRY (14.1)	BOYSENBERRY (10.0)	CAROB (40.0)
Unconcentrated	-20.59	-14.71	-55.90
1.5	20.60 - 23.72	14.72 - 17.01	55.91 - 63.10
2.0	23.73 - 29.74	17.02 - 21.47	63.11 - 76.31
2.5	29.75 - 35.47	21.48 - 25.78	76.32 - 88.19
3.0	35.48 - 40.93	25.79 - 29-94	88.20 - 99.01
3.5	40.94 - 46.16	29.95 - 33.96	—
4.0	46.17 - 51.16	33.97 - 37.85	—
4.5	51.17 - 55.96	37.86 - 41.62	—
5,6	55.97 - 60.56	41.63 - 45.26	—
5.5	60.57 - 64.99	45.27 - 48-80	—
6.0	65.00 - 69.26	48.81 - 52.24	—
6.5	69.27 - 73.38	52.25 - 55.57	—
7.0	—	55.58 - 58.82	—

DEGREE OF CONCENTRATION[a]	CHERRY (14.3)	CRABAPPLE (15.4)	CRANBERRY (10.5)
Unconcentrated	-20.88	-22.44	-15.44
1.5	20.89 - 24.04	22.45 - 25.81	15.45 - 17.83
2.0	24.05 - 30.13	25.82 - 32.30	17.84 - 22.50
2.5	30.14 - 35.93	32.31 - 38.44	22.51 - 26.99
3.0	35.94 - 41.45	38.45 - 44.29	27.00 - 31.32
3.5	41.46 - 46.73	44.30 - 49.85	31.33 - 35.50
4.0	46.74 - 51.78	49.86 - 55.17	35.51 - 39.53
4.5	51.79 - 56.62	55.18 - 60.25	39.54 - 43.44
5.0	56.63 - 61.27	60.26 - 65.12	43.45 - 47.21
5.5	61.28 - 65.74	65.13 - 69.79	47.22 - 50.87
6.0	65.75 - 70.05	69.80 - 74.29	50.88 - 54.42
6.5	70.06 - 74.20	74.30 - 78.62	54.43 - 57.86
7.0	—	—	57.87 – 61.21

DEGREE OF CONCENTRATION[a]	DATE (18.5)	DEWBERRY (10.0)	ELDERBERRY (11.0)
Unconcentrated	-26.82	-14.71	-16.16
1.5	26.83 - 30.78	14.72 - 17.01	16.17 - 18.66
2.0	30.79 - 38.31	17.02 - 21.47	18.67 - 23.52
2.5	38.32 - 45.40	21.48 - 25.78	23.53 - 28.19
3.0	45.41 - 52.08	25.79 - 29.94	28.20 - 32.68
3.5	52.09 - 58.40	29.95 - 33.96	32.69 - 37.02
4.0	58.41 - 64.40	33.97 - 37.85	37.03 - 41.20
4.5	64.41 - 70.10	37.86 - 41.62	41.21 - 45.23
5.0	70.11 - 75.53	41.63 - 45.26	45.24 - 49.14
5.5	75.54 - 90.73	45.27 - 48.80	49.15 - 52.91
6.0	—	48.81 - 52.24	52.92 - 56.57
6.5	—	52.25 - 55.57	56.58 - 60.12
7.0	—	55.58 - 58.82	60.13 - 63.56

DEGREE OF CONCENTRATION[a]	FIG (18.2)	GOOSEBERRY (8.3)	GRAPE [VITIS VINIFERA] (21.5)
Unconcentrated	-26.39	-12.25	-30.99
1.5	26.40 - 30.28	12.26 - 14.18	31.00 - 35.47
2.0	30.29 - 37.72	14.19 - 17.96	35.48 - 43.95
2.5	37.73 - 44.71	17.97 - 21.62	43.96 - 51.86
3.0	44.72 - 51.31	21.63 - 25.18	51.87 - 59.27
3.5	51.32 - 57.56	25.19 - 28.64	59.28 - 66.23
4.0	57.57 - 63.49	28.65 - 32.00	66.24 - 72.81
4.5	63.50 - 69.13	32.01 - 35.27	72.82 - 79.03
5.0	69.14 - 74.51	35.28 - 38.45	79.04 - 84.95
5.5	74.52 - 79.66	38.46 - 41.54	84.96 - 90.95
6.0	79.67 - 84.60	41.55 - 44.56	—
6.5	—	44.57 - 47.50	—
7.0	—	47.51 – 50.37	—

DEGREE OF CONCENTRATION[a]	GRAPE [SLIPSKIN VARIETIES] (16.0)	GRAPEFRUIT (10.2)	GUAVA (7.7)
Unconcentrated	-23.29	-15.00	-11.38
1.5	23.30 - 26.78	15.01 - 17.34	11.39 - 13.18
2.0	26.79 - 33.47	17.35 - 21.88	13.19 - 16.71
2.5	33.48 - 39.80	21.89 - 26.26	16.72 - 20.14
3.0	39.81 - 45.81	26.27 - 30.49	20.15 - 23.47
3.5	45.82 - 51.53	30.50 - 34.58	23.48 - 26.72
4.0	51.54 - 56.98	34.59 - 38.52	26.73 - 29.88
4.5	56.99 - 62.19	38.53 - 42.35	29.89 - 32.96
5.0	62.20 - 67.18	42.36 - 46.05	32.97 - 35.97
5.5	67.19 - 71.96	46.06 - 49.63	35.98 - 38.90
6.0	71.97 - 76.55	49.64 - 53.11	38.91 - 41.75
6.5	—	53.12 - 56.49	41.76 - 44.55
7.0	—	56.50 - 59.78	44.56 - 47.27

DEGREE OF CONCENTRATION[a]	LEMON (8.9)	LIME (10.0)	LOGANBERRY (10.5)
Unconcentrated	-13.12	-14.71	-15.44
1.5	13.13 - 15.18	14.72 - 17.01	15.45 - 17.83
2.0	15.19 - 19.21	17.02 - 21.47	17.84 - 22.50
2.5	19.22 - 23.10	21.48 - 25.78	22.51 - 26.99
3.0	23.11 - 26.87	25.79 - 29.94	27.00 - 31.32
3.5	26.88 - 30.53	29.95 - 33.96	31.33 - 35.50
4.0	30.54 - 34.09	33.97 - 37.85	35.51 - 39.53
4.5	34.10 - 37.54	37.86 - 41.62	39.54 - 43.44
5.0	37.55 - 40.89	41.63 - 45.26	43.45 - 47.21
5.5	40.90 - 44.15	45.27 - 48.80	47.22 - 50.87
6.0	44.16 - 47.32	48.81 - 52.24	50.88 - 54.42
6.5	47.33 - 50.40	52.25 - 55.57	54.43 - 57.86
7.0	50.41 - 53.41	55.58 - 58.82	57.87 - 61.21

DEGREE OF CONCENTRATION[a]	MANGO (17.0)	NARANJILLA (10.5)	ORANGE (11.8)
Unconcentrated	-24.70	-15.44	-17.31
1.5	24.71 - 28.38	15.45 - 17.83	17.32 - 19.97
2.0	28.39 - 35.41	17.84 - 22.50	19.98 - 25.14
2.5	35.42 - 42.05	22.51 - 26.99	25.15 - 30.09
3.0	42.06 - 48.33	27.00 - 31.32	30.10 - 34.85
3.5	48.34 - 54.30	31.33 - 35.50	34.86 - 39.42
4.0	54.31 - 59.97	35.51 - 39.53	39.43 - 43.83
4.5	59.98 - 65.38	39.54 - 43.44	43.84 - 48.07
5.0	65.39 - 70.55	43.45 - 47.21	48.08 - 52.17
5.5	70.56 - 75.51	47.22 - 50.87	52.18 - 56.12
6.0	75.52 - 80.26	50.88 - 54.42	56.13 - 59.95
6.5	80.27 - 84.83	54.43 - 57.86	59.96 - 63.65
7.0	84.84 – 89.24	57.87 - 61.21	63.66 - 67.25

DEGREE OF CONCENTRATION[a]	PAPAYA (10.2)	PASSION FRUIT (15.3)	PEACH (11.8)
Unconcentrated	-15.00	-22.30	-17.31
1.5	15.01 - 17.34	22.31 - 25.65	17.32 - 19.97
2.0	17.35 - 21.88	25.66 - 32.10	19.98 - 25.14
2.5	21.89 - 26.26	32.11 - 38.22	25.15 - 30.09
3.0	26.27 - 30.49	38.23 - 44.03	30.10 - 34.85
3.5	30.50 - 34.58	44.04 - 49.57	34.86 - 39.42
4.0	34.59 - 38.52	49.58 - 54.86	39.43 - 43.83
4.5	38.53 - 42.35	54.87 - 59.92	43.84 - 48.07
5.0	42.36 - 46.05	59.93 - 64.77	48.08 - 52.17
5.5	46.06 - 49.63	64.78 - 69.43	52.18 - 56.12
6.0	49.64 - 53.11	69.44 - 73.91	56.13 - 59.95
6.5	53.12 - 56.49	73.92 - 78.22	59.96 - 63.65
7.0	56.50 - 59.78	78.23 – 82.39	63.66 - 67.25

DEGREE OF CONCENTRATION[a]	PEAR (15.4)	PINEAPPLE[b] (14.3)	PLUM (14.3)
Unconcentrated	-22.44	-20.88	-20.88
1.5	22.45 - 25.81	20.89 - 24.04	20.89 - 24.04
2.0	25.82 - 32.30	24.05 - 30.13	24.05 - 30.13
2.5	32.31 - 38.44	30.14 - 35.93	30.14 - 35.93
3.0	38.45 - 44.29	35.94 - 41.45	35.94 - 41.45
3.5	44.30 - 49.85	41.46 - 46.73	41.46 - 46.73
4.0	49.86 - 55.17	46.74 - 51.78	46.74 - 51.78
4.5	55.18 - 60.25	51.79 - 56.62	51.79 - 56.62
5.0	60.26 - 65.12	56.63 - 61.27	56.63 - 61.27
5.5	65.13 - 69.79	61.28 - 65.74	61.28 - 65.74
6.0	69.80 - 74.29	65.75 - 70.05	65.75 - 70.05
6.5	74.30 - 78.62	70.06 - 74.20	70.06 - 74.20
7.0	—	—	—

DEGREE OF CONCENTRATION[a]	POMEGRANATE (18.2)	PRUNE (18.5)	QUINCE (13.3)
Unconcentrated	-26.39	-26.82	-19.45
1.5	26.40 - 30.28	26.83 - 30.78	19.46 - 22.42
2.0	30.29 - 37.72	30.79 - 38.31	22-43 - 28.15
2.5	37.73 - 44.71	38.32 - 45.40	28.16 - 33.61
3.0	44.72 - 51.31	45.41 - 52.08	33.62 - 38.83
3.5	51.32 - 57.56	52.09 - 58.40	38.84 - 43.84
4.0	57.57 - 63.49	58.41 - 64.40	43.85 - 48.65
4.5	63.50 - 69.13	64.41 - 70.10	48.66 - 53.26
5.0	69.14 - 74.51	70.11 - 75.53	53.27 - 57.69
5.5	74.52 - 79.66	75.54 - 90.73	57.70 - 61.97
6.0	79.67 - 84.60	—	61.98 - 66.09
6.5	—	—	66.10 - 70.07
7.0	—	—	70.08 - 73.92

DEGREE OF CONCENTRATION[a]	RAISIN (18.5)	RASPBERRY [RED] (10.5)	RED CURRANT (10.5)
Unconcentrated	-26.82	-15.44	-15.44
1.5	26.83 - 30.78	15.45 - 17.83	15.45 - 17.83
2.0	30.79 - 38.31	17.84 - 22.50	17.84 - 22.50
2.5	38.32 - 45.40	22.51 - 26.99	22.51 - 26.99
3.0	45.41 - 52.08	27.00 - 31.32	27.00 - 31.32
3.5	52.09 - 58.40	31.33 - 35.50	31.33 - 35.50
4.0	58.41 - 64.40	35.51 - 39.53	35.51 - 39.53
4.5	64.41 - 70.10	39.54 - 43.44	39.54 - 43.44
5.0	70.11 - 75.53	43.45 - 47.21	43.45 - 47.21
5.5	75.54 - 80.73	47.22 - 50.87	47.22 - 50.87
6.0	—	50.88 - 54.42	50.88 - 54.42
6.5	—	54.43 - 57.86	54.43 - 57.86
7.0	—	57.87 - 61.21	57.87 - 61.21

DEGREE OF CONCENTRATION[a]	SOURSOP (16.0)	STRAWBERRY (8.0)	TAMARIND (55.0)
Unconcentrated	-23.29	-11.81	-75.17
1.5	23.30 - 26.78	11.82 - 13.68	75.18 - 84.09
2.0	26.79 - 33.47	13.69 - 17.33	—
2.5	33.48 - 39.80	17.34 - 20.88	—
3.0	39.81 - 45.81	20.89 - 24.33	—
3.5	45.82 - 51.53	24.34 - 27.68	—
4.0	51.54 - 56.98	27.69 - 30.94	—
4.5	56-99 - 62.19	30.95 - 34.12	—
5.0	62.20 - 67.18	34.13 - 37.21	—
5.5	67.19 - 71.96	37.22 - 40.23	—
6.0	71.97 - 76.55	40.24 - 43.17	—
6.5	—	43.18 - 46.03	—
7.0	—	46.04 - 48.83	—

DEGREE OF CONCENTRATION[a]	TANGERINE (11.5)	YOUNGBERRY (10.0)
Unconcentrated	-16.87	-14.71
1.5	16.88 - 19.48	14.72 - 17.01
2.0	19.49 - 24.53	17.02 - 21.47
2.5	24.54 - 29.38	21.48 - 25.78
3.0	29.39 - 34.04	25.79 - 29.94
3.5	34.05 - 38.52	29.95 - 33.96
4.0	38.53 - 42.85	33.97 - 37.85
4.5	42.86 - 47.01	37.86 - 41.62
5.0	47.02 - 51.04	41.63 - 45.26
5.5	51.05 - 54.93	45.27 - 48.80
6.0	54.94 - 58.69	48.81 - 52.24
6.5	58.70 - 62.34	52.25 - 55.57
7.0	62.35 - 65.88	55.58 - 58.82

The figures in parentheses are the average Brix values of the respective unconcentrated natural fruit juices (19 CFR Part 151.91 Chapter 1, Subpart G – Fruit Juices).

[a] In accordance with the provisions of the *Harmonized Tariff Schedule of the United States* (*HTSUS*), Section IV, Chapter 20, Additional U.S. Notes 1 and 2.

[b] For the purpose of *HTSUS* 2009.49.20.00, pineapple juice having a Brix value of not more than 44.095 has a degree of concentration of not more than 3.5 degrees before correction to the nearest 0.5 degree.

END