



**KHARKOV NATIONAL UNIVERSITY OF RADIO ELECTRONICS  
NATIONAL SCIENTIFIC CENTRE "INSTITUTE OF METROLOGY"  
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"Uncertainty in Measurement: Scientific, Normative,  
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## **THESES OF REPORTS**

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acetylene-air flame at a wavelength of 852 nm on an AAS-3 spectrometer (Germany). Thus, it has been shown that the use of ultrasound in sample preparation in the determination of cesium for the destruction of its organic compounds and the intensification of preconcentration by coprecipitation makes it possible to increase the expressiveness and improve the metrological characteristics of the results of analysis (Table 3).

Table 3

Results of the determination of cesium in cooking salt

Object of analysis	Injected Cs·10 <sup>-7</sup> %	Found out Cs · 10 <sup>-7</sup> , % / Sr (p = 0,95, n = 6)		
		*	**	***
PO "Artyomsol"	0	–	–	–
R. one	2,00	2,07 /0,03	1,76 /0,09	1,86 /0,06
Genic	0	4,26 /0,03	8,97 /0,08	9,26 /0,05
Salt factory	2,00	6,11 /0,04	10,45/0,09	11,19/0,06
Heroic	0	4,88 /0,04	8,04 /0,09	8,76 /0,06
Salt factory	2,00	7,01 /0,03	9,65 /0,08	11,01/0,07

Notes. The averaged results of six experiments are given.

\*No destruction of organic compounds.

\*\* With the destruction of organic compounds by boiling with ammonium persulfate in an acidic medium.

\*\*\* With the destruction of organic compounds by US exposure

## EXAMPLES OF THE EXPANDED UNCERTAINTY EVALUATION BASED ON THE KURTOSIS METHOD

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A disadvantage of the Guide to the Expression of Uncertainty in Measurement (GUM) [1] is the independence of the expanded uncertainty from the probability density function (PDF) of the input quantities [2]. In documents EA-4/02 M:2022 [3] and M3003:2012 [4], it is proposed that the coverage factor should be selected based on an analysis of the budget of uncertainty obtained from the “most highly studied and most highly controlled statistical measurements” [1]. An algorithm for use in selecting the coverage factor, generalizing the approaches proposed in [3-4], is presented in [5]. It should be noted that the implementation of this algorithm has a low accuracy in determining the coverage factor and is poorly automated. We have proposed an approach based on the kurtosis method (KM), which allows us to automate the process of calculating the coverage factor [6]. The estimations of the expanded uncertainty will be close to the estimations obtained by the Monte-Carlo method (MCM) [7].

The report considers the use of KM [5, 7-8] for expanded uncertainty evaluation for the examples given in [3], Supplement 2. These examples were developed for situations in which one or two abnormal contributions to the measurement uncertainty are dominant.

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## COMPONENT UNCERTAINTIES EVALUATION AT MANUFACTURE OF CALIBRATION STANDARD – CADMIUM SOLUTION IN HNO<sub>3</sub>

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This paper discusses the preparation of a calibration solution for atomic absorption spectrometry based on the corresponding high-purity metal. A solution of 1000 mg of cadmium Cd in 1 liter of nitric acid HNO<sub>3</sub> is considered.

Almost all modern analytical measurements (in this case, atomic absorption spectrometry) are relative. Therefore, they require the use of a reference standard to ensure the traceability of the measuring instrument.

A calibration solution with a mass concentration of approximately 1000 mg/l is prepared from high-purity cadmium metal.

The measurement model:

$$C_{Cd} = 1000 \frac{mP}{V},$$

where  $C_{Cd}$  is mass concentration of cadmium in solution, mg/l, 1000 is conversion

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