Standard Reference Methods for Metals

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OSHA Occupational Safety and Health Administration

Genesis of Metals Analysis Methods

- **Most of today's metals analysis methods originated from general AA methods**
- **Sources include early NIOSH methods; and methods published by instrument manufacturers**
  - ✓**Certain reagents and sample digestion procedures were combined with specific metals in numerous SOPs**

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Standard Metals Analysis Methods

- **Present-day standard metals methods are a combination of compatible metals, reagents, sample digestion procedures, and analytical instruments**
  - ✓**Flame AA and AA variants are still used, but ICP is preferred means of analysis**
  - ✓**ICP methodology is slowly moving from ICP/AES towards ICP/MS**
  - ✓**Varying degrees of method validation**

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Standard Reference Methods

- **Standard methods attributed to recognized agencies (NIOSH,OSHA, etc.) are sometimes referred to as standard *reference* methods**
- **Most standard reference methods have found an acknowledged niche**
- **Some standard and standard reference methods become *consensus* standards**

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Standard Reference Methods are Sometimes Modified

- **OSHA's toxic substances regulatory standards generally require exposure monitoring; but rarely specify the method to be used**
- **This strategy may promote the modification of standard reference methods**
  - ✓ **Convenience**
  - ✓ **Economic efficiency**
  - ✓ **Safety**

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AIHA's Impact on Sample Analysis

- **AIHA influences labs to improve sample analysis through accreditation policies**
- **AIHA maintains a list of accredited labs**
  - ✓ **Labs/core program testing/field-of-testing/ approved analytical methods**
  - ✓ **Labs required to demonstrate proficiency in FoT**
  - ✓ **Proficiency can be shown by participating in PAT sample analysis, or if PAT samples are not available: alternate PT programs (WASP, BGIA), round-robin studies, internal QCs**

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But…Things Can Go Wrong

- **Most internal QCs and AIHA PATs for metals are prepared with soluble analytes**
  - ✓**Almost any metals analysis method gives good results, but they can be misleading**
  - ✓**Analysis gives useful information about analytical instrument**
  - ✓**Analysis gives little or no information about sample digestion**

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Concerned About Quantitative Recovery of a Substance?

- The only way these kinds of issues are going to be resolved is with laboratory testing using an established and comprehensive validation protocol
- Test the substance, not just the element
- Document the results

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Resources

- **AIHA list of accredited labs**

  http://apps.aiha.org/qms_aiha/public/pages/reports/publicscopeview.aspx?ProgramCode=40

- **AIHA beryllium guidance document**

  http://www.aihapat.org/bepat/Documents/BeAccreditationGuidanceDocument_R0.pdf

- **OSHA methods**

  http://osha.gov/dts/sltc/methods/index.html

- **NIOSH methods**

  http://www.cdc.gov/niosh/docs/2003-154/

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