

INTERNATIONAL STANDARD



1743

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Glucose syrup — Determination of dry matter — Refractive index method

First edition — 1973-03-01

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UDC 664.162

Ref. No. ISO 1743-1973 (E)

Descriptors : carbohydrates, sugars, glucose, determination of content, dry matter, refractivity.

Price based on 13 pages

FOREWORD

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International Standard ISO 1743 was drawn up by Technical Committee ISO/TC 93, *Starch (including derivatives and by-products)*.

It was approved in July 1969 by the Member Bodies of the following countries :

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Brazil	Iran	Romania
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Colombia	Israel	Spain
Egypt, Arab Rep. of	Korea, Rep. of	Thailand
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Germany	New Zealand	United Kingdom
Greece	Peru	U.S.A.
Hungary	Poland	

No Member Body expressed disapproval of the document.

Glucose syrup — Determination of dry matter — Refractive index method

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies a method for the determination of the dry matter content of glucose syrup on the basis of its refractive index.

The method is applicable to glucose syrup and solid glucose obtained by acid hydrolysis, and to solutions of these products; it is also applicable to dextrose, whatever its manufacturing process, and to dextrose solutions.

The tables given are not valid, in the present stage of knowledge, for glucose syrups and solid glucose obtained by total or partial enzymatic hydrolysis (see Appendix, Z.2).

2 PRINCIPLE

Determination of the refractive index of an undiluted product, or of a solution containing a known proportion of the product, at a specified temperature; calculation of the dry matter content by means of tables showing refractive index as a function of composition, concentration and temperature.

3 APPARATUS

3.1 Refractometer, Abbe type or similar (see 6.1) allowing the reading or the estimation of refractive indices of between 1,300 0 and 1,550 0, to the nearest 0,000 2 unit.

It shall be so designed that samples can be introduced easily and rapidly, and shall be easy to clean. It is essential that the instrument should be provided with a thermometer the scale of which covers the temperatures of measurement of 20 °C and 45 °C, and with a device for the circulation of water to maintain the instrument at these two temperatures to the nearest $\pm 0,5$ °C.

The operating instructions for this instrument shall always be strictly complied with, especially as far as the calibration is concerned.

3.2 Micro-pipette or **glass rod** with bent flattened end, to apply the sample to the measuring prism.

3.3 Light source: full daylight or an incandescent bulb (25 to 50 watt) or other light source recommended by the manufacturer of the refractometer, arranged so that the light falls on the illumination prism or mirror.

4 PROCEDURE

4.1 Sample preparation

4.1.1 *In the case of syrups*

Use either :

4.1.1.1 the product as received; or

4.1.1.2 a solution containing a known proportion, by mass, of the product.

4.1.2 *In the case of solid glucose or dextrose*

Prepare a solution containing a known proportion, by mass, of the product.

4.2 Determination

Adjust the water circulation to operate at the required temperature ($20 \pm 0,5$ °C or $45 \pm 0,5$ °C) and allow it to circulate in order to bring the prisms to the same temperature (see 6.2).

Bring the prepared sample (see 4.1) to the measuring temperature.

Apply a small quantity of the prepared sample to the fixed prism of the refractometer (3.1), by means of the micro-pipette or the glass rod (3.2), and immediately clamp down the movable prism (see 6.3).

Use the micro-pipette for diluted syrups (containing about 65 % of dry matter or less), and for solutions of solid glucose or dextrose; for syrups of higher concentration, use the glass rod. Generally, 1 to 3 drops suffice to fill uniformly the space between the prisms. (If the quantity is too small, the contrast is insufficient when reading is attempted.)

With the instrument suitably illuminated, read the refractive index to the nearest 0,000 2 unit.

Read from the appropriate table (Table 1 for glucose syrup and solid glucose solutions, or Table 3 for dextrose solutions) the percentage by mass of dry matter in the test portion, corresponding to the measured refractive index (see the Appendix).

Take at least two readings on each test portion and take as the result of the determination the arithmetical mean of the values obtained.

Clean and dry completely the two prisms and carry out a second determination on a new test portion taken from the same prepared sample.

5 EXPRESSION OF RESULTS

5.1 Method of calculation and formulae

5.1.1 Case of undiluted products (see 4.1.1.1)

The dry matter content, as a percentage by mass, is given directly by the tables.

5.1.2 Case of diluted products (see 4.1.1.2 or 4.1.2)

The dry matter content, as a percentage by mass, is given by the formula

$$m_1 \times \frac{100}{m_0}$$

where

m_0 is the mass, in grams, of product in 100 g of diluted product;

m_1 is the mass, in grams, of dry matter in 100 g of product, read on the appropriate table and corresponding to the determined refractive index.

NOTE — It is possible to calculate the moisture content by the formula

$$100 - \left(m_1 \times \frac{100}{m_0} \right) = \frac{100 (m_0 - m_1)}{m_0}$$

5.1.3 Take as the result the arithmetic mean of two determinations, if the conditions of repeatability are fulfilled.

5.2 Repeatability

The difference between the results of two determinations carried out in rapid succession and on the same sample by the same analyst shall not be greater than 0,2 g of dry matter per 100 g of the product.

6 NOTES ON PROCEDURE

6.1 The procedure described in 4.2 and the values given in the tables were established as a result of the use of an Abbe type refractometer (3.1).

6.2 If the temperature of the refractometer or the measuring temperature is lower than room temperature, there is a tendency for the prisms to fog if the relative humidity in the room is high. Difficulties arising in the analysis of concentrated highly viscous syrups can best be overcome by carrying out the measurement at the higher temperature (45 °C), at which the viscosity is lower.

6.3 To obtain accurate results with warm samples the measurement shall be carried out rapidly; the application of the test portion to the prism face shall not take more than 2 s.

7 TEST REPORT

The test report shall show the method used and the results obtained. It shall also mention any operating conditions not specified in this International Standard, or regarded as optional, as well as any circumstances that may have influenced the results.

The test report shall include all details required for complete identification of the sample.

APPENDIX

Z.1 If desired, the refractive index values for undiluted syrups may be converted to US Commercial Baumé degrees¹⁾ by the use of Table 2.

Z.2 The data given in Tables 1 and 2 on the relationship between refractive index and dry matter or the US Commercial Baumé degree, for glucose syrup and solid glucose, were established by CLELAND, EVANS, FAUSER and FETZER (Ind. Eng. Chem. Anal. Ed. 16, 161 (1944)). Those in Table 3 on the relationship of refractive index and dry matter for dextrose solutions were established by ZERBAN and MARTIN (J. Assoc. Official Agr. Chemists 27, 295 (1944)). Tables 1 and 2 are valid only for acid saccharified products.

Z.3 With glucose syrup and solid glucose, the refractive index depends on various factors, in particular on the degree of saccharification or the DE value and on the ash.

Z.4 While Table 1 does not contain figures for low-saccharified syrups below 42 DE, syrups with 30 and 35 DE are also considered in Table 2.

1) The US Commercial Baumé hydrometer is calibrated at 15,56 °C (60 °F) with a modulus (*M*) of 145.

$$\text{Baumé degrees} : M = \frac{M}{\text{specific gravity}}$$

In other countries the value of *M* is different (for example in the UK, *M* = 144,3). In practice 41° and 43° Baumé syrups would be measured at 60 °C (140 °F) and 45° syrups at 71,1 °C (160 °F). Correction factors are applied to the observed values which are intended to give the value at 37,78 °C (100 °F) as follows :

US Commercial Baumé : Observed Baumé at 60 °C + 1,00;

US Commercial Baumé : Observed Baumé at 71,1 °C + 1,50.

TABLE 1 — Correspondence between dry matter and refractive index of glucose syrups and solid glucose (starch sugar) solutions¹⁾

Dry matter in air % m/m	Measurements carried out at							
	20 °C (68 °F)				45 °C (113 °F)			
	Dextrose equivalent and ash, %				Dextrose equivalent and ash, %			
	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22
0,00	1,333 0	1,333 0	1,333 0	1,333 0	1,329 8	1,329 8	1,329 8	1,329 8
1,00	1,334 4	1,334 4	1,334 4	1,334 4	1,331 2	1,331 2	1,331 2	1,331 2
2,00	1,335 9	1,335 9	1,335 9	1,335 9	1,332 7	1,332 7	1,332 6	1,332 6
3,00	1,337 4	1,337 4	1,337 3	1,337 4	1,334 1	1,334 1	1,334 0	1,334 0
4,00	1,338 9	1,338 9	1,338 8	1,338 8	1,335 6	1,335 6	1,335 5	1,335 5
5,00	1,340 4	1,340 4	1,340 3	1,340 3	1,337 1	1,337 1	1,336 9	1,336 9
6,00	1,341 9	1,341 9	1,341 8	1,341 8	1,338 6	1,338 6	1,338 4	1,338 4
7,00	1,343 5	1,343 5	1,343 3	1,343 3	1,340 1	1,340 1	1,339 9	1,339 9
8,00	1,345 0	1,345 0	1,344 8	1,344 8	1,341 6	1,341 6	1,341 4	1,341 4
9,00	1,346 6	1,346 6	1,346 3	1,346 4	1,343 2	1,343 1	1,342 9	1,342 9
10,00	1,348 2	1,348 2	1,347 9	1,347 9	1,344 7	1,344 7	1,344 4	1,344 4
11,00	1,349 8	1,349 7	1,349 4	1,349 5	1,346 3	1,346 2	1,345 9	1,345 9
12,00	1,351 4	1,351 3	1,351 0	1,351 0	1,347 9	1,347 8	1,347 5	1,347 5
13,00	1,353 1	1,353 0	1,352 6	1,352 6	1,349 5	1,349 4	1,349 0	1,349 0
14,00	1,354 7	1,354 6	1,354 2	1,354 2	1,351 1	1,351 0	1,350 6	1,350 6
15,00	1,356 3	1,356 2	1,355 8	1,355 8	1,352 7	1,352 6	1,352 1	1,352 1
16,00	1,358 0	1,357 9	1,357 4	1,357 4	1,354 4	1,354 2	1,353 7	1,353 7
17,00	1,359 7	1,359 5	1,359 0	1,359 0	1,356 0	1,355 8	1,355 3	1,355 3
18,00	1,361 4	1,361 2	1,360 6	1,360 7	1,357 6	1,357 5	1,356 9	1,356 9
19,00	1,363 2	1,362 9	1,362 3	1,362 3	1,359 3	1,359 2	1,358 5	1,358 5
20,00	1,364 9	1,364 6	1,364 0	1,364 0	1,361 0	1,360 8	1,360 2	1,360 2
21,00	1,366 6	1,366 3	1,365 6	1,365 6	1,362 7	1,362 5	1,361 8	1,361 8
22,00	1,368 4	1,368 1	1,367 3	1,367 3	1,364 5	1,364 2	1,363 5	1,363 5
23,00	1,370 1	1,369 8	1,369 0	1,369 0	1,366 2	1,365 9	1,365 2	1,365 2
24,00	1,371 9	1,371 6	1,370 7	1,370 7	1,368 0	1,367 7	1,366 9	1,366 8
25,00	1,373 7	1,373 3	1,372 5	1,372 5	1,369 8	1,369 4	1,368 6	1,368 5
26,00	1,375 5	1,375 1	1,374 2	1,374 2	1,371 5	1,371 2	1,370 3	1,370 2
27,00	1,377 4	1,376 9	1,375 9	1,375 9	1,373 3	1,372 9	1,372 0	1,371 9
28,00	1,379 2	1,378 8	1,377 7	1,377 7	1,375 1	1,374 7	1,373 7	1,373 7
29,00	1,381 1	1,380 6	1,379 4	1,379 4	1,377 0	1,376 5	1,375 4	1,375 5
30,00	1,382 9	1,382 4	1,381 2	1,381 2	1,378 8	1,378 3	1,377 2	1,377 3
31,00	1,384 8	1,384 3	1,383 0	1,383 0	1,380 6	1,380 2	1,378 9	1,379 0
32,00	1,386 7	1,386 2	1,384 8	1,384 8	1,382 5	1,382 0	1,380 7	1,380 8
33,00	1,388 6	1,388 0	1,386 6	1,386 6	1,384 4	1,383 9	1,382 6	1,382 6
34,00	1,390 6	1,389 9	1,388 5	1,388 5	1,386 3	1,385 7	1,384 4	1,384 4
35,00	1,392 5	1,391 9	1,390 3	1,390 3	1,388 2	1,387 6	1,386 2	1,386 3
36,00	1,394 5	1,393 8	1,392 2	1,392 1	1,390 1	1,389 5	1,388 0	1,388 1
37,00	1,396 4	1,395 7	1,394 1	1,394 0	1,392 1	1,391 4	1,389 9	1,389 9
38,00	1,398 4	1,397 7	1,395 9	1,395 9	1,394 0	1,393 4	1,391 7	1,391 8
39,00	1,400 4	1,399 7	1,397 8	1,397 8	1,396 0	1,395 3	1,393 6	1,393 7
40,00	1,402 4	1,401 6	1,399 7	1,399 7	1,398 0	1,397 3	1,395 5	1,395 5
41,00	1,404 4	1,403 6	1,401 6	1,401 6	1,400 0	1,399 3	1,397 4	1,397 4
42,00	1,406 5	1,405 7	1,403 6	1,403 5	1,402 0	1,401 2	1,399 3	1,399 3
43,00	1,408 6	1,407 7	1,405 5	1,405 5	1,404 1	1,403 2	1,401 2	1,401 1
44,00	1,410 7	1,409 7	1,407 4	1,407 4	1,406 1	1,405 3	1,403 1	1,403 2
45,00	1,412 8	1,411 8	1,409 4	1,409 4	1,408 2	1,407 3	1,405 1	1,405 1
46,00	1,414 9	1,413 9	1,411 4	1,411 3	1,410 3	1,409 3	1,407 1	1,407 1
47,00	1,417 0	1,416 0	1,413 4	1,413 3	1,412 4	1,411 4	1,409 0	1,409 1
48,00	1,419 2	1,418 1	1,415 4	1,415 4	1,414 5	1,413 5	1,411 0	1,411 1
49,00	1,421 3	1,420 2	1,417 4	1,417 4	1,416 7	1,415 6	1,413 1	1,413 1

1) Ind. Eng. Chem. Vol. 16, 15 March, 1944.

TABLE 1 (concluded)

Dry matter in air % m/m	Measurements carried out at							
	20 °C (68 °F)				45 °C (113 °F)			
	Dextrose equivalent and ash, %				Dextrose equivalent and ash, %			
	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22
50,00	1,423 5	1,422 4	1,419 5	1,419 5	1,418 9	1,417 7	1,415 1	1,415 1
51,00	1,425 7	1,424 5	1,421 5	1,421 5	1,421 0	1,419 9	1,417 1	1,417 1
52,00	1,427 9	1,426 7	1,423 6	1,423 5	1,423 2	1,422 0	1,419 2	1,419 2
53,00	1,430 1	1,428 8	1,425 6	1,425 6	1,425 4	1,424 2	1,421 2	1,421 2
54,00	1,432 4	1,431 0	1,427 8	1,427 7	1,427 6	1,426 4	1,423 3	1,423 3
55,00	1,434 6	1,433 3	1,429 9	1,429 8	1,429 8	1,428 6	1,425 4	1,425 4
56,00	1,436 9	1,435 5	1,432 0	1,432 0	1,432 1	1,430 8	1,427 5	1,427 5
57,00	1,439 2	1,437 8	1,434 1	1,434 1	1,434 4	1,433 1	1,429 6	1,429 6
58,00	1,441 5	1,440 0	1,436 3	1,436 2	1,436 7	1,435 4	1,431 8	1,431 7
59,00	1,443 8	1,442 3	1,438 4	1,438 4	1,439 0	1,437 6	1,433 9	1,433 9
60,00	1,446 2	1,444 6	1,440 6	1,440 6	1,441 3	1,439 9	1,436 1	1,436 1
61,00	1,448 6	1,446 9	1,442 8	1,442 8	1,443 7	1,442 2	1,438 3	1,438 3
62,00	1,451 0	1,449 3	1,445 0	1,445 0	1,446 1	1,444 6	1,440 5	1,440 5
63,00	1,453 4	1,451 6	1,447 3	1,447 3	1,448 5	1,446 9	1,442 7	1,442 7
64,00	1,455 8	1,454 0	1,449 5	1,449 5	1,450 9	1,449 3	1,444 9	1,445 0
65,00	1,458 2	1,456 4	1,451 8	1,451 8	1,453 4	1,451 7	1,447 1	1,447 2
66,00	1,460 7	1,458 8	1,454 0	1,454 0	1,455 8	1,454 1	1,449 4	1,449 5
67,00	1,463 1	1,461 2	1,456 3	1,456 3	1,458 3	1,456 5	1,451 7	1,451 8
68,00	1,465 6	1,463 7	1,458 7	1,458 7	1,460 8	1,458 9	1,454 0	1,454 1
69,00	1,468 1	1,466 2	1,461 0	1,461 0	1,463 3	1,461 4	1,456 3	1,456 4
70,00	1,470 7	1,468 7	1,463 3	1,463 3	1,465 8	1,463 9	1,458 7	1,458 7
71,00	1,473 3	1,471 2	1,465 7	1,465 7	1,468 3	1,466 3	1,461 0	1,461 0
72,00	1,475 9	1,473 7	1,468 1	1,468 1	1,470 9	1,468 8	1,463 4	1,463 3
73,00	1,478 5	1,476 2	1,470 5	1,470 5	1,473 5	1,471 4	1,465 7	1,465 7
74,00	1,481 1	1,478 8	1,472 9	1,472 9	1,476 1	1,474 0	1,468 1	1,468 0
75,00	1,483 7	1,481 4	1,475 4	1,475 3	1,478 7	1,476 5	1,470 6	1,470 4
76,00	1,486 3	1,483 9	1,477 8	1,477 8	1,481 3	1,479 1	1,473 0	1,472 8
77,00	1,489 0	1,486 5	1,480 2	1,480 2	1,484 0	1,481 6	1,475 4	1,475 3
78,00	1,491 7	1,489 2	1,482 7	1,482 7	1,486 7	1,484 3	1,477 8	1,477 8
79,00	1,494 4	1,491 8	1,485 2	1,485 2	1,489 5	1,486 9	1,480 3	1,480 2
80,00	1,497 1	1,494 4	1,487 6	1,487 7	1,492 2	1,489 6	1,482 8	1,482 7
81,00	1,499 8	1,497 1	1,490 1	1,490 2	1,494 9	1,492 2	1,485 3	1,485 2
82,00	1,502 6	1,499 8	1,492 7	1,492 7	1,497 6	1,494 9	1,487 8	1,487 8
83,00	1,505 4	1,502 5	1,495 3	1,495 3	1,500 4	1,497 5	1,490 3	1,490 4
84,00	1,508 2	1,505 3	1,497 8	1,497 9	1,503 1	1,500 2	1,492 9	1,492 9
85,00	1,511 0	1,508 0	1,500 4	1,500 5	1,505 9	1,503 0	1,495 5	1,495 5
86,00	1,513 8	1,510 8	1,503 0	1,503 1	1,508 7	1,505 8	1,498 1	1,498 1
87,00	1,516 6	1,513 5	1,505 6	1,505 7	1,511 5	1,508 5	1,500 8	1,500 7
88,00	1,519 5	1,516 3	1,508 3	1,508 3	1,514 3	1,511 3	1,503 4	1,503 3
89,00	1,522 4	1,519 1	1,510 9	1,511 0	1,517 2	1,514 0	1,506 0	1,505 9
90,00	1,525 2	1,521 9	1,513 6	1,513 6	1,520 2	1,516 7	1,508 7	1,508 6

TABLE 1a) — Correspondence between dry matter and refractive index of glucose syrups and solid glucose (starch sugar) solutions (expanded)

Dry matter in air % m/m	Measurements carried out at							
	20 °C (68 °F)				45 °C (113 °F)			
	Dextrose equivalent and ash, %				Dextrose equivalent and ash, %			
	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22
70,0	1,470 7	1,468 7	1,463 3	1,463 3	1,465 8	1,463 9	1,458 7	1,458 7
70,1	1,471 0	1,468 9	1,463 5	1,463 5	1,466 0	1,464 1	1,458 9	1,458 9
70,2	1,471 2	1,469 2	1,463 8	1,463 8	1,466 3	1,464 4	1,459 2	1,459 2
70,3	1,471 5	1,469 4	1,464 0	1,464 0	1,466 5	1,464 6	1,459 4	1,459 4
70,4	1,471 7	1,469 7	1,464 3	1,464 3	1,466 8	1,464 9	1,459 6	1,459 6
70,5	1,472 0	1,469 9	1,464 5	1,464 5	1,467 0	1,465 1	1,459 8	1,459 8
70,6	1,472 3	1,470 2	1,464 7	1,464 7	1,467 3	1,465 3	1,460 1	1,460 1
70,7	1,472 5	1,470 4	1,465 0	1,465 0	1,467 5	1,465 6	1,460 3	1,460 3
70,8	1,472 8	1,470 7	1,465 2	1,465 2	1,467 8	1,465 8	1,460 5	1,460 5
70,9	1,473 0	1,470 9	1,465 5	1,465 5	1,468 0	1,466 1	1,460 8	1,460 8
71,0	1,473 3	1,471 2	1,465 7	1,465 7	1,468 3	1,466 3	1,461 0	1,461 0
71,1	1,473 6	1,471 4	1,465 9	1,465 9	1,468 6	1,466 5	1,461 2	1,461 2
71,2	1,473 8	1,471 7	1,466 2	1,466 2	1,468 8	1,466 8	1,461 5	1,461 5
71,3	1,474 1	1,471 9	1,466 4	1,466 4	1,469 1	1,467 0	1,461 7	1,461 7
71,4	1,474 3	1,472 2	1,466 7	1,466 7	1,469 3	1,467 3	1,462 0	1,461 9
71,5	1,474 6	1,472 4	1,466 9	1,466 9	1,469 6	1,467 5	1,462 2	1,462 1
71,6	1,474 9	1,472 7	1,467 1	1,467 1	1,469 9	1,467 8	1,462 4	1,462 4
71,7	1,475 1	1,472 9	1,467 4	1,467 4	1,470 1	1,468 0	1,462 7	1,462 6
71,8	1,475 4	1,473 2	1,467 6	1,467 6	1,470 4	1,468 3	1,462 9	1,462 8
71,9	1,475 6	1,473 4	1,467 9	1,467 9	1,470 6	1,468 5	1,463 2	1,463 1
72,0	1,475 9	1,473 7	1,468 1	1,468 1	1,470 9	1,468 8	1,463 4	1,463 3
72,1	1,476 2	1,473 9	1,468 3	1,468 3	1,471 2	1,469 1	1,463 6	1,463 5
72,2	1,476 4	1,474 2	1,468 6	1,468 6	1,471 4	1,469 3	1,463 9	1,463 8
72,3	1,476 7	1,474 4	1,468 8	1,468 8	1,471 7	1,469 6	1,464 1	1,464 0
72,4	1,476 9	1,474 7	1,469 1	1,469 1	1,471 9	1,469 8	1,464 3	1,464 3
72,5	1,477 2	1,474 9	1,469 3	1,469 3	1,472 2	1,470 1	1,464 5	1,464 5
72,6	1,477 5	1,475 2	1,469 5	1,469 5	1,472 5	1,470 4	1,464 8	1,464 7
72,7	1,477 7	1,475 4	1,469 8	1,469 8	1,472 7	1,470 6	1,465 0	1,465 0
72,8	1,478 0	1,475 7	1,470 0	1,470 0	1,473 0	1,470 9	1,465 2	1,465 2
72,9	1,478 2	1,475 9	1,470 3	1,470 3	1,473 2	1,471 1	1,465 5	1,465 5
73,0	1,478 5	1,476 2	1,470 5	1,470 5	1,473 5	1,471 4	1,465 7	1,465 7
73,1	1,478 8	1,476 5	1,470 7	1,470 7	1,473 8	1,471 7	1,465 9	1,465 9
73,2	1,479 0	1,476 7	1,471 0	1,471 0	1,474 0	1,471 9	1,466 2	1,466 2
73,3	1,479 3	1,477 0	1,471 2	1,471 2	1,474 3	1,472 2	1,466 4	1,466 4
73,4	1,479 5	1,477 2	1,471 5	1,471 5	1,474 5	1,472 4	1,466 7	1,466 6
73,5	1,479 8	1,477 5	1,471 7	1,471 7	1,474 8	1,472 7	1,466 9	1,466 8
73,6	1,480 1	1,477 8	1,471 9	1,471 9	1,475 1	1,473 0	1,467 1	1,467 1
73,7	1,480 3	1,478 0	1,472 2	1,472 2	1,475 3	1,473 2	1,467 4	1,467 3
73,8	1,480 6	1,478 3	1,472 4	1,472 4	1,475 6	1,473 5	1,467 6	1,467 5
73,9	1,480 8	1,478 5	1,472 7	1,472 7	1,475 8	1,473 7	1,467 9	1,467 8
74,0	1,481 1	1,478 8	1,472 9	1,472 9	1,476 1	1,474 0	1,468 1	1,468 0
74,1	1,481 4	1,479 1	1,473 1	1,473 1	1,476 4	1,474 3	1,468 3	1,468 2
74,2	1,481 6	1,479 3	1,473 4	1,473 4	1,476 6	1,464 5	1,468 6	1,468 5
74,3	1,481 9	1,479 6	1,473 6	1,473 6	1,476 9	1,474 8	1,468 8	1,468 7
74,4	1,482 1	1,479 8	1,473 9	1,473 9	1,477 1	1,475 0	1,469 1	1,469 0
74,5	1,482 4	1,480 1	1,474 1	1,474 1	1,477 4	1,475 3	1,469 3	1,469 2
74,6	1,482 7	1,480 4	1,474 4	1,474 3	1,477 7	1,475 6	1,469 6	1,469 4
74,7	1,482 9	1,480 6	1,474 6	1,474 6	1,477 9	1,475 8	1,469 8	1,469 7
74,8	1,483 2	1,480 9	1,474 9	1,474 8	1,478 2	1,476 1	1,470 1	1,469 9
74,9	1,483 4	1,481 1	1,475 1	1,475 1	1,478 4	1,476 3	1,470 3	1,470 2
75,0	1,483 7	1,481 4	1,475 4	1,475 3	1,478 7	1,476 5	1,470 6	1,470 4
75,1	1,484 0	1,481 6	1,475 6	1,475 6	1,479 0	1,476 8	1,470 8	1,470 6
75,2	1,484 2	1,481 9	1,475 9	1,475 8	1,479 2	1,477 0	1,471 1	1,470 9
75,3	1,484 5	1,482 1	1,476 1	1,476 0	1,479 5	1,477 3	1,471 3	1,471 1
75,4	1,484 7	1,482 4	1,476 4	1,476 3	1,479 7	1,477 5	1,471 6	1,471 4

TABLE 1a) (continued)

Dry matter in air % m/m	Measurements carried out at							
	20 °C (68 °F)				45 °C (113 °F)			
	Dextrose equivalent and ash, %				Dextrose equivalent and ash, %			
	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22
75,5	1,485 0	1,482 6	1,486 6	1,476 5	1,480 0	1,477 8	1,471 8	1,471 6
75,6	1,485 3	1,482 9	1,476 8	1,476 8	1,480 3	1,478 1	1,472 0	1,471 8
75,7	1,485 5	1,483 1	1,477 1	1,477 0	1,480 5	1,478 3	1,472 3	1,472 1
75,8	1,485 8	1,483 4	1,477 3	1,477 3	1,480 8	1,478 6	1,472 5	1,472 3
75,9	1,486 0	1,483 6	1,477 6	1,477 5	1,481 0	1,478 8	1,472 8	1,472 6
76,0	1,486 3	1,483 9	1,477 8	1,477 8	1,481 3	1,479 1	1,473 0	1,472 8
76,1	1,486 6	1,484 2	1,478 0	1,478 0	1,481 6	1,479 3	1,473 2	1,473 0
76,2	1,486 8	1,484 4	1,478 3	1,478 3	1,481 8	1,479 6	1,473 5	1,473 3
76,3	1,487 1	1,484 7	1,478 5	1,478 5	1,482 1	1,479 8	1,473 7	1,473 5
76,4	1,487 4	1,484 9	1,478 8	1,478 8	1,482 4	1,480 1	1,474 0	1,473 8
76,5	1,487 6	1,485 2	1,479 0	1,479 0	1,482 6	1,480 3	1,474 2	1,474 0
76,6	1,487 9	1,485 5	1,479 2	1,479 2	1,482 9	1,480 6	1,474 4	1,474 3
76,7	1,488 2	1,485 7	1,479 5	1,479 5	1,483 2	1,480 8	1,474 7	1,474 5
76,8	1,488 5	1,486 0	1,479 7	1,479 7	1,483 5	1,481 1	1,474 9	1,474 8
76,9	1,488 7	1,486 2	1,480 0	1,480 0	1,483 7	1,481 3	1,475 2	1,475 0
77,0	1,489 0	1,486 5	1,480 2	1,480 2	1,484 0	1,481 6	1,475 4	1,475 3
77,1	1,489 3	1,486 8	1,480 4	1,480 4	1,484 3	1,481 9	1,475 6	1,475 5
77,2	1,489 5	1,487 0	1,480 7	1,480 7	1,484 5	1,482 1	1,475 9	1,475 8
77,3	1,489 8	1,487 3	1,480 9	1,480 9	1,484 8	1,482 4	1,476 1	1,476 0
77,4	1,490 1	1,487 6	1,481 2	1,481 2	1,485 1	1,482 7	1,476 4	1,476 3
77,5	1,490 3	1,487 8	1,481 4	1,481 4	1,485 3	1,482 9	1,476 6	1,476 5
77,6	1,490 6	1,488 1	1,481 7	1,481 7	1,485 6	1,483 2	1,476 8	1,476 8
77,7	1,490 9	1,488 4	1,481 9	1,481 9	1,485 9	1,483 5	1,477 1	1,487 0
77,8	1,491 2	1,488 7	1,482 2	1,482 2	1,486 2	1,483 8	1,477 3	1,477 3
77,9	1,491 4	1,488 9	1,482 4	1,482 4	1,486 4	1,484 0	1,477 6	1,477 5
78,0	1,491 7	1,489 2	1,482 7	1,482 7	1,486 7	1,484 3	1,477 8	1,477 8
78,1	1,492 0	1,489 5	1,482 9	1,482 9	1,487 0	1,484 6	1,478 0	1,478 0
78,2	1,492 2	1,489 7	1,483 2	1,483 2	1,487 3	1,484 8	1,478 3	1,488 3
78,3	1,492 5	1,490 0	1,483 4	1,483 4	1,487 5	1,485 1	1,478 5	1,478 5
78,4	1,492 8	1,490 2	1,483 7	1,483 7	1,487 8	1,485 3	1,478 8	1,478 8
78,5	1,493 0	1,490 5	1,483 9	1,483 9	1,488 1	1,485 6	1,479 0	1,479 0
78,6	1,493 3	1,490 8	1,484 2	1,484 2	1,488 4	1,485 9	1,479 3	1,479 2
78,7	1,493 6	1,491 0	1,484 4	1,484 4	1,488 7	1,486 1	1,479 5	1,479 5
78,8	1,493 9	1,491 3	1,484 7	1,484 7	1,488 9	1,486 4	1,479 8	1,479 7
78,9	1,494 1	1,491 5	1,484 9	1,484 9	1,489 2	1,486 6	1,480 0	1,480 0
79,0	1,494 4	1,491 8	1,485 2	1,485 2	1,489 5	1,486 9	1,480 3	1,480 2
79,1	1,494 7	1,492 1	1,485 4	1,485 4	1,489 8	1,487 2	1,480 5	1,480 4
79,2	1,494 9	1,492 3	1,485 7	1,485 7	1,490 0	1,487 4	1,480 8	1,480 7
79,3	1,495 2	1,492 6	1,485 9	1,485 9	1,490 3	1,487 7	1,481 0	1,480 9
79,4	1,495 5	1,492 8	1,486 2	1,486 2	1,490 6	1,488 0	1,481 3	1,481 2
79,5	1,495 7	1,493 1	1,486 4	1,486 4	1,490 8	1,488 2	1,481 5	1,481 4
79,6	1,496 0	1,493 4	1,486 6	1,486 7	1,491 1	1,488 5	1,481 8	1,481 7
79,7	1,496 3	1,493 6	1,486 9	1,486 9	1,491 4	1,488 8	1,482 0	1,481 9
79,8	1,496 6	1,493 9	1,487 1	1,487 2	1,491 7	1,489 1	1,482 3	1,482 2
79,9	1,496 8	1,494 1	1,487 4	1,487 4	1,491 9	1,489 3	1,482 5	1,482 4
80,0	1,497 1	1,494 4	1,487 6	1,487 7	1,492 2	1,489 6	1,482 8	1,482 7
80,1	1,497 4	1,494 7	1,487 8	1,487 9	1,492 5	1,489 9	1,483 0	1,482 9
80,2	1,497 6	1,494 9	1,488 1	1,488 2	1,492 7	1,490 1	1,483 3	1,483 2
80,3	1,497 9	1,495 2	1,488 3	1,488 4	1,493 0	1,490 4	1,483 5	1,483 4
80,4	1,498 2	1,495 5	1,488 6	1,488 7	1,493 3	1,490 6	1,483 8	1,483 7
80,5	1,498 4	1,495 7	1,488 8	1,488 9	1,493 5	1,490 9	1,484 0	1,483 9
80,6	1,498 7	1,496 0	1,489 1	1,489 2	1,493 8	1,491 2	1,484 3	1,484 2
80,7	1,499 0	1,496 3	1,489 3	1,489 4	1,494 1	1,491 4	1,484 5	1,484 4
80,8	1,499 3	1,496 6	1,489 6	1,489 7	1,494 4	1,491 7	1,484 8	1,484 7
80,9	1,499 5	1,496 8	1,489 8	1,489 9	1,494 6	1,491 9	1,485 0	1,484 9

TABLE 1a) (continued)

Dry matter in air % m/m	Measurements carried out at							
	20 °C (68 °F)				45 °C (113 °F)			
	Dextrose equivalent and ash, %				Dextrose equivalent and ash, %			
	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22
81,0	1,499 8	1,497 1	1,490 1	1,490 2	1,494 9	1,492 2	1,485 3	1,485 2
81,1	1,500 1	1,497 4	1,490 4	1,490 4	1,495 2	1,492 5	1,485 5	1,485 5
81,2	1,500 4	1,497 6	1,490 6	1,490 7	1,495 4	1,492 7	1,485 8	1,485 7
81,3	1,500 6	1,497 9	1,490 9	1,490 9	1,495 7	1,493 0	1,486 0	1,486 0
81,4	1,500 9	1,498 2	1,491 1	1,491 2	1,496 0	1,493 3	1,486 3	1,486 2
81,5	1,501 2	1,498 4	1,491 4	1,491 4	1,496 2	1,493 5	1,496 5	1,486 5
81,6	1,501 5	1,498 7	1,491 7	1,491 7	1,496 5	1,493 8	1,486 8	1,486 8
81,7	1,501 8	1,499 0	1,491 9	1,491 9	1,496 8	1,494 1	1,487 0	1,487 0
81,8	1,502 0	1,499 3	1,492 2	1,492 2	1,497 1	1,494 4	1,487 3	1,487 3
81,9	1,502 3	1,499 5	1,492 4	1,492 4	1,497 3	1,494 6	1,487 5	1,487 5
82,0	1,502 6	1,499 8	1,492 7	1,492 7	1,497 6	1,494 9	1,487 8	1,487 8
82,1	1,502 9	1,500 1	1,493 0	1,493 0	1,497 9	1,495 2	1,488 0	1,488 1
82,2	1,503 2	1,500 3	1,493 2	1,483 2	1,498 2	1,495 4	1,488 3	1,488 3
82,3	1,503 4	1,500 6	1,493 5	1,483 5	1,498 4	1,495 7	1,488 5	1,488 6
82,4	1,503 7	1,500 9	1,493 7	1,493 7	1,498 7	1,495 9	1,488 8	1,488 8
82,5	1,504 0	1,501 1	1,494 0	1,494 0	1,499 0	1,496 2	1,489 0	1,489 1
82,6	1,504 3	1,501 4	1,494 3	1,494 3	1,499 3	1,496 5	1,489 3	1,489 4
82,7	1,504 6	1,501 7	1,494 5	1,494 5	1,499 6	1,496 7	1,489 5	1,489 6
82,8	1,504 8	1,502 0	1,494 8	1,494 8	1,499 8	1,497 0	1,489 8	1,489 9
82,9	1,505 1	1,502 2	1,495 0	1,495 0	1,500 1	1,497 2	1,490 0	1,490 1
83,0	1,505 4	1,502 5	1,495 3	1,495 3	1,500 4	1,497 5	1,490 3	1,490 4
83,1	1,505 7	1,502 8	1,495 5	1,495 5	1,500 7	1,497 8	1,490 6	1,490 6
83,2	1,506 0	1,503 1	1,495 8	1,495 8	1,500 9	1,498 0	1,490 8	1,490 9
83,3	1,506 2	1,503 3	1,496 0	1,496 1	1,501 2	1,498 3	1,491 1	1,491 1
83,4	1,506 5	1,503 6	1,496 3	1,496 3	1,501 5	1,498 6	1,491 3	1,491 4
83,5	1,506 8	1,503 9	1,496 5	1,496 6	1,501 7	1,498 8	1,491 6	1,491 6
83,6	1,507 1	1,504 2	1,496 8	1,496 9	1,502 0	1,499 1	1,491 9	1,491 9
83,7	1,507 4	1,504 5	1,497 0	1,497 1	1,502 3	1,499 4	1,492 1	1,492 1
83,8	1,507 6	1,504 7	1,497 3	1,497 4	1,502 6	1,499 7	1,492 4	1,492 4
83,9	1,507 9	1,505 0	1,497 5	1,497 6	1,502 8	1,499 9	1,492 6	1,492 6
84,0	1,508 2	1,505 3	1,497 8	1,497 9	1,503 1	1,500 2	1,492 9	1,492 9
84,1	1,508 5	1,505 5	1,498 1	1,498 2	1,503 4	1,500 5	1,493 2	1,493 2
84,2	1,508 8	1,505 8	1,498 3	1,498 4	1,503 7	1,500 8	1,493 4	1,493 4
84,3	1,509 0	1,506 1	1,498 6	1,498 7	1,503 9	1,501 0	1,493 7	1,493 7
84,4	1,509 3	1,506 4	1,498 8	1,498 9	1,504 2	1,501 3	1,493 9	1,493 9
84,5	1,509 6	1,506 6	1,499 1	1,499 2	1,504 5	1,501 6	1,494 2	1,494 2
84,6	1,509 9	1,506 9	1,499 4	1,499 5	1,504 8	1,501 9	1,494 5	1,494 5
84,7	1,510 2	1,507 2	1,499 6	1,499 7	1,505 1	1,502 2	1,494 7	1,494 7
84,8	1,510 4	1,507 5	1,500 0	1,499 9	1,505 3	1,502 4	1,495 0	1,495 0
84,9	1,510 7	1,507 7	1,500 1	1,500 2	1,505 6	1,502 7	1,495 2	1,495 2
85,0	1,511 0	1,508 0	1,500 4	1,500 5	1,505 9	1,503 0	1,495 5	1,495 5
85,1	1,511 3	1,508 3	1,500 7	1,500 8	1,506 2	1,503 3	1,495 8	1,495 8
85,2	1,511 6	1,508 6	1,500 9	1,501 0	1,506 5	1,503 6	1,496 0	1,496 0
85,3	1,511 8	1,508 8	1,501 2	1,501 3	1,506 7	1,503 8	1,496 3	1,496 3
85,4	1,512 1	1,509 1	1,501 4	1,501 5	1,507 0	1,504 1	1,496 5	1,496 5
85,5	1,512 4	1,509 4	1,501 7	1,501 8	1,507 3	1,504 4	1,496 8	1,496 8
85,6	1,512 7	1,509 7	1,502 0	1,502 1	1,507 6	1,504 7	1,497 1	1,497 1
85,7	1,513 0	1,510 0	1,502 2	1,502 3	1,507 9	1,505 0	1,497 3	1,497 3
85,8	1,513 2	1,510 2	1,502 5	1,502 6	1,508 1	1,505 2	1,497 6	1,497 6
85,9	1,513 5	1,510 5	1,502 7	1,502 8	1,508 4	1,505 5	1,497 8	1,497 8
86,0	1,513 8	1,510 8	1,503 0	1,503 1	1,508 7	1,505 8	1,498 1	1,498 1
86,1	1,514 1	1,511 1	1,503 3	1,503 4	1,509 0	1,506 1	1,498 4	1,498 4
86,2	1,514 4	1,511 3	1,503 5	1,503 6	1,509 3	1,506 3	1,498 6	1,498 6
86,3	1,514 6	1,511 6	1,503 8	1,503 9	1,509 5	1,506 6	1,498 9	1,498 9
86,4	1,514 9	1,511 9	1,504 0	1,504 1	1,509 8	1,506 9	1,499 2	1,499 1

TABLE 1a) (concluded)

Dry matter in air % <i>m/m</i>	Measurements carried out at							
	20 °C (68 °F)				45 °C (113 °F)			
	Dextrose equivalent and ash, %				Dextrose equivalent and ash, %			
	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22	42,00 0,28	55,00 0,30	89,00 0,61	90,7 1,22
86,5	1,515 2	1,512 1	1,504 3	1,504 4	1,510 1	1,507 1	1,499 4	1,499 4
86,6	1,515 5	1,512 4	1,504 6	1,504 7	1,510 4	1,507 4	1,499 7	1,499 7
86,7	1,515 8	1,512 7	1,504 8	1,504 9	1,510 7	1,507 7	1,500 0	1,499 9
86,8	1,516 0	1,513 0	1,505 1	1,505 2	1,510 9	1,508 0	1,500 3	1,500 2
86,9	1,516 3	1,513 2	1,505 3	1,505 4	1,511 2	1,508 2	1,500 5	1,500 4
87,0	1,516 6	1,513 5	1,505 6	1,505 7	1,511 5	1,508 5	1,500 8	1,500 7
87,1	1,516 9	1,513 8	1,505 9	1,506 0	1,511 8	1,508 8	1,501 1	1,501 0
87,2	1,517 2	1,514 1	1,506 1	1,506 2	1,512 1	1,509 1	1,501 3	1,501 2
87,3	1,517 5	1,514 3	1,506 4	1,506 5	1,512 3	1,509 3	1,501 6	1,501 5
87,4	1,517 8	1,514 6	1,506 7	1,506 7	1,512 6	1,509 6	1,501 8	1,501 7
87,5	1,518 0	1,514 9	1,506 9	1,507 0	1,512 9	1,509 9	1,502 1	1,502 0
87,6	1,518 3	1,515 2	1,507 2	1,507 3	1,513 2	1,510 2	1,502 4	1,502 3
87,7	1,518 6	1,515 5	1,507 5	1,507 5	1,513 5	1,510 5	1,502 6	1,502 5
87,8	1,518 9	1,515 7	1,507 8	1,507 8	1,513 7	1,510 7	1,502 9	1,502 8
87,9	1,519 2	1,516 0	1,508 0	1,508 0	1,514 0	1,511 0	1,503 1	1,503 0
88,0	1,519 5	1,516 3	1,508 3	1,508 3	1,514 3	1,511 3	1,503 4	1,503 3
88,1	1,519 8	1,516 6	1,508 6	1,508 6	1,514 6	1,511 6	1,503 7	1,503 6
88,2	1,520 1	1,516 9	1,508 8	1,518 8	1,514 9	1,511 8	1,503 9	1,503 8
88,3	1,520 4	1,517 1	1,509 1	1,519 1	1,515 2	1,512 1	1,504 2	1,504 1
88,4	1,520 7	1,517 4	1,509 3	1,519 4	1,515 5	1,512 4	1,504 4	1,504 3
88,5	1,520 9	1,517 7	1,509 6	1,519 6	1,515 7	1,512 6	1,504 7	1,504 6
88,6	1,521 2	1,518 0	1,509 9	1,519 9	1,516 0	1,512 9	1,505 0	1,504 9
88,7	1,521 5	1,518 3	1,510 1	1,510 2	1,516 3	1,513 2	1,505 2	1,505 1
88,8	1,521 8	1,518 5	1,510 4	1,510 5	1,516 6	1,513 5	1,505 5	1,505 4
88,9	1,522 1	1,518 8	1,510 6	1,510 7	1,516 9	1,513 7	1,505 7	1,505 6
89,0	1,522 4	1,519 1	1,510 9	1,511 0	1,517 2	1,514 0	1,506 0	1,505 9
89,1	1,522 7	1,519 4	1,511 2	1,511 3	1,517 5	1,514 3	1,506 3	1,506 2
89,2	1,523 0	1,519 7	1,511 4	1,511 5	1,517 8	1,514 5	1,506 5	1,506 4
89,3	1,523 2	1,519 9	1,511 7	1,511 8	1,518 1	1,514 8	1,506 8	1,506 7
89,4	1,523 5	1,520 2	1,512 0	1,512 0	1,518 4	1,515 2	1,507 1	1,507 0
89,5	1,523 8	1,520 5	1,512 2	1,512 3	1,518 7	1,515 3	1,507 3	1,507 2
89,6	1,524 1	1,520 8	1,512 5	1,512 6	1,519 0	1,515 6	1,507 6	1,507 5
89,7	1,524 4	1,521 1	1,512 8	1,512 8	1,519 3	1,515 9	1,507 9	1,507 8
89,8	1,524 6	1,521 3	1,513 1	1,513 1	1,519 6	1,516 2	1,508 2	1,508 1
89,9	1,524 9	1,521 6	1,513 3	1,513 3	1,519 9	1,516 4	1,508 4	1,508 3
90,0	1,525 2	1,521 9	1,513 6	1,513 6	1,520 2	1,516 7	1,508 7	1,508 6

TABLE 2 — Glucose syrup¹⁾ — Correspondence between US Commercial baumé degree and refractive index at 20 °C (68 °F)

Baumé degree	Dextrose equivalent and ash, %							
	30,00 0,28	35,00 0,28	42,00 0,28	45,00 0,28	50,00 0,30	55,00 0,30	60,00 0,30	65,00 0,30
40,0	1,482 5	1,482 4	1,482 1	1,482 0	1,481 9	1,481 8	1,481 7	1,481 5
40,1	1,483 0	1,482 9	1,482 6	1,482 5	1,482 4	1,482 3	1,482 2	1,482 0
40,2	1,483 5	1,483 4	1,483 1	1,483 0	1,482 9	1,482 8	1,482 7	1,482 5
40,3	1,484 0	1,483 9	1,483 6	1,483 5	1,483 4	1,483 3	1,483 2	1,483 0
40,4	1,484 5	1,484 4	1,484 1	1,484 0	1,483 9	1,483 8	1,483 7	1,483 5
40,5	1,485 0	1,484 9	1,484 6	1,484 5	1,484 4	1,484 3	1,484 2	1,484 0
40,6	1,485 5	1,485 5	1,485 2	1,485 1	1,485 0	1,484 9	1,484 8	1,484 6
40,7	1,486 1	1,486 0	1,485 7	1,485 6	1,485 5	1,485 4	1,485 3	1,485 1
40,8	1,486 6	1,486 5	1,486 2	1,486 1	1,486 0	1,485 9	1,485 8	1,485 6
40,9	1,487 1	1,487 0	1,486 7	1,486 6	1,486 5	1,486 4	1,486 3	1,486 1
41,0	1,487 6	1,487 5	1,487 2	1,487 1	1,487 0	1,486 9	1,486 8	1,486 6
41,1	1,488 1	1,488 0	1,487 7	1,487 6	1,487 5	1,487 4	1,487 3	1,487 1
41,2	1,488 6	1,488 5	1,488 3	1,488 2	1,488 1	1,487 9	1,487 8	1,487 6
41,3	1,489 2	1,489 1	1,488 8	1,488 7	1,488 6	1,488 5	1,488 4	1,488 2
41,4	1,489 7	1,489 6	1,489 3	1,489 2	1,489 1	1,489 0	1,488 9	1,488 7
41,5	1,490 2	1,490 1	1,489 8	1,489 7	1,489 6	1,489 5	1,489 4	1,489 2
41,6	1,490 7	1,490 6	1,490 4	1,490 3	1,490 2	1,490 0	1,489 9	1,489 7
41,7	1,491 2	1,491 1	1,490 9	1,490 8	1,490 7	1,490 5	1,490 4	1,490 2
41,8	1,491 8	1,491 7	1,491 4	1,491 3	1,491 2	1,491 1	1,491 0	1,490 3
41,9	1,492 3	1,492 2	1,492 0	1,491 9	1,491 8	1,491 6	1,491 5	1,491 3
42,0	1,492 8	1,492 7	1,492 5	1,492 4	1,492 3	1,492 1	1,492 0	1,491 8
42,1	1,493 3	1,493 2	1,493 0	1,492 9	1,492 8	1,492 6	1,492 5	1,492 3
42,2	1,493 9	1,493 8	1,493 6	1,493 5	1,493 4	1,493 2	1,493 1	1,492 9
42,3	1,494 4	1,494 3	1,494 1	1,494 0	1,493 9	1,493 7	1,493 6	1,493 4
42,4	1,494 9	1,494 8	1,494 6	1,494 5	1,494 4	1,494 3	1,494 1	1,493 9
42,5	1,495 4	1,495 3	1,495 1	1,495 0	1,494 9	1,494 8	1,494 6	1,494 4
42,6	1,496 0	1,495 9	1,495 7	1,495 6	1,495 5	1,495 3	1,495 2	1,495 0
42,7	1,496 5	1,496 4	1,496 2	1,496 1	1,496 0	1,495 9	1,495 7	1,495 5
42,8	1,497 0	1,496 9	1,496 7	1,496 6	1,496 5	1,496 4	1,496 2	1,496 0
42,9	1,497 6	1,497 5	1,497 3	1,497 2	1,497 1	1,497 0	1,496 8	1,496 6
43,0	1,498 1	1,498 0	1,497 8	1,497 7	1,497 6	1,497 5	1,497 3	1,497 1
43,1	1,498 7	1,498 5	1,498 3	1,498 2	1,498 1	1,498 0	1,497 9	1,497 7
43,2	1,499 2	1,499 1	1,498 9	1,498 8	1,498 7	1,498 6	1,498 4	1,498 2
43,3	1,499 8	1,499 6	1,499 4	1,499 3	1,499 2	1,499 1	1,499 0	1,498 8
43,4	1,500 3	1,500 2	1,500 0	1,499 9	1,499 8	1,499 7	1,499 5	1,499 3
43,5	1,500 9	1,500 7	1,500 5	1,500 4	1,500 3	1,500 2	1,500 1	1,499 9
43,6	1,501 5	1,501 3	1,501 1	1,501 0	1,500 9	1,500 8	1,500 7	1,500 5
43,7	1,502 0	1,501 8	1,501 6	1,501 5	1,501 4	1,501 3	1,501 2	1,501 0
43,8	1,502 6	1,502 4	1,502 2	1,502 1	1,502 0	1,501 9	1,501 0	1,501 6
43,9	1,503 1	1,502 9	1,502 7	1,502 6	1,502 5	1,502 4	1,502 3	1,502 1
44,0	1,503 7	1,503 5	1,503 3	1,503 2	1,503 1	1,503 0	1,502 9	1,502 7
44,1	1,504 3	1,504 1	1,503 9	1,503 8	1,503 7	1,503 6	1,503 4	1,503 2
44,2	1,504 8	1,504 6	1,504 4	1,504 3	1,504 2	1,504 1	1,504 0	1,503 8
44,3	1,505 4	1,505 2	1,505 0	1,504 9	1,504 8	1,504 7	1,504 5	1,504 3
44,4	1,505 9	1,505 8	1,505 5	1,505 4	1,505 3	1,505 2	1,505 1	1,504 9
44,5	1,506 5	1,506 3	1,506 1	1,506 0	1,505 9	1,505 8	1,505 6	1,505 4
44,6	1,507 1	1,506 9	1,506 7	1,506 6	1,506 5	1,506 4	1,506 2	1,506 0
44,7	1,507 6	1,507 5	1,507 2	1,507 1	1,507 0	1,506 9	1,506 7	1,506 5
44,8	1,508 2	1,508 1	1,507 8	1,507 7	1,507 6	1,507 5	1,507 3	1,507 1
44,9	1,508 7	1,508 6	1,508 3	1,508 2	1,508 1	1,508 0	1,507 8	1,507 6

1) J.E. Cleland, J.W. Evans, E.E. Fauser and W.R. Fetzer Anal. Ed. Ind. Eng. Chem. Vol. 16, Page 161, 15 March, 1944.