DIRECT AA MERCURY DETERMINATION IN FOODSTUFF AND MIXED FEED

INTRODUCTION

Direct atomic absorption mercury determination (without any pre-treatment procedures) in food is complicated by its organic matrix. That is the reason why almost all AAS methods of mercury determination in foodstuff include sample digestion by acids. This stage extends analysis time, increases detection limit and becomes the main source of errors. Using a **RA-915M** mercury analyzer with Zeeman background correction and a **PYRO-915+** pyrolytic attachment allows direct mercury determination in foodstuff, food/feed products and similar samples at ppb level that saves time due to elimination of the sample preparation stage.

MEASUREMENT 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 mercury analyzer**.

A sample is placed into the sample boat, 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-915M 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.

Total time needed for determination of mercury is not longer than 2 minutes.

MEASUREMENT RANGE

The measurement range of the mass concentration of total mercury is **2.5–5000 µg/kg** (mass of homogenized sample is **30–400 mg**).

Sample	Detection limit, ppb	Sample	Detection limit, ppb
Bread	0.5	Milk	0.5
Dry milk and condensed milk	1	Sugar	5
Fruits	0.5	Tea	2
Fish	0.5	Vegetables	0.5

ANALYSIS FEATURES

- Sample homogenization and weighting is enough as sample preparation.
- Control of non-selective absorption during the measurement process allows optimizing of sample weight and reduces analysis errors.
- Rapid analysis.
- SRMs with any matrix (both liquid and solid) can be used for calibration.
- Low running cost (Needs no chemical reagent).

EQUIPMENT AND REAGENTS

The following equipment and materials are used for analysis:

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

EXAMPLES OF ANALYSIS

The validity of the LUMEX method is proved by the agreement between the measured and certified concentrations in various standard complex-matrix samples.

Reference material	Mass, mg	Measured value, ppb	Certificate value, ppb	Deviation, %
BCR-150 (Dry milk)	52 / 96 / 109	8.4 / 7.9 / 7.9	9.4±1.7	-14
DORM-1 (Fish)	50 / 100	860 / 780	798±74	+4
BCR-184 (Beef)	29 / 59 100	2.3 / 2.5 / 3.1	2.6±0.6	0

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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