



## RAPID ANALYSIS OF **TOTAL MERCURY** IN WASTE WATERS AND PROCESS WATERS USING DIRECT PYROLYSIS TECHNIQUE

### INTRODUCTION

A conventional standard method of total mercury determination in water using atomic absorption spectrometry (AAS) involves preliminary sample digestion that takes from 30 minutes to 8 hours depending on the digestion conditions.

The use of a mercury analyzer RA-915M/RA-915+ with Zeeman background correction in combination with PYRO-915+ pyrolysis attachment provides direct determination of mercury in process and waste waters contaminated with mercury without digestion or any other sample preparation stages.

### MEASURING METHOD

The measuring method is based on thermal atomization of mercury from a sample using a **PYRO-915+ attachment** and its consequent determination by flameless AAS with Zeeman background correction using a **RA-915M/RA-915+ mercury analyzer**.

A water sample is placed into the sample boat with a charcoal bed, which is inserted into the first chamber of the atomizer, where the sample is heated at a temperature of 200–800°C (depending on the selected operation mode). The mercury compounds are evaporated and partially dissociated, forming elemental mercury. All the gaseous products formed are transported into the second chamber of the atomizer by a carrier gas (ambient air). Mercury compounds are totally dissociated and the organic matrix of the sample is burnt out. Downstream from the atomizer the air flow enters the analytical cell heated up to 700°C, and the mercury atoms are detected by RA-915+ analyzer.

This approach does not involve preconcentration on a gold trap and “cooling step”, thereby eliminating ensuing problems. The use of ZAAS combined with a “dry” converter provides the highest sensitivity with no interferences from the sample matrix. Purified ambient air is used for combustion, so that no cylinders with oxidizer or compressed gases and “clean room” environment are required.

***The total time needed for determination of mercury is not longer than 2 minutes.***

***RA-915+/915M is compliant with US EPA 7473 and ASTM D7622 methods.***

### MEASUREMENT RANGE

The measurement range of the mass concentration of total mercury in waste, process or other waters is **3–50000 µg/l without dilution**.

For water with low mercury concentration (natural, potable, treated waste water) LUMEX specialists have developed methods for determination of mercury using RA-915M/RA-915+ analyzer with RP-91 attachment with the detection limit 0.2 ng/l.

### ANALYSIS FEATURES

As compared to the determination of mercury in two stages (digestion + spectroscopic determination), the proposed method has the following advantages:

- Direct determination of total mercury;
- Rapid analysis;
- Low reagent consumption;
- Low running cost (Needs no chemical reagent).

### EQUIPMENT AND REAGENTS

The following equipment and materials are used for analysis:

- Mercury analyzer RA-915M (RA-915+) with PYRO-915+ attachment;
- PC with Windows® 2000/XP/Vista/7 and dedicated software;
- SRM of mercury, concentration 1g/l;
- Activated coconut charcoal, 12/40 mesh, mercury-free (<2 ppb).

The contents of this paper are subject to change without notice.