
Light Berries in Black and White Pepper

Purpose: To determine the amount of light berries in black or white pepper. Do not confuse this measurement with analysis for bulk density by ASTA Methods 25.0 or 25.1. (Note 4)

Principle: The weight percent of "light" or low density pepper berries is determined by collection and mass measurement of berries that float in an alcohol/water solution with relative density of 0.80-0.82.

A. Apparatus:

1. Balance -- sensitivity 0.01 g.
2. Beaker, 600 ml. Griffin, Low form, pyrex approximately 85 mm. in diameter and 120mm. in height is recommended. (Note 1).
3. Blotting paper or other similar absorbent material.

B. Reagents:

1. Alcohol-water solution with relative density of 0.80 - 0.82 at 20°C (Note 2). The alcohol may be ethanol, denatured ethanol or isopropanol.

C. Preparation of Sample:

1. Sample shall be cleaned of extraneous matter as in ASTA method 14.0.

D. Procedure:

1. Perform the following steps in duplicate with two separate 50.0 g samples. Place each sample into the 600 mL Griffin, low-form pyrex beaker and add 300 mL of the alcohol-water solution.
2. Stir the material in the beaker with a spoon and allow to settle two minutes; then spoon off the berries which float.
3. Repeat the stirring, settling and removal of the floating berries until two successive additional stirrings raise no more berries to the surface. Remove only the berries that actually float (Note 3).
4. Blot the removed berries to free them from excess liquid and spread them out to dry on a piece of paper towel or other absorbent material.
5. Air dry for one hour and weigh the air dried light berries to the nearest 0.01 g and calculate and report the percent of light berries to the nearest 0.1%. (See Calculations.)
6. If the range of two determinations is not over 0.8%, the two determinations shall be averaged and reported as percent light berries. If the difference is greater than 0.8%,

determine the light berries in a third sample. Average all three values and report as percent light berries.

E. Calculations:

$$\% \text{ Light Berries} = \frac{\text{weight of light berries (g)}}{\text{weight of samples (50 g)}} \times 100$$

F. Statistics:

TBD

G. Notes:

1. Other transparent beakers may be used, but they should be between 75 and 100 mm. in diameter and between 100 and 140 mm in height.
2. Specially denatured alcohols no. 3A, 23A, or 30 are recommended.
 - a. SDA no. 3A: 5 gallons of methyl alcohol plus 100 gallons 95% ethyl alcohol.
 - b. SDA no. 23A: 10 gallons USP acetone plus 100 gallons 95% ethyl alcohol.
 - c. SDA no. 30: 10 gallons methyl alcohol plus 100 gallons 95% ethyl alcohol.

For use of denatured alcohol or alcohols of unknown purity, the density of the solvent should be verified between 0.80-0.82 by measurement. The following tables may be used as a guide for preparation and for testing performed at temperatures higher than 20°C. The shaded values fall within the specified test range.

Specific gravity of ethanol-water solutions at 20°C and 25°C.

Percent ethanol by weight (g/100 g soln)	Percent ethanol by volume (mL/100 mL soln)	density (20°C)	density (25°C)
100	100.0	0.79074	0.78736
98	98.8	0.79688	0.79349
96	97.5	0.80280	0.79939
94	96.1	0.80848	0.80507
92	94.7	0.81401	0.81060
90	93.3	0.81942	0.81600
88	91.8	0.82469	0.82128

From *Lange's Handbook of Chemistry*, 10th ed., McGraw-Hill: New York, 1967.

Specific gravity of isopropanol-water solutions at 20°C.

Percent isopropanol by weight (g/100 g soln)	Percent isopropanol by volume (mL/100 mL soln)	density (20°C)
100	100.0	0.78620
96	97.2	0.79630
92	94.3	0.80610
88	91.3	0.81600
84	88.2	0.82580

From *Handbook of Chemistry and Physics*, 56th ed., CRC Press: Boca Raton, FL, 1975.

- Some berries may remain suspended some distance below the surface of the liquid. These are not considered as floaters.
- Bulk index/bulk density is a measurement of weight to volume (density) in a loose or tapped sample. It should not be confused with or used as an indication of percent light berries, which is a measure of the weight percentage of “low density” peppercorns in a sample.

H. References:

ISO Standard 959-1 (“Pepper (*Piper nigrum* L.), whole or ground — Specification — Part 1: Black pepper”), 2nd ed. (1998-05-15).

I. Revision History

10/02/12 This method was excerpted from ASTA method 14.0 (“Extraneous Matter in Black and White Pepper”) and reissued as method 14.2. Two changes were introduced for conformance to ISO Standard 959-1: (1) berries must be cleaned of extraneous matter before testing and (2) the relative density of the test solution is specified at 20 °C instead of 25 °C. Added Principle section. Added Note 4 to clarify difference between bulk density and percent light berries.