

Enhanced versatility of AOAC official method 2015.01 for arsenic determination in infant formula and dairy products

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Naoto Hieda, Yoshihiro Ikeuchi, Ichiro Matsuno

Central Food Analysis Laboratory Quality Assurance Dept., Megmilk Snow Brand Co., Ltd.

Abstract

This study aims to improve the versatility of AOAC Official Method 2015.01 (Method 2015.01) for the determination of arsenic in infant formula and milk products in international trade. The sample preparation was changed from a wet ashing method using a microwave digester to a dry ashing one with an electric furnace, which will simplify the process and allow the processing of several samples. Magnesium nitrate solution was added before dry ashing to prevent arsenic volatilization. Importantly, helium was used as a replacement for oxygen as the reaction cell gas during sample measurement with inductively coupled plasma mass spectrometry, for making the process highly versatile. The modified method exhibited excellent linearity over the concentration range of the standard solutions, and all the conditions (lower limit of quantification, repeatability, and recovery factor) of the Standard Method Performance Requirement of AOAC International were met. When the sample used in the proficiency test for the trace element, provided by KANSO CO., LTD. (PTP-1801WR), was measured, the result was close to the value allowed by KANSO CO., LTD. By modifying the sample preparation and the reaction cell gas, we enhanced the versatility of Method 2015.01 for the analysis of arsenic in infant formula and dairy products.

Keywords : arsenic, infant formula, dairy product, dry ashing, ICP-MS

I Introduction

The Codex methods ensure the validity of the sampling and analysis and play vital roles during dispute resolution in the world food trade. In addition to these, several other methods with the same provisions are applied for the same purpose by other standard development organizations (SDOs), such as AOAC International (AOACI) and International Organization for Standardization (ISO)/International Dairy Federation (IDF), which makes the method selection and the analysis highly challenging.

To address these challenges, AOACI and ISO/IDF are working together to unify Codex methods for formulating widely acceptable methods for analysis. In this regard, the Stakeholder Panel on Infant Formula and Adult Nutritionals

(SPIFAN) has been convened as a pilot project¹⁾. Since its launch, SPIFAN has made rapid strides in the last seven years and has unified half of the major test items available, by reviewing conventional formulation procedures²⁾. The unification of the Codex methods will be further advanced in the future, with the simultaneous expansion of the SPIFAN project's scope to include official methods for general foods as well (Stakeholder Panel on Strategic Food Analytical Methods: SPSFAM)²⁾.

SPIFAN and SPSFAM promote the unification of Codex methods with significant financial support from key stakeholders, who are primarily manufacturers of food, raw material, and analysis equipment in American and European countries, and thus, these organizations exert a strong influence in both these projects. Therefore, the official

Corresponding author: Naoto Hieda, Central Food Analysis Laboratory Quality Assurance Dept., Megmilk Snow Brand Co., Ltd., 1-1-2 Minamidai, Kawagoe, Saitama 350-1165, Japan

*1. AOAC International Web site: <http://stakeholder.aoc.org/SPIFAN/>; accessed September 25, 2019.

*2. AOAC International Web site:

staging.aoc.org/AOAC_Ref_Imis/AOAC/SD/SPSFAM/AOAC_Member/SD/SPSFAM/CF/SPSFAM_M.aspx?tkery=6da4dbbd-0fad-4b26-922b-59a16db06b18; accessed September 25, 2019.

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