



# Official Methods of Analysis

21st Edition (2019)

SMPRs®

## **Stakeholder Panel on Agent Detection Assays (SPADA):**

**NEW** AOAC SMPR® 2016.006 *Standard Method Performance Requirements* for DNA-Based Methods of Detecting *Bacillus anthracis* in Field-Deployable, Department of Defense Aerosol Collection Devices

**NEW** AOAC SMPR® 2016.007 *Standard Method Performance Requirements* for Detection of *Francisella tularensis* in Aerosol Collection Devices

**NEW** AOAC SMPR® 2016.008 *Standard Method Performance Requirements* for DNA-Based Methods of Detecting *Yersinia pestis* in Field-Deployable, Department of Defense Aerosol Collection Devices

**NEW** AOAC SMPR® 2016.009 *Standard Method Performance Requirements* for DNA-Based Methods of Detecting *Brucella suis* in Field-Deployable, Department of Defense Aerosol Collection Devices

**NEW** AOAC SMPR® 2016.010 *Standard Method Performance Requirements* for DNA-Based Methods of Detecting *Burkholderia pseudomallei* in Field-Deployable, Department of Defense Aerosol Collection Devices

**NEW** AOAC SMPR® 2016.011 *Standard Method Performance Requirements* for Detection of Botulinum Neurotoxins A1 and A2 in Field-Deployable, Department of Defense Aerosol Collection Devices

**NEW** AOAC SMPR® 2016.012 *Standard Method Performance Requirements* for Detection and Identification of *Variola Virus*

## **Stakeholder Panel on Infant Formula and Adult Nutritional (SPIFAN):**

AOAC SMPR® 2011.006 *Standard Method Performance Requirements* for Folate in Infant Formula and Adult/Pediatric Nutritional Formula

Revised March 2017 to reflect changes to Applicability and Reference Materials sections

AOAC SMPR® 2014.003 *Standard Method Performance Requirements* for GOS in Infant Formula and Adult/Pediatric Nutritional Formula

Revised March 2018 to correct Figure 1 and revise upper limit of analytical range in Table 1

AOAC SMPR® 2014.004 *Standard Method Performance Requirements* for Minerals and Trace Elements in Infant Formula and Adult/Pediatric Nutritional Formula

Revised May 26, 2016 to correct unit in Table 1 footnote b

AOAC SMPR® 2014.013 *Standard Method Performance Requirements* for Amino Acids in Infant Formula and Adult/Pediatric Nutritional Formula

Revised August 2018 to update method performance table and to add methionine to NIST reference values

AOAC SMPR® 2014.016 *Standard Method Performance Requirements* for Fluoride in Infant Formula and Adult/Pediatric Nutritional Formula

Revised March 2018 to reflect changes in Table 1

**NEW** AOAC SMPR® 2017.005 *Standard Method Performance Requirements* for  $\alpha$ -Carotene in Infant and Adult/Pediatric Nutritional Formula (revision of SMPR 2014.014 Carotenoids)

**NEW** AOAC SMPR® 2017.006 *Standard Method Performance Requirements* for  $\beta$ -Carotene in Infant and Adult/Pediatric Nutritional Formula (revision of SMPR 2014.014 Carotenoids)

**NEW** AOAC SMPR® 2017.007 *Standard Method Performance Requirements* for Lutein in Infant and Adult/Pediatric Nutritional Formula (revision of SMPR 2014.014 Carotenoids)

**NEW** AOAC SMPR® 2017.008 *Standard Method Performance Requirements* for Lycopene in Infant and Adult/Pediatric Nutritional Formula (revision of SMPR 2014.014 Carotenoids)

**NEW** AOAC SMPR® 2017.017 *Standard Method Performance Requirements* for Determination of 2- and 3-MCPD, 2- and 3-MCPD Esters, and Glycidyl Esters in Infant and Adult/Pediatric Nutritional Formula

**If you have any questions of a technical nature or suggestions for editorial changes, please e-mail us at [editoma@aoac.org](mailto:editoma@aoac.org).**

***Stakeholder Panel on Strategic Food Analytical Methods (SPSFAM):***

**NEW** AOAC SMPR® 2016.001 *Standard Method Performance Requirements* for Determination of Ethanol in Kombucha

**NEW** AOAC SMPR® 2016.002 *Standard Method Performance Requirements* for Detection and Quantitation of Selected Food Allergens

**NEW** AOAC SMPR® 2017.001 *Standard Method Performance Requirements* for Quantitation of Cannabinoids in Cannabis Concentrates

**NEW** AOAC SMPR® 2017.002 *Standard Method Performance Requirements* for Quantitation of Cannabinoids in Dried Plant Materials

**NEW** AOAC SMPR® 2017.003 *Standard Method Performance Requirements* for Quantitation of Proanthocyanidin Content in Cranberry Fruit, Juice, Beverage, Dried Cranberry, Cranberry Sauce, Ingredients (Concentrates, Extracts, and Powders), and Dietary Supplement Formulations

**NEW** AOAC SMPR® 2017.004 *Standard Method Performance Requirements* for Identification of Type-A Proanthocyanidins in Cranberry-Based Foods and Dietary Supplements

**NEW** AOAC SMPR® 2017.018 *Standard Method Performance Requirements* for Determination of Free Bisphenol A (BPA) in Commercially Packaged Ready-to-Consume Carbonated and Noncarbonated Water and Nonalcoholic Beverages

**NEW** AOAC SMPR® 2017.019 *Standard Method Performance Requirements* for Quantitation of Cannabinoids in Edible Chocolate

**NEW** AOAC SMPR® 2018.001 Sugars in Animal Feed, Pet Food, and Human Food

**NEW** AOAC SMPR® 2018.002 Fructans in Animal Food (Animal Feed, Pet Food, and Ingredients)

**NEW** AOAC SMPR® 2018.009 Lactose in Low-Lactose or Lactose-Free Milk, Milk Products, and Products Containing Dairy Ingredients

**NEW** AOAC SMPR® 2018.010 Screening and Identification Method for Regulated Veterinary Drug Residues in Food

**NEW** AOAC SMPR® 2018.011 Identification and Quantitation of Selected Pesticide Residues in Dried Cannabis Materials

***Stakeholder Panel on Dietary Supplements (SPDS):***

AOAC SMPR® 2015.016 *Standard Method Performance Requirements* for Vitamin D in Dietary Supplement Finished Products and Ingredients

Revised March 2017 to reflect changes to Applicability section

**NEW** AOAC SMPR® 2016.003 *Standard Method Performance Requirements* for Quantitation of Curcuminoids

**NEW** AOAC SMPR® 2016.004 *Standard Method Performance Requirements* for Quantitative Measurement of  $\beta$ -Cryptoxanthin, Lutein, and Zeaxanthin in Ingredients and Dietary Supplements

**NEW** AOAC SMPR® 2016.005 *Standard Method Performance Requirements* for Quantitation of Collagen

**NEW** AOAC SMPR® 2016.013 *Standard Method Performance Requirements* for Determination of Meat-Derived Proteins

**NEW** AOAC SMPR® 2016.014 *Standard Method Performance Requirements* for Determination of Plant-Derived Proteins

**NEW** AOAC SMPR® 2016.015 *Standard Method Performance Requirements* for Identification of Meat-Derived Proteins

**NEW** AOAC SMPR® 2016.016 *Standard Method Performance Requirements* for Identification of Plant-Derived Proteins

**NEW** AOAC SMPR® 2016.017 *Standard Method Performance Requirements* for Quantitative Measurement of Vitamin B<sub>12</sub> in Dietary Supplements and Ingredients

**NEW** AOAC SMPR® 2017.009 *Standard Method Performance Requirements* for Quantitation of Aloe Vera Characteristic Water-Soluble Main Constituents in Dietary Supplements

**NEW** AOAC SMPR® 2017.010 *Standard Method Performance Requirements* for Identification of Aloe Vera in Dietary Supplements and Dietary Ingredients

**NEW** AOAC SMPR® 2017.011 *Standard Method Performance Requirements* for Identification and Quantitation of Free  $\alpha$ -Amino Acids in Dietary Ingredients and Supplements

**NEW** AOAC SMPR® 2017.012 *Standard Method Performance Requirements* for Quantitation of Select Nonvolatile Ginger Constituents

**NEW** AOAC SMPR® 2017.013 *Standard Method Performance Requirements* for Vitamins K<sub>1</sub> and K<sub>2</sub> in Dietary Supplements and Dietary Ingredients

**NEW** AOAC SMPR® 2017.014 *Standard Method Performance Requirements* for Determination of Select Ginsenosides in Dietary Supplements and Dietary Ingredients

**NEW** AOAC SMPR® 2017.015 *Standard Method Performance Requirements* for Determination of Phenolic Compounds in Dietary Supplements and Dietary Ingredients Containing Echinacea

**NEW** AOAC SMPR® 2017.016 *Standard Method Performance Requirements* for Determination of SAME in Dietary Supplements and Dietary Ingredients

**NEW** AOAC SMPR® 2018.004 Determination of *trans* Resveratrol in Dietary Supplements and Dietary Ingredients

**NEW** AOAC SMPR® 2018.005 Determination of Kavalactones and/or Flavokavains from Kava (*Piper methysticum*)

**NEW** AOAC SMPR® 2018.006 Determination of Select Flavonoids from Skullcap

**NEW** AOAC SMPR® 2018.007 Identification of Skullcap in Raw Materials, Skullcap-Based Dietary Ingredients, and Dietary Supplements

**NEW** AOAC SMPR® 2018.008 Determination of Selected Compounds from *Teucrium* spp. in Skullcap Materials in Commerce

**International Stakeholder Panel on Alternative Methods (ISPAM):**

**NEW** AOAC SMPR® 2017.020 *Standard Method Performance Requirements* for Quantitation of Chicken Egg by ELISA-Based Methods

**NEW** AOAC SMPR® 2017.021 *Standard Method Performance Requirements* for Quantitation of Wheat, Rye, and Barley Gluten in Oats

Revised August 2018 to update reference material(s) source

**NEW** AOAC SMPR® 2018.003 Quantitation of Milk by ELISA-Based Methods

**NEW** AOAC SMPR® 2018.012 Quantitation of Peanut by ELISA-Based Methods

Chapter 2

**959.03** (2.4.20) Urea in Fertilizers

Minor modification approved by ERP for Fertilizers in March 2017: Revised to include applicability statement and reference to *J. AOAC Int.* **98**, 1475(2015)

**983.01** (2.4.21) Urea and Methylureas (Water-Soluble) in Fertilizers

Minor modification approved by ERP for Fertilizers in March 2017: Revised to include applicability statement and reference to *J. AOAC Int.* **98**, 1475(2015)

**NEW 2015.15** (2.6.36) Nitrogen, Phosphorus, and Potassium (and Other Nutrients) Release Patterns of Slow- and Controlled-Release Fertilizers

**NEW 2015.18** (2.6.37) Phosphorus and Potassium in Commercial Inorganic Fertilizers

**NEW 2017.02** (2.6.38) Arsenic, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Molybdenum, Nickel, Selenium, and Zinc in Fertilizers

**NEW 2017.08** (2.6.39) Total Sulfur in Fertilizer

Chapter 4

**2014.10** (4.7.07) Dietary Starch in Animal Feeds and Pet Food

Final Action 2018

**C(e)(2)**: Changed “sucrose 0.7 ± 0.3%” to “sucrose 1.0 ± 0.3%.”

**E(2)**: Added *Note*

**2000.12** (4.10.06) Phytase Activity in Feed

Revised August 2018: Table **2000.12A**: Corrected columns for %RSD<sub>r</sub> and %RSD<sub>R</sub>

**E**. Expression of Phytase Activity: Corrected “...liberate 1 mol inorganic *ortho*-phosphate...” to “...liberate 1 μmol inorganic *ortho*-phosphate...”

Chapter 9

**NEW 2016.04** (9.2.43) Four Arsenic Species in Fruit Juice

Chapter 17

**2014.05** (17.2.11) Enumeration of Yeast and Mold in Food

Final Action 2017

**2015.13** (17.2.12) Enumeration of Aerobic Bacteria in Food

Included reference: *J. AOAC Int.* **99**, 664(2016)

Final Action 2018

**NEW 2017.01** (17.4.09) 3M™ Molecular Detection Assay (MDA) 2-*E. coli* O157 (Including H7) for the Detection of *E. coli* O157:H7 species in Selected Foods

**NEW 2017.05** (17.4.10) *Escherichia coli* O157:H7 and *Escherichia coli* non-O157 Shiga Toxin-Producing *Escherichia coli* (STEC) in Select Foods

**2013.01** (17.9.36) *Salmonella* in a Variety of Foods

Minor modification March 2018: To improve the ease of use of the method, bioMérieux is now also providing the *Salmonella* supplement in tablets, packed in opaque blister packs: one small tablet for 25 g sampling and one larger tablet for 375 g sampling. The tablet is added directly into buffered peptone water without intermediate solubilization. The lyophilized format is also continuing to be offered. Selective agent composition of the supplement formulation is the same for both the tablet and lyophilized formats.

**2014.01** (17.9.40) *Salmonella* in Selected Foods

Final Action 2017

**NEW 2016.01** (17.9.41) *Salmonella* spp. in Select Foods and Environmental Surfaces

**NEW 2017.09** (17.9.42) Confirmation and Identification of *Salmonella* species, *Cronobacter* species, *Campylobacter* species, and Other Gram-Negative Organisms

Revised First Action 2018: Applicability to include *Campylobacter* species

**NEW 2017.06** (17.9.43) *Salmonella* species in Select Foods

**NEW 2018.01** (17.9.44) *Cronobacter* species in Select Foods and Environmental Surfaces

**2014.06** (17.10.16) *Listeria* species in Selected Foods and Environmental Surfaces

Revised First Action 2016: Applicability to include bagged raw spinach (25 g), whole cantaloupe melon, and plastic (swab in 10 mL enrichment volume)

Table **2014.06B** revised to reflect new applicability

**2014.07** (17.10.17) *Listeria monocytogenes* in Selected Foods and Environmental Surfaces

Revised First Action 2016: Applicability to include bagged raw spinach (25 g), romaine lettuce (25 g), and whole cantaloupe melon

Table **2014.07C** revised to reflect new applicability

**NEW 2016.07** (17.10.18) Detection of *Listeria* species in Select Foods and Environmental Surfaces

**NEW 2016.08** (17.10.19) *Listeria monocytogenes* in a Variety of Foods and Select Environmental Surfaces

**NEW 2017.10** (17.10.20) Confirmation and Identification of *Listeria monocytogenes*, *Listeria* species, and Other Gram-Positive Organisms

Chapter 29

**NEW 2017.15** (29.1.30) Bisphenol A (BPA) in Commercially Packaged Ready-to-Consume Carbonated and Noncarbonated Water and Nonalcoholic Beverages

Chapter 30

**2014.09** (30.1.35) Determination and Confirmation of Residues of 653 Multiclass Pesticides and Chemical Pollutants in Tea

Final Action 2018: Included additional references and removed “Qualitative” in **G**

**NEW 2016.12** (30.1.36) Ethanol in Kombucha

**NEW 2017.07** (30.1.37) Ethanol in Kombucha, Juices, and Alcohol-Free Beer

Chapter 32

**2012.01** (32.1.44) Gliadin as a Measure of Gluten in Rice and Corn-Based Foods

Final Action 2017: Title: Changed from “Foods Containing Wheat, Rye, and Barley” to “Rice- and Corn-Based Foods”

Minor modification approved by ERP for Gluten Assays in March 2017: **D(b)**: modification of the wash solution to substitute thimerosal in the washing buffer by the mercury-free preserving agent bronidox L

Minor modification September 2017: New ELISA plate approved as a replacement to the current plate

**2014.03** (32.1.45) Gluten in Rice Flour and Rice-Based Food Products

Final Action 2018

**2015.05** (32.2.11) Partially Hydrolyzed Gluten in Fermented Cereal-Based Products

Final Action 2018: Applicability revised to include “and may not measure or detect all fermented and/or hydrolyzed forms of gluten”

**NEW 2015.16** (32.2.12) Gluten in Processed and Nonprocessed Products

Final Action 2018

Chapter 45  
Chapter 50

**NEW 2017.16** (45.4.18) Total Dietary Fiber in Foods

**2011.06** (50.1.29) Total Folate in Infant Formula and Adult Nutritionals  
Final Action 2018

**2011.19** (50.1.41) Chromium, Selenium, and Molybdenum in Infant Formula and Adult Nutritional Products  
Revised First Action 2016: Method was shown to achieve a lower LOQ to support Codex criteria

**2014.02** (50.2.06) Vitamin B<sub>12</sub> in Infant Formula and Adult/Pediatric Formulas  
Final Action 2017

**2012.22** (50.2.07) Vitamin C in Infant Formula and Adult/Pediatric Nutritional Formula  
Final Action 2016  
Codex-Adopted AOAC–ISO Method 2017

**2015.09** (50.2.08) *trans* Vitamin K<sub>1</sub> in Infant, Pediatric, and Adult Nutritionals  
Final Action 2018

**NEW 2015.14** (50.2.09) Simultaneous Determination of Total Vitamins B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, and B<sub>6</sub> in Infant Formula and Related Nutritionals  
Revised First Action 2018: Applicability to include vitamin B<sub>3</sub>

**NEW 2016.05** (50.2.10) Analysis of Vitamins D<sub>2</sub> and D<sub>3</sub> in Milk Powders, Infant Formulas, and Adult Nutritionals  
Final Action 2017  
Codex-Adopted AOAC–ISO Method 2018

**NEW 2016.15** (50.5.03) Quantification of Whey Protein Content in Milk-Based Infant Formula Powders  
Final Action 2018

**2015.10** (50.6.05) Carnitine and Choline in Infant Formula and Adult/Pediatric Nutritional Formula  
Revised First Action 2016: Applicability to include choline

**2015.06** (50.10.01) Minerals and Trace Elements in Infant Formula and Adult/Pediatric Nutritional Formula  
Final Action 2017

**NEW 2016.03** (50.11.03) Chloride in Milk, Milk Powder, Whey Powder, Infant Formula, and Adult Nutritionals  
Final Action 2018: Removed butter and cheese in the method, among other revisions  
Codex-Adopted AOAC–ISO Method 2018

**NEW 2016.02** (50.12.01) Total Biotin in Infant Formula and Adult/Pediatric Nutritional Formulas  
Final Action 2017  
Codex-Adopted AOAC–ISO Method 2018

**NEW 2016.11** (50.12.02) Biotin in Infant, Pediatric, and Adult Nutritionals

**NEW 2016.06** (50.13.01) Fructans in Infant and Adult/Pediatric Nutritional Formula

**NEW 2016.14** (50.13.02) Fructans in Infant Formula and Adult Nutritionals

**NEW 2016.13** (50.14.01) Lutein, β-Carotene, and Lycopene in Infant Formula and Adult Nutritionals  
Revised First Action 2017: Applicability to include lycopene

**NEW 2017.04** (50.14.02) *cis*- and *trans*-Lutein, *cis*- and *trans*-β-Carotene, and *cis*- and *trans*-Lycopene in Infant, Pediatric, and Adult Nutritionals

**NEW 2017.03** (50.15.01) Total Tryptophan in Infant Formula and Adult/Pediatric Nutritional Formula Following Enzymatic Hydrolysis  
Subchapter 16: AOAC SPIFAN Final Action *Official Methods*<sup>SM</sup> with Joint Organizational Approvals  
Revised to include **2012.22** (Vitamin C), **2016.02** (Biotin), **2016.03** (Chloride), and **2016.05** (Vitamin D)

Chapter 51 **NEW 2015.17** (51.12.01) Estimation of Withanolides (Withanoside IV, Withanoside V, Withaferin A, 12-Deoxywithastromonolide, Withanolide A, Withanolide B) in *Withania somnifera*

**NEW 2016.09** (51.13.01) Aloin A, Aloin B, and Aloe-emodin in Raw Materials and Finished Products

**NEW 2016.10** (51.14.01) Theanine in Tea (*Camellia sinensis*) Dietary Ingredients and Supplements

**NEW 2016.16** (51.15.01) Curcuminoids in Turmeric Roots and Supplements

**NEW 2017.11** (51.16.01) Identification of Pea, Rice, and Soy Proteins in Raw Materials and Finished Goods

- NEW 2017.12** (51.16.02) Identification of Milk Proteins in Raw Materials and Finished Goods
- NEW 2017.13** (51.17.01) Total Phenolic Content Using the Folin-C Assay
- NEW 2017.14** (51.18.01) Mitragynine in *Mitragyna speciosa* Raw Materials and Finished Products
- NEW 2018.08** (51.19.01) Phenolic Compounds in Dietary Supplements and Dietary Ingredients Containing *Echinacea*
- NEW 2018.09** (51.20.01) Ginsenoside Content in *Panax ginseng* C.A. Meyer and *Panax quinquefolius* L. Root Materials and Finished Products
- NEW** *Environmental Factors for Validating Biological Threat Agent Detection Assays*

Appendix O