

<b>EFFECTIVE DATE</b>	<b>N P Analytical Laboratories</b>	<b>METHOD CODE</b>
<b>REVISED: 02/27/26</b>	<b>LABORATORY TEST METHOD SUMMARY</b>	<b>ICPHM, ICPHMPMX</b>
<b>REPLACES: 01/20/25</b>	<b>Metals and Mineral determination using Inductively Coupled Plasma Mass Spectrometry</b>	<b>PAGE 1 OF 2</b>
<b>KEY WORDS: ICP-MS, Heavy Metals, Arsenic, Selenium, Cadmium, Lead, Mineral Premix</b>		

**1. SCOPE AND PURPOSE:**

- 1.1. Description of a reference method for the quantitative determination of trace elements (As, Cd, Pb, Se) in all types of food and raw materials including mineral premixes by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Mass spectrometers with additional reaction or collision cells are used to reduce the influence of polyatomic ions. Analysis of additional metals may be included provided acceptable validation has been performed.
- 1.2. The method has been validated in-house for samples covering AOAC food triangle.

**2. PRINCIPLE:**

- 2.1. The test sample is mineralized by various digestion procedures. After appropriate dilution, the digestion solution is introduced and then nebulised and finally transferred to a high frequency inductively coupled argon plasma (ICP). The high temperature of the plasma atomizes and ionizes the elements. The ions are extracted from the plasma torch by a set of sampler and skimmer cones and transferred to a mass spectrometer, where the ions are separated by their mass/charge ratio using optionally a collision or a reaction step with gas, and quantified by a pulse-count and/or analog detector.
- 2.2. Specific LabVantage test codes are used to indicate conditions for determining various heavy metals and selenium according to the following table:

<b>LabVantage Test Code</b>	<b>Used for Determining</b>
ICPHM	Arsenic, Cadmium, Lead, Selenium
ICPHM Arsenic	Arsenic
ICPHM Cadmium	Cadmium
ICPHM Lead	Lead
ICPHM Selenium	Selenium
ICPHMPMX	Arsenic, Cadmium, Lead, Selenium (in mineral premixes)
ICPHMPMX Arsenic	Arsenic (in mineral premixes)
ICPHMPMX Cadmium	Cadmium (in mineral premixes)
ICPHMPMX Lead	Lead (in mineral premixes)
ICPHMPMX Selenium	Selenium (in mineral premixes)
ICPHM DM	Arsenic, Cadmium, Lead, Selenium Dry Matter
ICPHM Arsenic DM	Arsenic Dry Matter
ICPHM Cadmium DM	Cadmium Dry Matter
ICPHM Lead DM	Lead Dry Matter
ICPHM Selenium DM	Selenium Dry Matter
ICPHMPMX DM	Arsenic, Cadmium, Lead, Selenium (in mineral premixes) Dry Matter
ICPHMPMX Arsenic DM	Arsenic (in mineral premixes) Dry Matter
ICPHMPMX Cadmium DM	Cadmium (in mineral premixes) Dry Matter
ICPHMPMX Lead DM	Lead (in mineral premixes) Dry Matter
ICPHMPMX Selenium DM	Selenium (in mineral premixes) Dry Matter

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- 2.3. The MDL for ICPHM is 0.050 ppm for a 2 g sample and 100 mL dilution. The MDL for ICPHMPMX is 1.0 ppm for a 2 g sample and 2000 mL dilution. See instrument validation report.
- 2.4. Known Interferences: This method uses a Helium dilution gas in order to eliminate polyatomic interferences.

**3. PRECISION:**

Records of method precision based on Method Validation and/or known control summaries are located in the QA Master file for this test method. Assay precision may vary with test matrix and analyte level. Terms used to describe method precision are defined in NPSOP3000, *Validation of Quantitative Chemical Tests*.

**4. REFERENCES:**

- 4.1. Trace Elements by ICP-MS Nestle LI-00.848-03
- 4.2. AOAC Official Method 993.14 Trace Elements in Waters and Wastewaters Inductively coupled Plasma-Mass Spectrometric Method