

Standard Method Performance RequirementsSM (SMPRs) for Total Vitamin B₁ (Thiamin) in Infant and Adult/ Pediatric Nutritional Formula

Intended Use: Reference Method for Dispute Resolution

1 Applicability

Determinations of total vitamin B₁ (thiamin) in all forms of infant, and adult, and/or pediatric formulas (powders, ready-to-feed liquids, and liquid concentrates). Total B₁ defined as the sum of thiamin (CAS No. 70-16-6), thiamin phosphate (CAS No. 532-40-1), thiamin diphosphate (CAS No. 154-87-0), and thiamin triphosphate (CAS No. 3475-65-8). All data should be mass corrected and expressed as thiamin ion.

2 Analytical Technique

Any analytical technique that meets the following method performance requirements is acceptable.

3 Definitions

Accuracy (corresponds to the VIM definition for “trueness”).—The closeness of agreement between the average of an infinite number of replicate measured quantity values and a reference quantity value.

Adult/pediatric formula.—Nutritionally complete, specially formulated food, consumed in liquid form, which may constitute the sole source of nourishment, made from any combination of milk, soy, rice, whey, hydrolyzed protein, starch, and amino acids, with and without intact protein.

Infant formula.—Breast-milk substitute specially manufactured to satisfy, by itself, the nutritional requirements of infants during the first months of life up to the introduction of appropriate complementary feeding (Codex Standard 72-1981), made from any combination of milk, soy, rice, whey, hydrolyzed protein, starch, and amino acids, with and without intact protein.

Limit of detection (LOD).—The minimum concentration or mass of analyte that can be detected in a given matrix with no greater than 5% false-positive risk and 5% false-negative risk.

Limit of quantitation (LOQ).—The minimum concentration or mass of analyte in a given matrix that can be reported as a quantitative result

Repeatability.—Variation arising when all efforts are made to keep conditions constant by using the same instrument and operator, and repeating during a short time period. Expressed as the

Table 1. Method performance requirements^a

Analytical range	20–2000 ^b
Limit of quantitation (LOQ)	≤20 ^b
Recovery	90–110%
Repeatability (RSD _r)	≤5%
Reproducibility (RSD _R)	≤10%

^a Concentrations apply to: (a) “ready-to-feed” liquids “as is”; (b) reconstituted powders (25 g into 200 g water); and (c) liquid concentrates diluted 1:1 by weight.

^b µg /100 g reconstituted final product.

repeatability standard deviation (SD_r); or % repeatability relative standard deviation (%RSD_r).

Reproducibility.—The standard deviation or relative standard deviation calculated from among-laboratory data. Expressed as the reproducibility relative standard deviation (SD_R); or % reproducibility relative standard deviation (%RSD_R).

Vitamin B₁ (thiamin).—2-[3-[(4-Amino-2-methyl-pyrimidin-5-yl)methyl]-4-methyl-thiazol-5-yl] ethanol. CAS No. 70-16-6 (including all forms listed in applicability statement above).

4 Method Performance Requirements

See Table 1.

5 System Suitability Tests and/or Analytical Quality Control

Suitable methods will include blank check samples, and check standards at the lowest point and midrange point of the analytical range.

6 Reference Material(s)

NIST Standard Reference Material[®] (SRM) 1849a Infant/Adult Nutritional Formula or equivalent. The SRM is a milk-based, hybrid infant/adult nutritional powder prepared by a manufacturer of infant formula and adult nutritional products. A unit of SRM 1849 consists of 10 packets, each containing approximately 10 g of material. Certified value of NIST 1849a is 12.57 ± 0.98 mg/kg vitamin B₁ (thiamin).

7 Validation Guidance

Recommended level of validation: *Official Methods of AnalysisSM*.

8 Maximum Time-to-Result

No maximum time.

Approved by AOAC Stakeholder Panel on Infant Formula and Adult Nutritionals (SPIFAN). Final Version Date: April 17, 2015. Effective Date: April 17, 2015.