



U.S. Department of Health & Human Services



U.S. Food and Drug Administration

Elemental Analysis Manual

for Food and Related Products

The following is a section of the Elemental Analysis Manual for Food and Related Products.

For additional information and to view other sections of the manual, visit the Elemental Analysis Manual for Food and Related Products web page at

<https://www.fda.gov/food/laboratory-methods-food/elemental-analysis-manual-eam-food-and-related-products>

Elemental Analysis Manual

for Food and Related Products

3.1 Safety

Version 3.0 (December 2021)

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[GLOSSARY and ACRONYMS](#)

Safe laboratory operations require both institutional and personal responsibility for the awareness and communication of potential hazards and diligent application of appropriate safety procedures and practices. FDA’s Office of Laboratory Safety, which oversees an agency wide laboratory safety program, provides foundational and on-going training. Analysts are expected to have received and operate in compliance with this training and follow their laboratory’s chemical hygiene, laboratory safety and hazardous waste disposal plans. EAM 3.1 does not supersede any of these safety requirement and guidelines but is meant to emphasize several aspects that may be particularly relevant for EAM methods.

3.1.1 HAZARDS

In addition to general workplace hazards such as slips, trips, and falls, EAM methods may present many hazards of particular significance to elemental analysis laboratories:

- Chemical hazards

Exposure to reagents should, in general, be limited but some are of particular concern. Acids, bases, and solvents can cause tissue damage on contact and be absorbed. When working with hydrofluoric acid, for example, calcium gluconate gel should always be close and readily available. Vapors and fumes involve mucus membranes and lungs. Oxidizer and solvent mixtures can be highly energetic or even explosive. Sample decomposition products may be hazardous.

Compressed gases and cryogenic liquids/gases present a range of risks associated with, for example, high pressure, asphyxiation, and frostbite.

- Laboratory equipment hazards

Many types of hazards can be associated with laboratory equipment - electrical shock (any electrically-powered equipment and especially high voltage sub systems); high heat or hot surface (hot plate, hot block, conventional and microwave oven, flame and plasma spectrometer), high pressure (microwave digestion vessels, compressed gas cylinders), harmful light (direct and/or reflected, plasma ICPs, laser ablation & absorption & ring-down spectrometers, microwave ovens, x-ray spectrometers), high vacuum (mass spectrometers, x-ray fluorescence systems)

3.1.2 SAFETY PRACTICES

Laboratory design and engineering controls provide a level of protection, but personal safety inherently depends on the analyst who is (within the context of this manual) assumed to follow practices such as the following:

- Use safety equipment and apparatus, fume hoods, tools, etc.
- Wear personal protective items (eye-ware, gloves, shoes, lab coats, hearing protection, etc.)
- Follow safety guidelines associated with the operation of laboratory equipment and do not disable any safety interlocks.
- Work only when alert (e.g., well rested and not under the influence of drugs, alcohol, etc.)
- Know locations of eye wash stations, safety showers, spill kits, first aid kits, fire extinguishers and how to use them.
- Keep work areas clear of clutter or other obstructions.
- Incorporate safety practices into all laboratory operations (before performing analyses).
- Know the laboratory's emergency procedures and locations of contact information.

Laboratories maintain awareness files (available to analysts) with OSHA ([Occupational Safety & Health Administration, U. S. Department of Labor](#)) regulations regarding the safe handling of the

chemicals specified in the methods and Safety Data Sheets for chemicals [1].

3.1.3 HISTORY

EAM 3.1 Table 1. History

Version	Revisions Made	Effective Date
1.0	<i>Contamination Control</i>	June 2008
2.0	Renamed to <i>Safety</i> ; <i>Contamination Control</i> moved to section 2.4; <i>Safety</i> brought into this location (formerly 4.0.3); converted to PDF for web posting.	September 2014
3.0	Expanded discussion; added <i>History</i> section.	December 2021

References

- [1] Occupational Safety and Health Administration, "OSHA BRIEF: Hazard Communication Standard: Safety Data Sheets," 2012. [Online]. Available: <https://www.osha.gov/sites/default/files/publications/OSHA3514.pdf>. [Accessed September 2021].