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United States Standards for Grades of Frozen Concentrate for Lemonade

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This is a reprint of the United States Standards for Grades of Frozen Concentrate for Lemonade (33 FR 11881) which have been in effect since September 21, 1968 and were updated to modify the format and to correct and align the text as originally published in the CFR.

Voluntary U.S. grade standards are issued under the authority of the Agricultural Marketing Act of 1946, which provides for the development of official U.S. grades to designate different levels of quality. These grade standards are available for use by producers, suppliers, buyers, and consumers. As in the case of other standards for grades of fresh and processed fruits, vegetables, and specialty crops these standards are designed to facilitate orderly marketing by providing a convenient basis for buying and selling, for establishing quality control programs, and for determining loan values.

The U.S. grade standards and inspection instructions for all fresh and processed fruits, vegetables, and specialty crops are available on the internet and upon request at the address below. These documents provide detailed interpretations of the grade standards and provide step-by-step procedures for grading the product.

Grade standards are issued by the U.S. Department of Agriculture (USDA) after careful consideration of all data and views submitted during rulemaking. The Department welcomes suggestions for improving the standards in future revisions. Comments may be submitted to, and copies of standards and inspection instructions obtained from:

Director, Specialty Crops Inspection Division
Specialty Crops Program,
USDA, Agricultural Marketing Service
1400 Independence Avenue, SW, STOP 0240
Washington, D.C. 20250

Authority: 7 U.S.C. 1621-1627.

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Product Description and Grades
§52.1421 Product description.

Frozen concentrate for lemonade is the product prepared from lemon juice and one or more nutritive sweetening ingredients. It may contain added lemon oil or concentrated lemon oil (or their extracts or emulsions) and may or may not contain water in sufficient quantities to standardize the product. The product contains not less than 48.0 percent by weight of soluble solids taken as the sucrose value determined by refractometer and corrected for acidity as given in **Refractometric Determination of Soluble Solids in Citrus Juices**, by Stevens and Baier, Industrial and Engineering Chemistry, Analytical Edition, Volume 11, page 447 (1939). The lemon juice is produced from fresh, sound, ripe, and thoroughly cleansed fruit of one or more of the high acid varieties of the species *Citrus limon* (limonia). Such juice may be fresh or frozen or fresh concentrated or frozen concentrated. The concentrate for lemonade is processed in accordance with good commercial practice and is frozen and maintained at temperatures sufficient for the preservation of the product. If properly labeled any color materials permissible under the provisions of the Federal Food, Drug, and Cosmetic Act may be added.

§52.1422 Grades of frozen concentrate for lemonade.

- (a) **U.S. Grade A or U.S. Fancy** is the quality of frozen concentrate for lemonade which mixes readily into a lemonade that possesses an amount of pulp, cloud, and juice sacs so as to substantially reflect the appearance of lemonade prepared from freshly expressed lemon juice; that possesses a good color; that is practically free from defects; that possesses a good flavor; and that scores not less than 85 points when scored in accordance with the scoring system outlined in this section.
- (b) **U.S. Grade B or U.S. Choice** is the quality of frozen concentrate for lemonade which mixes readily into a lemonade that possesses at least a slight, but not an excessive, amount of pulp, cloud, and juice sacs so as to reasonably reflect the appearance of lemonade prepared from freshly expressed lemon juice; that possesses a reasonably good color; that is reasonably free from defects; that possesses a reasonably good flavor; and that scores not less than 70 points when scored in accordance with the scoring system outlined in this section.
- (c) **Substandard** is the quality of frozen concentrate for lemonade that fails to meet the requirements of **U.S. Grade B or U.S. Choice**.

Fill of Container

§52.1423 Recommended fill of container.

The recommended fill of container is not incorporated in the grades of the finished product since fill of container, as such, is not a factor of quality for the purpose of these grades. It is recommended that each container be filled as full as practicable with frozen concentrate for lemonade.

Factors of Quality

§52.1424 Ascertaining the grade.

- (a) The grade of frozen concentrate for lemonade is ascertained by considering the requirements with respect to the ease with which the product mixes into a lemonade and to the amount of pulp, cloud and juice sacs present in the lemonade, which factors are not scored, and the factors of color, absence of defects, and flavor which are scored.
- (b) The relative importance of each factor which is scored is expressed numerically on the scale of 100. The maximum number of points that may be given such factors are:

Factors	Points
Color	20
Absence of Defects	20
Flavor	60
Total Score	100

- (c) The scores for the factors of color, absence of defects, and flavor are determined immediately after the product has been prepared as lemonade by thoroughly mixing the frozen concentrate for lemonade with a specific volume of water as directed by the manufacturer.

§52.1425 Ascertaining the rating for the factors which are scored.

The essential variations within each factor which is scored are so described that the value may be ascertained for each factor and expressed numerically. The numerical range within each factor which is scored is inclusive (for example, **17 to 20 points** means 17, 18, 19, or 20 points).

§52.1426 Color.

- (a) **“A” classification.** Frozen concentrate for lemonade which, when prepared as lemonade, possesses a good color may be given a score of 17 to 20 points. **Good color** means a good bright characteristic color that reflects the appearance of lemonade prepared from freshly expressed lemon juice; or, if colored, possesses a bright attractive light-red color typical of colored lemonade.
- (b) **“B” classification.** If the frozen concentrate for lemonade, when prepared as lemonade, possesses a reasonably good color a score of 14 to 16 points may be given. Frozen concentrate for lemonade that falls into this classification shall not be graded above **U.S. Grade B or U.S. Choice**, regardless of the total score for

the product (this is a limiting rule). **Reasonably good color** means a characteristic color that reflects to a reasonable extent the color of lemonade prepared from freshly expressed lemon juice and is not dark or otherwise discolored for any reason; or, if colored, possesses a reasonably bright color typical of colored lemonade.

- (c) **“SStd” classification.** If the lemonade fails to meet the requirements of paragraph (b) of this section, a score of 0 to 13 points may be given. Frozen concentrate for lemonade that falls into this classification shall not be graded above **Substandard**, regardless of the total score for the product (this is a limiting rule).

§52.1427 Absence of defects.

- (a) **General.** The factor of absence of defects refers to the degree of freedom from seeds or portions of seeds, from harmless extraneous material, from objectionable material and from other defects not specifically mentioned that affect the appearance or drinking quality of the product.
- (1) **Harmless extraneous material** includes, but is not limited to, embryonic seeds or particles of seeds that measure not more than 3/16 inch in any dimension, or other similar material which is harmless.
- (2) **Seeds or portions of seeds** means any seed or portion thereof, whether or not fully developed, that measures more than 3/16 inch in any dimension.
- (b) **“A” classification.** Frozen concentrate for lemonade which, when prepared as lemonade, is practically free from defects may be given a score of 17 to 20 points. **Practically free from defects** means that there may be present not more than an average of 1 seed or portion of seed for each quart of prepared lemonade; and that the appearance and drinking quality of the lemonade is not materially affected by the presence of seeds, portions of seeds, objectionable material, harmless extraneous material, any other defects not specifically mentioned, or any combination thereof.
- (c) **“B” classification.** If the lemonade is reasonably free from defects a score of 14 to 16 points may be given. Frozen concentrate for lemonade that falls into this classification shall not be graded above **U.S. Grade B or U.S. Choice** regardless of the total score for the product (this is a limiting rule). **Reasonably free from defects** means that there may be present not more than an average of 2 seeds or portions of seeds for each quart of lemonade; and that the appearance and drinking quality of the lemonade is not seriously affected by the presence of seeds, portions of seeds, objectionable material, harmless extraneous material, any other defects not specifically mentioned, or any combination thereof.

- (d) **“SStd” classification.** If the lemonade fails to meet the requirements of paragraph (c) of this section, a score of 0 to 13 points may be given. Frozen concentrate for lemonade that falls into this classification shall not be graded above **Substandard** regardless of the total score for the product (this is a limiting rule).

§52.1428 Flavor.

- (a) **“A” classification.** Frozen concentrate for lemonade which, when prepared as lemonade, possesses a good flavor, may be given a score of 51 to 60 points. **Good flavor** means a fine, distinct, and substantially typical flavor of lemonade prepared from freshly expressed lemon juice and which flavor is free from terpenic, oxidized, rancid, or other off-flavors. To score in this classification, the lemonade shall test not less than 10.5 degrees Brix; shall contain not less than 0.7 gram of acid per 100 ml. of the lemonade; may not contain more than 0.025 ml. of recoverable oil per 100 ml. of the lemonade; and the Brix-acid ratio shall not exceed 20:1.
- (b) **“B” classification.** If the prepared lemonade possesses a reasonably good flavor, a score of 42 to 50 points may be given. Frozen concentrate for lemonade that falls into this classification shall not be graded above **U.S. Grade B or U.S. Choice** regardless of the total score for the product (this is a limiting rule). **Reasonably good flavor** means a fairly typical flavor of lemonade prepared from freshly expressed lemon juice and which flavor is practically free from terpenic, oxidized, rancid, or other off-flavors and is free from abnormal flavors of any kind. To score in this classification the lemonade shall test not less than 10.5 degrees Brix; shall contain not less than 0.7 gram of acid per 100 ml. of the lemonade, may contain not more than 0.035 ml. of recoverable oil per 100 ml. of the lemonade; and the Brix-acid ratio shall not exceed 20:1.
- (c) **“SStd” classification.** If the prepared lemonade fails to meet the requirements of paragraph (b) of this section, a score of 0 to 41 points may be given. Frozen concentrate for lemonade that falls into this classification shall not be graded above **Substandard** regardless of the total score for the product (this is a limiting rule).

Explanations and Methods of Analysis

§52.1429 Definitions of terms.

- (a) **Brix** means the degrees Brix of the lemonade when tested with a Brix hydrometer calibrated at 20° C (68° F). If used in testing lemonade at a temperature other than 20° C (68° F) the applicable temperature correction shall be made to the reading of the scale as prescribed in **Official Methods of Analysis of the Association of Official Analytical Chemists**. The degrees Brix of lemonade may be determined by any other method which gives

equivalent results.

- (b) **Acid** means the grams of acid (calculated as anhydrous citric acid) per 100 ml. of the prepared lemonade determined by titration with standard sodium hydroxide solution using phenolphthalein as an indicator.
- (c) **Brix-acid ratio** means the ratio between the degrees **Brix** as determined in this section and the acid in grams per 100 ml. of lemonade.
- (d) **Dilution factor** is the value obtained by dividing a volume of lemonade by the volume of concentrate for lemonade used in its preparation when such lemonade is prepared in accordance with the manufacturer's directions.

§52.1430 Explanation of analyses.

- (a) Recoverable oil is determined by the following method:

METHOD

(1) Reagents.

Standard bromide-bromate solution – prepared and standardized to 0.099N in accordance with Chapter 42, Standard Solutions in the current edition of the AOAC¹. For 1 use, add 1 volume of standard solution to 3 volumes of water to make 0.0247N solution. 1 ml. of 0.0247N solution supplies bromine to react with 0.00085g., or 0.0010 ml., of *d*-limonene. The solutions are stable for 6 months.

2-Propanol – Reagent grade ACS (American Chemical Society).

Dilute hydrochloric acid – prepared by adding 1 volume of concentrated acid to 2 volumes of water.

Methyl orange indicator – 0.1 percent in water.

(2) Apparatus.

Electric heater – with recessed refractory top, 500-750 watts.

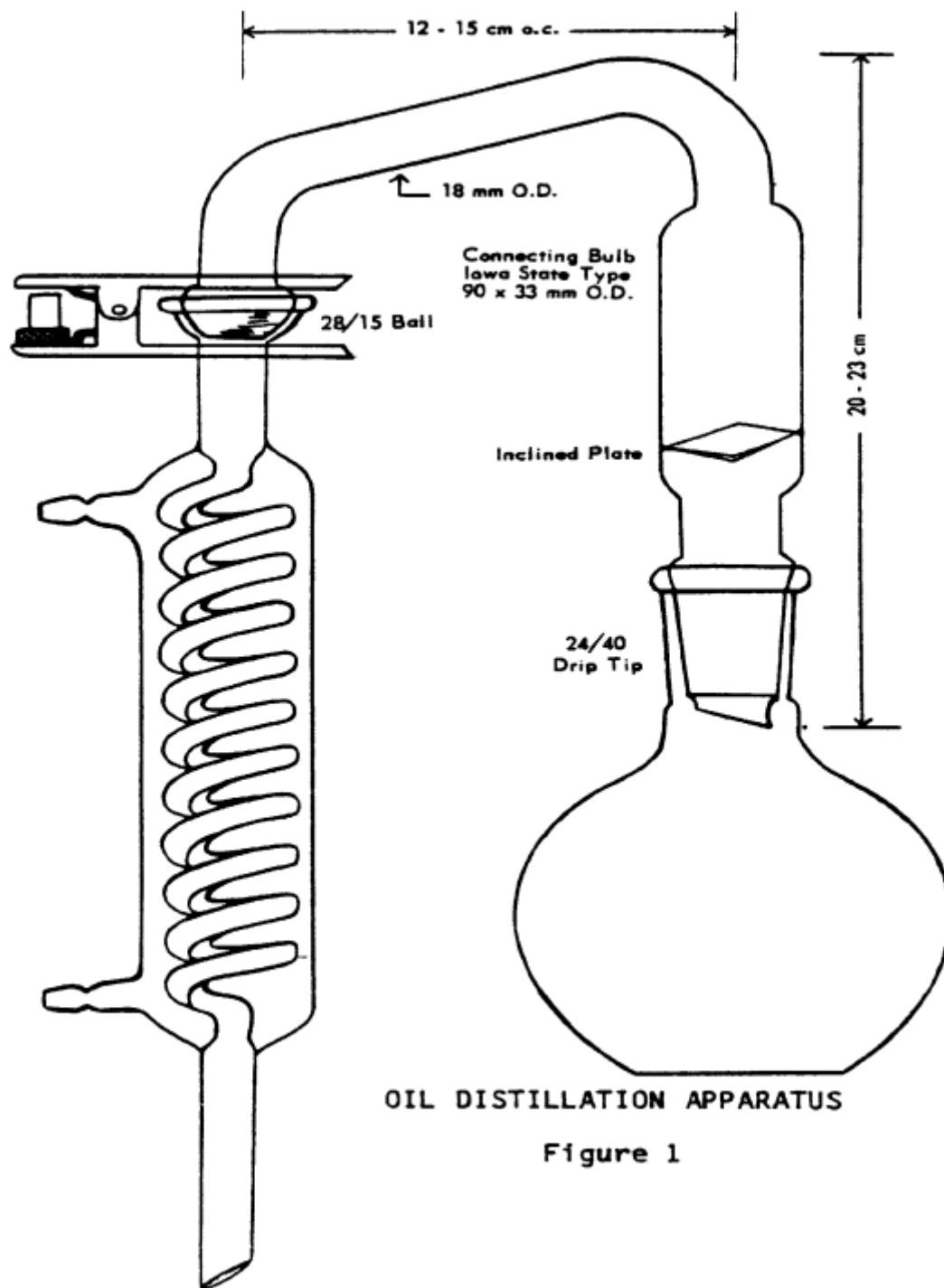
Still, all glass – 500 ml. distillation flask with 24/40 standard taper neck; 200 mm. Graham condenser with 28/15 receiving socket and drip tip; connecting bulb and adapter as shown in Figure 1.

¹ "AOAC" refers to the Official Methods of Analysis published by the Association of Official Analytical (formerly Agricultural) Chemists. Copies may be obtained from this Association at Box 540, Benjamin Franklin Station, Washington, D.C. 20044

Burette – 10 ml. or 25 ml. graduated to 0.1 ml., with easily controllable flow to permit both rapid and dropwise titration.

(3) Determination.

- (i) Pipette 25 ml. of well-mixed sample (juice or reconstituted juice) into the distillation flask containing carborundum chips or glass beads, and add 25 ml. of 2-Propanol.
- (ii) Distill into a 150 ml. beaker. Continue distilling until solvent ceases to reflux then remove the flask from the heater.
- (iii) Add 10 ml. of dilute hydrochloric acid and 1 drop of indicator. (An alternative method would be to prepare a solution containing 5 ml. of indicator and 1,000 ml. of dilute hydrochloric acid – then add 10 ml. of this acid-indicator mix to the 150 ml. beaker.)
- (iv) Titrate with the dilute bromate solution while stirring. The major portion of the titrant may be added rapidly, but the endpoint must be approached at about 1 drop per second. Disappearance of color indicates the endpoint.
- (v) Determine the reagent blank by titrating three separate mixtures of 25 ml. 2-Propanol and 10 ml. of dilute hydrochloric acid with indicator – without refilling the burette. Divide the total milliliters of titrant used by three to obtain the average blank. Subtract the average blank thus obtained from the milliliters of the titrant used to titrate the distillate.
- (vi) Multiply the remainder by 0.004 to obtain the percent recoverable oil by volume in the lemonade.



Lot Inspection and Certification

§52.1431 Ascertaining the grade of a lot.

The grade of a lot of the processed product covered by these standards is determined by the procedures set forth in the **Regulations Governing Inspection and Certification of Processed Fruits and Vegetables, Processed Products Thereof, and Certain Other Processed Food Products** (§§ 52.1 to 52.87).

Score Sheet

§52.1432 Score sheet for frozen concentrate for lemonade.

Size and kind of container			
Container mark or identification			
Label (including dilution factor			
Liquid measure (fluid ounces)			
Brix of the lemonade			
Anhydrous citric acid in the lemonade (grams per 100 milliliter)			
Brix-acid ratio			
Recoverable oil (milliliter/100 milliliter of the lemonade)			
Reconstituted properly (yes) (no)			
Scoring Factors		Score Points	
Color	20	"A"	17-20
		"B"	14-16 <u>1/</u>
		"SStd"	0-13 <u>1/</u>
Absence of defects	20	"A"	17-20
		"B"	14-16 <u>1/</u>
		"SStd"	0-13 <u>1/</u>
Flavor	<u>60</u>	"A"	51-60
		"B"	42-50 <u>1/</u>
		"SStd"	0-41 <u>1/</u>
Total Score	100		
Grade			

1/ Indicates limiting rule.