

Elemental Analysis Manual

for Food and Related Products

Archive Notes

This is an archived file provided for historical reference purposes only. Links to sites external to this file are not maintained and have therefore been removed. For the most recent information, readers are directed to the current [EAM](#).

3.1 Contamination Control

Version 1.0 (June 2008)
Authors: William R. Mindak
Stephen G. Capar

Table of Contents

3.1.1 ENVIRONMENTAL

3.1.2 LABORATORY WARE

GLOSSARY

Clean laboratory procedures are necessary for trace element analysis. Efforts must be made to minimize the potential of contamination throughout the analytical procedure. Sources of contamination include air, containers, the analyst and reagents. Contamination control is a constant chore for a successful trace element analysis. Advice on controlling contamination is available in the literature¹⁻³.

3.1.1 ENVIRONMENTAL

For trace element analyses the samples should be processed in Class 100 workbenches located in a clean room of at least a Class 10,000 type. This environment will minimize and control contamination of samples and method blanks and allow achievement of the best analytical limits. The analytical instrument's sample introduction system should be arranged to have Class 100 clean air conditions by having a suitable clean air module positioned around the system. Some

advice on preparing a clean laboratory is available in the literature⁴⁻⁵.

3.1.2 LABORATORY WARE

Laboratory ware—All reusable laboratory ware (glass, polyethylene, PTFE, *etc.*) must be sufficiently clean for trace element analysis. The recommended cleaning procedure for all laboratory ware includes washing in clean-rinsing laboratory detergent, reagent water rinse, soaking at least 4 hrs in 10% nitric acid and final reagent water rinse. Rinse with 1% nitric acid immediately before use.

Disposable laboratory ware—All disposable laboratory ware such as autosampler cups and bottles/tubes for analytical solution storage should be rinsed with 1% nitric acid immediately before use. Disposable laboratory ware should be tested for contamination or pre-cleaned before using a particular lot.

Gloves—Use powder free vinyl, polyethylene, or nitrile. Do not use latex because of possible contamination. There are gloves manufactured for clean room use that are free from trace metals contamination.

Micropipettes—Air displacement micropipettes. Use with colorless disposable plastic tips since colored tips may be a source of contamination.

Note: Low-density polyethylene bottles are recommended for storage of standard and analytical solutions because of low cost and low trace metals contamination but other types of plastic bottles can be used such as high-density polyethylene, polypropylene, polystyrene, Teflon[®] etc. Teflon[®] FEP bottles are preferred from a contamination standpoint but high cost will usually limit their use to intermediate and standard solutions.

REFERENCES

- (1) Knapp, G. and Schramel, P. (2003) Sources of Analyte Contamination and Loss During the Analytical Process, in Sample Preparation for Trace Element Analysis (Wilson and Wilson's Comprehensive Analytical Chemistry, Vol. 41), Z. Mester and R. Sturgeon, (Editors), Elsevier, Amsterdam, Chap 2, pp 23-45.
- (2) Rhoades, C. B., Jr. (1996) Clean Laboratory Chemistry for the Microwave Assisted Digestion of Botanical Samples, *J. Anal. At. Spectrom.* **11**, 751-757.
- (3) Morton, S. (2001) Contamination Control in the Trace Metal Laboratory, *Am. Lab. News* **33**[January] 20, 22.
- (4) U.S. Environmental Protection Agency (1996) Guidance on Establishing Trace Metal Clean Rooms in Existing Facilities, EPA 821-B-96-001. (Accessed April, 2008) (*link removed*). Available National Technical Information Service, Number PB96-193321.
- (5) International Atomic Energy Agency (2003) Clean Laboratories and Clean Rooms for Analysis of Radionuclides and Trace Elements, IAEA Technical Document Series 1339 [IAEA-TECDOC-1339]. (Accessed April, 2008) (*link removed*).