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A futuristic digital interface with a glowing Earth globe in the center. The interface is overlaid on a background of a person's hands reaching out towards the screen. The interface includes various data visualizations such as bar charts, line graphs, and pie charts. Text elements include "BUSINESS", "NETWORK SEARCH", "LOADING 100%", "MEDIA", and "WORLD". The overall aesthetic is high-tech and data-driven.

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Analysis of the Current State of Providing Metrological Traceability and Assessment of Uncertainty of Measurement

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ABSTRACT: This article discusses the concept of metrological traceability, which is important for practical use, since it allows you to compare the accuracy of measurements in accordance with a standardized procedure for assessing measurement uncertainty. The analysis of the current state of ensuring metrological traceability and assessment of measurement uncertainty is carried out. Metrological traceability is analyzed as a property of a measurement result, with the help of which the result can be compared with a standard through a documented continuous chain of calibrations that cause measurement uncertainty. This is usually achieved by using reliable accredited calibration laboratories (CL) that provide traceability to national standards.

KEYWORDS: metrological assurance, measurement uncertainty, state standard, national standards, metrological traceability, standard samples, calibration.

I. INTRODUCTION

Every day, hundreds of thousands of technical and chemical measurements support decisions about food safety, health, and environmental protection.

The global market also needs accurate and reliable measurements so that technical barriers to trade can be minimized. In all these areas, "tested once, accepted everywhere" is an increasingly important concept and underscores the need for reliable measurement results. It is known that the measurement result is only complete when it is specified together with a quantitative measure of the reliability of this estimate, i.e. it will only be when the estimated value of the measured value is accompanied by an accurate characteristic of the measurement result [1-4].

In accordance with ISO / IEC 17025 and the identical state standard of the Republic of Uzbekistan O'z DST ISO / IEC 17025, all SI used for testing and / or calibration of SI in General, and in particular for the purpose of their certification, must be calibrated before they Are put into operation.

In the international document VIM JCGM 200, metrological traceability is defined as a property of the measurement result, by which the result can be compared with the standard through a documented continuous chain of calibrations that cause measurement uncertainty.

II. RELATED WORK

The concept of metrological traceability is important for practical application, as it allows you to compare the accuracy of measurements in accordance with a standardized procedure for estimating measurement uncertainty.



Therefore, an important element of ensuring metrological traceability is the estimation of measurement uncertainty, which in accordance with JCGM 200 is defined as an integral parameter that characterizes the variance of a quantitative quantity that can be attributed to the measured value based on the information used.

III. EXPERIMENTAL RESULTS

Metrological traceability or measurement traceability for different levels of metrological work can be represented as shown in Fig. 1 [5].

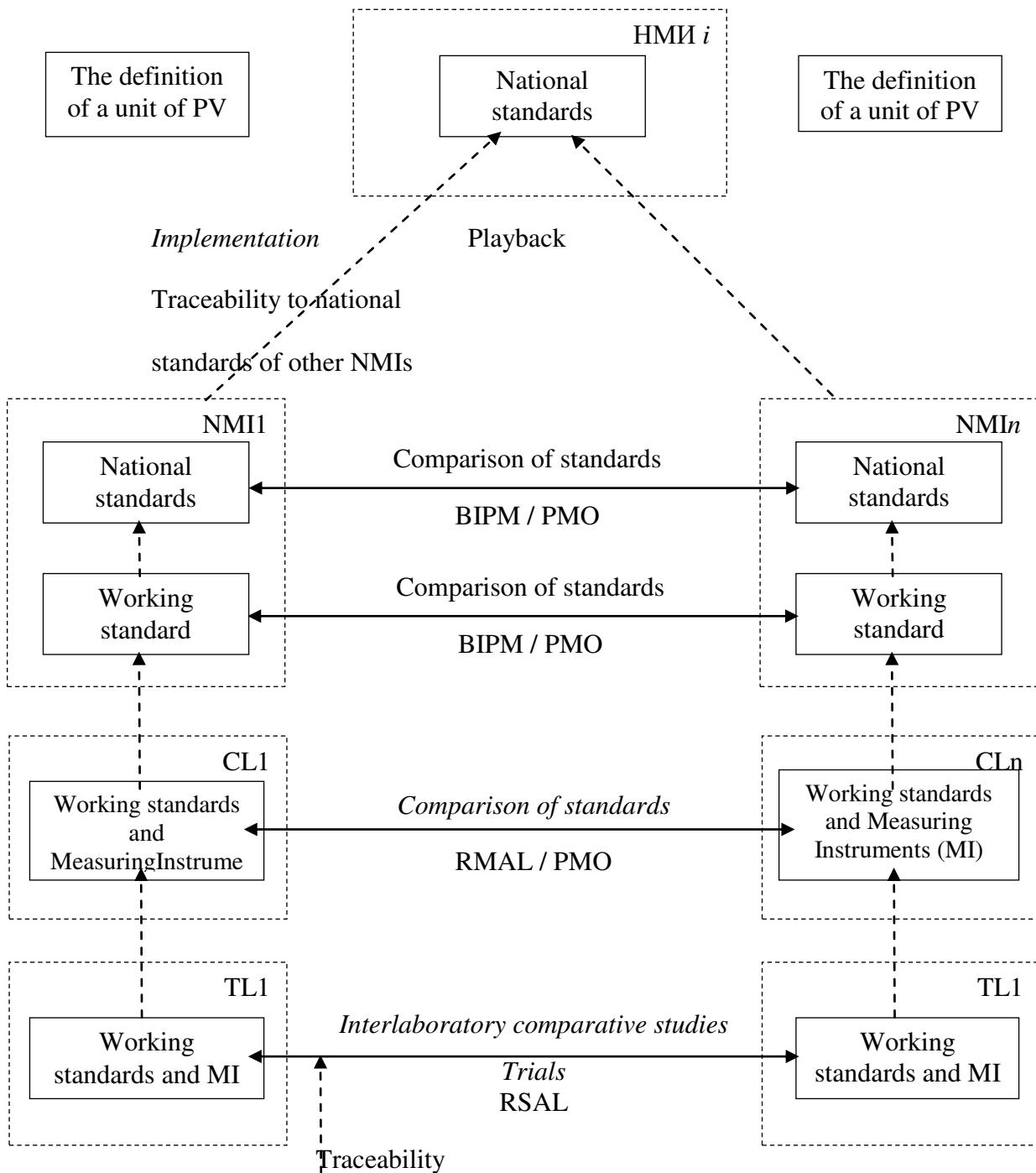


Fig. 1. Metrological traceability for different levels of metrological work.



The chain of metrological traceability begins with the SI units themselves. The authority to determine SI units in accordance with the provisions of the Metric Convention [6] is with the CMI. The BIPM is traditionally responsible for defining and implementing these units. It conducts regular comparisons of standards that are stored in the BIPM and national standards that are stored in the NMI. Standard samples (O'zdst 8.004 and GOST 8.315) in some cases can be considered reference copies. Metrological traceability is usually achieved by engaging reliable accredited calibration laboratories (CL) that provide traceability to national standards.

Calibration laboratories that meet the requirements of the ISO/IEC 17025 and [O'z DSt ISO/IEC 17025 standards are considered competent. The SI calibration certificate with the logo of the accreditation body, issued by the accredited in a certain area of measurement of CL, is sufficient confirmation of the traceability of a specific calibration of measuring instruments.

Traceability of measurements to SI units can be achieved by reference to the corresponding natural fundamental physical constant (FC).

The interstate recommendations of RMG 29 do not explicitly contain the concept of "metrological traceability", but instead use the concept of "unity of measurement". The concept of "unit size transfer" also has a certain connection with the concept of "metrological traceability".

Thus, the basic concepts of Metrology - "metrological traceability", "unity of measurement", "transmission of unit size" and "measurement uncertainty" are closely interrelated concepts.

The concept of "measurement uncertainty" in Metrology appeared as a result of the development of many international organizations.

These documents make it mandatory to provide quantitative measurement results with uncertainty values.

These standards also require calibration and test certificates to include: measurement uncertainty (5.10.4.1 enumeration b) and evidence that measurements are traceable to SI units (5.10.4.1 enumeration c).

The publication of the document [7] by the European Association for international traceability of chemical analytical measurements (EURACHEM) in 1995 was an important event in the implementation of international efforts to achieve comparability of chemical analysis results and adequate expression of their reliability. The main purpose of this paper is to show how, based on the General approach described in [1, 2], uncertainties should be estimated in a specific measurement area such as quantitative chemical analysis. It is important that many national accreditation bodies already require analytical laboratories to provide information about the uncertainty of their results. That is why the problem of developing uniform rules for estimating uncertainty in chemical analysis has become relevant.

The EURACHEM document, which is essentially a "chemical adaptation" of the GUM Manual, has caused serious controversy among analytical chemists. First of all, the uncertainty estimation scheme involves a detailed analysis of possible sources – the input values of the measurement equation. However, not all factors that affect the result of chemical analysis are known in advance and can be included in the measurement equation.

In addition, the principles of uncertainty estimation developed in the GUM Manual differ significantly from the methodology traditionally adopted in analytical chemistry. The current practice of developing and approving chemical analysis methods is based on establishing their "performance characteristics" and does not require knowledge of the mathematical model of the measurement process. Performance characteristics, such as reproducibility and accuracy, detection limit, selectivity, sensitivity, etc., are determined based on the results of an experimental study of the technique, preferably based on an inter-laboratory experiment in accordance with accepted standards, for example, ISO 5725.

In order to widely introduce measurement uncertainty assessment into international metrological practice, along with the previously mentioned works, numerous scientific, methodological and regulatory documents have been developed and are being developed, in particular [8-15].

IV. CONCLUSION

Despite such a wide range of developments, estimates of the uncertainty of the results of some types and subspecies of measurements remained undeveloped. The latter can include acoustic, in particular, measurements of dynamic shear elasticity and viscosity of liquids, which is partially devoted to this work.

Dynamic shear elasticity and viscosity of liquids are determined by direct GOST 8.207, MI 1552 and indirect MI 2083 measurements. Estimation of uncertainty of results of direct and indirect measurements is considered in point 1.2, and joint measurements in [20].

The uncertainty approach has not yet found its place in the country's economy, in particular, in scientific research, in the development of regulatory and methodological documents, in industrial measurements, and in other areas. This is due to the difficulties of applying the uncertainty approach, and they are mainly due to: the existence of many standards for testing products, in which the characteristics of test results are not required to be represented by



uncertainty, but by other accuracy characteristics and in various ways; the lack of procedures for evaluating uncertainty, etc.

REFERENCES

1. Guide to the Expression of Uncertainty in Measurement: First edition. – ISO, Switzerland, Geneva, 1993. – 101 p.
2. Guide to the expression of measurement uncertainty: Translated from English. under the scientific ed. of prof. Slaeva V. A.-GP "VNIIM im. D. I. Mendeleev", St. Petersburg, 1999. - 134 p.
3. Velichko O. N., Khakimov O. sh., Gordienko T. B., Jabbarov R. R. "Evaluation of results of precision and technical measurements". Scientific-methodical and training manual. - Tashkent: "Tafakkurqanoti", 2012. -316 p.
4. Diplomatic document "Metric Convention" signed in Paris on may 20, 1875, as amended by the agreement signed in Sevres on October 6, 1921, and the regulations attached thereto.
5. Guide: quantifying uncertainty in analytical measurement, EURACHEM/CITAC, 2nd edition, 2000.
6. Expressing of the Uncertainty of Measurement in Calibration, –EAL, –R (1997).
7. Grabe M. Towards a new standard for the assignment of Measurement Uncertainties: National Conference of Standard Laboratories. –Chicago, 1994.
8. Sommer K.–D., Kochsiek M., Siebert B.R.L., Weckenmann A.A. Generalized Procedure for Modelling of Measurements for Evaluating the Measurement Uncertainty. 17th IMEKO WORLD CONGRESS 2003, Dubrovnik. Proceedings, INTERNATIONAL MEASUREMENT CONFEDERATION(IMEKO) and Croatian Metrology Society, Zagreb, 2003(ISBN953–7124–00–2)
9. Laaneots R. A. Fundamentals of Metrology //Saint Petersburg, 2017, 471 p.
10. Bryansky L. N., Doynikov A. S., Krupin B. N. Measuring equipment, 2000, № 5, 29.
11. Doynikov A. S., Zdorikov N. N., Karpov O. V., Lakhov V. M., Maksimov I. I., Seiku E. E. Measuring equipment, 2002, no. 2, 66.
12. Khakimov O. S., Latipov V. B., Boymatov N. Introduction the evaluation of measurement uncertainty in Uzbekistan // J. STANDART, No. 1, 2007. –S. 8–11.
13. Khakimov O. S., Latipov V. B., Boymatov N. T. Evaluation of measurement uncertainty in non-destructive testing of polymer fibers// the Republican scientific–practical conference "non-destructive testing is a key element of the quality system". The main points of the reports. Tashkent, 2007. - P. 18-26.
14. T. B. Abdullaev, O. Sh. Khakimov. Kostrubanic and linderalique ensure the quality of suportin ajralmas castle // "products minegishi quality"international Khujand specialist angler petroproduct researcher and tehnikuma Materialhard. - Tashkent, 2007. 27-31 B.
15. Khakimov O. S., Boymatov N. T. Quality products cuticatclimetrine of nanocast of naturalising Dannielynn barelas // "high quality products menei" analni of buice specialist ready package–period requirements of the Republic of Sciences of AMI and tehtaviin of Materiallari Oliveri nauplii. Tashkent, 2007. 63-65 b.16. Latipov V. B., Khakimov O. SH. Traceability and uncertainty of measurements – an integral part of the quality system // TA'LIM TEXNOLOGIYALARI, No. 5, 2007. - Pp. 19-22.
16. Abduvaliev A. A., Latipov V. B., Umarov A. S. and others. Fundamentals of standardization, Metrology, certification and quality management. - T.: NIISMS, 2007. - 555 p.
17. Abduvaliev A. A. Latipov B. V., Umarov S. A. the most Important scientific results of the State scientific–technical program resulting NIISMS//J. STANDART, No. 3-4, 2005. –S. 7–9.
18. Velichko O. N., Latipov V. B. Calibration and measurement capabilities of national Metrology institutes //J. STANDART, No. 1, 2009. –S. 36–41.
19. Vafo Latipov, Ortogoli Hakimov, Rustam Jabbarov. Estimation procedure of measurment uncertainty of textile material thermal capacity different hummidities//The Advanced Science Journal. Mart (№ 1), United States, 2012, p.128-133.



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