RA-915 Series

Zeeman mercury analyzer

Direct **mercury** determination in cosmetics

ISO 23674

INTRODUCTION

National and international legislation prohibits the use of any inorganic and organic mercury compounds as an ingredient in cosmetics (including creams, soaps, lotions, shampoos, lipsticks, nail varnishes, makeup removers). An exception is made only for thiomersal (thimerosal) and phenylmercury salts (acetates, benzoates, borates) – preservatives used in eye makeup and eye makeup removal products. In other certified cosmetics, mercury occurs in trace amounts. Extremely high levels of mercury have been found in illegally and semi-legally produced lightening creams and soaps. Lumex Instruments propose the procedure of direct analysis of cosmetic products without sample pre-treatment and intermediate steps using RA-915 series mercury analyzers based on atomic absorption spectroscopy with Zeeman correction of the background absorption (ZAAS).

Regulation on mercury in cosmetic products

	Cosmetics	Eye cosmetics
21 CFR § 700.13 Use of mercury compounds in cosmetics including use as skin bleaching agents in cosmetic preparations also regarded as drugs	0.0001% (1 ppm)	0.0065% (65 ppm)
EU Regulation No 1223/2009 on cosmetic products	prohibited	0.007% (70 ppm)
MERCOSUR/GMC/RES N° 62/14	prohibited	
MERCOSUR/GMC/RES Nº 07/11		0.007% (70 ppm)
ASEAN Cosmetic Directive (2022)	prohibited	0.007% (70 ppm)
PRC Safety and technical standards for cosmetics (2015; 2022 draft)		0.007% (70 ppm)

MEASUREMENT METHOD

The sample is heated in the thermal decomposition chamber. The mercury compounds are evaporated and dissociated, forming elemental mercury. All volatile products generated are transported into the heated analytical cell by Hg-free ambient air, and 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.

Measurement of the mass concentration of total mercury is possible from a level of 0.002 ppm (2 µg/kg) and covers the entire possible range of concentrations.

ANALYSIS FEATURES

- direct analysis;
- low limit of detection, high selectivity;
- wide dynamic measurement range: more than 5 orders of magnitude;
- high analysis throughput (1–5 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.

EQUIPMENT AND REAGENTS

The following equipment and materials are used for analysis:

- RA-915 series mercury analyzer (RA-915Lab, RA-915M combined with PYRO-915+ attachment, or RA-915F);
- PC with Windows® OS and RAPID software;
- any solid or liquid CRM of mercury.

RA-915 Lab

RA-915M with PYRO-915+

RA-915F