

RA-915 series

Zeeman mercury analyzer



Direct mercury determination in coal

ASTM D6722
EPA 7473
DL/T 2296

INTRODUCTION

According to the UNEP Global Mercury Assessment (2018), coal combustion is the second largest anthropogenic source of mercury air emissions, accounting for 21% of global emissions. To reduce atmospheric emissions and effectively manage the process of stack gas cleaning, it is necessary to control the mercury content in coal prior to combustion.

The RA-915 series mercury analyzers use thermal decomposition method that provides direct determination of mercury concentration in coal and allows to omit elaborate and time-consuming procedures of the sample preparation. This method implemented in ASTM D6722, EPA 7473, DL/T 2296 involves thermal decomposition of the sample combined with amalgamation on a sorbent trap and catalytic conversion using oxygen as a carrier gas. Lumex Instruments offers the procedure and instrumentation for rapid direct analysis using thermal decomposition method without amalgamation step. Thermoscanning option enables fast determination of mercury species having different binding energy to coal matrix, improving the efficiency of coal pre-combustion treatment.

MEASUREMENT METHOD

The sample is heated in the thermal decomposition chamber. The mercury compounds are evaporated and dissociated forming elemental mercury. All the gaseous products formed are transported into the heated analytical cell by Hg-free ambient air, and the mercury atoms are detected by differential atomic absorption spectroscopy. This method does not involve intermediate preconcentration of mercury on a gold trap, thereby eliminating ensuing problems. Zeeman background correction provides the highest selectivity without interference from the sample matrix.

Detection limit: 1 ppb (1 µg/kg).

ANALYSIS FEATURES

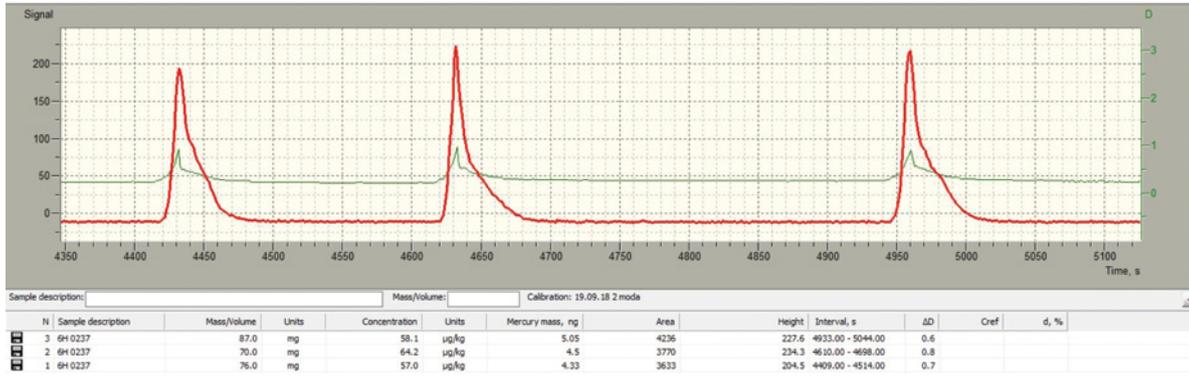
- no sample pretreatment with wet chemistry;
- low limit of detection, high selectivity;
- wide dynamic measurement range: more than 5 orders of magnitude;
- no amalgamation step;
- high analysis throughput (1–3 minutes per sample);
- no need for reagents and cylinders of oxygen, argon or other compressed gases;
- low running cost;
- no «memory» effect;
- the CRM of any matrix can be used for calibration and QA/QC.
- a special gradual heating mode allows the determination of mercury thermospecies in coal.

EQUIPMENT AND REAGENTS

The following equipment and materials are used for analysis:

- RA-915 series mercury analyzer (RA-915 Lab, RA-915M combined with PYRO-915+ attachment, or RA-915F);
- PC with Windows® and RAPID software;
- any solid or liquid CRM of mercury;
- Lumex Instruments kit, order No 0300003293.

EXAMPLES OF ANALYSIS



Samples:

Coal sample 6H 0237 (m1 = 87 mg, C1 = 58 ppb; m2 = 70 mg, C2 = 64 ppb; m3 = 76 mg, C3 = 57 ppb), Cav = 60 ppb, RSD = 6%



RA-915M mercury analyzer with PYRO-915+ attachment



RA-915 Lab mercury analyzer



RA-915F mercury analyzer

