

## Standard Method Performance Requirements for Vitamin A in Infant Formula and Adult/Pediatric Nutritional Formula

Intended Use: Global Dispute Resolution Method

### 1 Applicability

Determination of vitamin A in all forms of infant, adult, and/or pediatric formulas (powders, ready-to-feed liquids, and liquid concentrates). For the purpose of this SMPR, vitamin A is defined as 13-*cis* and all-*trans* retinol (CAS 68-26-8), retinyl esters [retinyl palmitate (CAS 79-81-2) and retinyl acetate (CAS 127-47-9)].

### 2 Analytical Technique

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

### 3 Definitions

*Adult/pediatric formula.*—Nutritionally complete, specially formulated food, consumed in liquid form, which may constitute the sole source of nourishment (AOAC SPIFAN, 2010), 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 repeatability standard deviation (SD<sub>r</sub>); or % repeatability relative standard deviation (%RSD<sub>r</sub>).

*Reproducibility.*—The SD or RSD calculated from among-laboratory data. Expressed as the reproducibility standard deviation (SD<sub>R</sub>), or % reproducibility relative standard deviation (%RSD<sub>R</sub>).

Analytical range	7.0–382.6 <sup>b</sup>
Limit of detection (LOD)	≤2.0 <sup>b</sup>
Limit of quantitation (LOQ)	≤7 <sup>b</sup>
Repeatability (RSD <sub>r</sub> )	≤8%
Recovery	90 to 110% of mean spiked recovery over the range of the assay
Reproducibility (RSD <sub>R</sub> )	≤16%
<sup>a</sup> Concentrations apply to (1) “ready-to-feed” liquids “as is”; (2) reconstituted powders (25 g into 200 mL water); and (3) liquid concentrates diluted 1:1 by weight.	
<sup>b</sup> µg/100 g expressed as 13- <i>cis</i> retinol and all- <i>trans</i> retinol in reconstituted final product.	

*Recovery.*—The fraction or percentage of spiked analyte that is recovered when the test sample is analyzed using the entire method.

### 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)

National Institute of Standards and Technology Standard Reference Material<sup>®</sup> (SRM) 1849 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 vitamin A in NIST 1849 is 16.4 (±1.3) mg/kg retinol.

### 7 Validation Guidance

Recommended level of validation: *Official Methods of Analysis*<sup>SM</sup>.

### 8 Maximum Time-to-Signal

No maximum time.

*Approved by Stakeholder Panel on Infant Formula and Adult Nutritionals (SPIFAN). Final Version Date: April 5, 2011. Effective Date: June 29, 2011.*