



MERCURY DETERMINATION IN NATURAL, SURFACE, SEA, DRINKING, BOTTLED, MINERAL, AND WASTE WATER BY CVAAS

Lumex Method M 01-51-2012
ISO 12846-2012

INTRODUCTION

Mercury determination in natural, drinking, and waste waters is one of the most popular analyses used for environment pollution and sanitary control. Background concentrations of mercury in natural water are within several ng/l. Maximum national permissible levels for mercury in water lie in the range of 0.16–6 µg/l. For example, the following limits for mercury in drinking water are set, µg/l:

- 0.5 – Japan, Russia;
- 1 – Argentina, Australia, Brazil, China, EC;
- 2 – US EPA, US FDA;
- 6 – WHO.

MEASUREMENT METHOD

The measurement method is based on standard procedures of digestion of mercury compounds in a water sample, reduction of mercury cations from decomposed sample with a tin chloride solution in the reaction vessel of RP-92 attachment ("cold vapor" technique) and further determination of atomic mercury using the method of atomic absorption with the **RA-915M analyzer** (using single-path and multi-path cells).

Depending on the chemical composition of a sample, one of the following two methods of digestion should be used. **Method A (permanganate digestion)** is recommended for preparation of samples with a complex matrix. This method is used to analyze natural, potable, and waste water. **Method B (bromide-bromate digestion)** suggests softer digestion conditions and is used to prepare samples of natural water (including seawater), mineral, potable water (including bottled and packaged water), and purified waste water.

The method of LUMEX Instruments allows one to determine both total mercury content and dissolved forms of mercury. Approximate time of sample preparation for analysis is 30 minutes for Method B and 2 hours for Method A. Limit of detection 0.5–2.5 ng/l depends on the purity of reagents. The measurement ranges of the mass concentration of total or dissolved mercury are

0.010–2000 µg/l (Method A);
0.010–50 µg/l (Method B).

The time of mercury concentration measurement does not exceed 2 minutes.

For water samples with relatively high mercury content (above 3 µg/l), an express method of direct pyrolysis (without any sample pre-treatment) can be provided with RA-915M analyzer coupled with PYRO-915+ attachment. Overall time of the analysis is 1–2 minutes.

EQUIPMENT AND REAGENTS

The following equipment and materials are used for analysis:

- Mercury analyzer RA-915M with RP-92 attachment;
- PC with Windows® XP/Vista/7/8/10 and RAPID software;
- CRM of mercury.

EXAMPLES OF ANALYSIS

The accuracy of the method was proved by the results of inter-laboratory proficiency testing programs, provided by the independent testing laboratories.

Year	Water samples	Measured value, µg/l	Certified value, µg/l
2010	OK 13-10	1.9±0.5	2.04±0.04
2013	OK C3-13	5.22±0.70	5.6±0.1
2014	OK L4-14	0.507±0.101	0.50±0.03

LUMEX Instruments specialists took part in the validation of the method **ISO 12846-2012 Water quality – Determination of mercury – Method using atomic absorption spectrometry (AAS) with and without enrichment.**

The information in this leaflet is supplemental. To get more specific information on this method, please contact the developer of this method LUMEX INSTRUMENT Group.

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