CITAC NEWS
Co-Operation on International Traceability in Analytical Chemistry
FEBRUARY 2006

Foreword by the Chair

In the last CITAC News I shared my thoughts about traceability and CITAC's role in disseminating traceability for chemical measurements to the working level. Now I would like to make some other points on this subject, especially focusing on ways for such dissemination and the need for participation of several different players in order to achieve this objective in an effective manner.

As we know, measurements to assess the chemical composition of a material or to determine the amount of a particular substance in a material are critical in providing information needed to assure equity in trade, monitor and enhance industry's products and services and its innovation, and to assess and improve public health, safety, and the environment.

Chemical measurements of known quality have become increasingly important during the past decade impelled by trade and economic globalization. While not an end in itself, measurement traceability [the "property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties" (VIM, 1993)] is an important tool/concept for assuring the quality of measurements over both space and time. In practice, establishment of traceability for chemical measurements at the working level is not an easy task. To have traceability to SI or any other combination (multiple, sub-multiple) is not always possible, thus, often making us look for the "next best" internationally agreed reference.This difficulty comes from the very large number of chemical entities, covering a wide range of concentrations in different matrices. This shows that the infrastructure established for physical measurements cannot easily be applied to the field of chemical or even biological measurements.

National Metrology Institutes (NMIs) are designated to work at the top of the traceability pyramid. Their contributions alone are not sufficient to provide traceability to the working level. Additionally, it is important to consider that only 51 countries, plus 20 other associated countries, signed the Metre Convention - of the existing ~ 200 countries in the world. It means that not more than ~35% of the countries worldwide have the conventionally established metrological system. It shows that laboratories with expertise in specific techniques, reference materials producers, calibration laboratories, etc. are also needed.

The fact that an institute is designated to be an NMI does not necessarily mean that it has demonstrated capabilities for realization and dissemination with respect to chemistry. The same must be for any laboratory within the metrological system. So, how can traceability for chemical measurements be realized on a global level? It is a critical point that needs to be discussed with transparency on a scientific basis.

To disseminate traceability for routine chemical testing laboratories that employ, out of necessity, rapid and cost-effective methods, it is necessary to have organizations whose mission and responsibility it is to develop, critically evaluate and maintain measurement methods of "higher order" - methods capable of delivering with low bias, whose operation is completely described and understood, with complete uncertainty budget provided. Again, meeting this requirement demands a clear demonstration of chemical measurement capability, not formal designation.

Considering that (i) laboratories to be at the metrological top must have systems that require a measurement and testing infrastructure in place which will enable them to demonstrate the comparability and traceability of their measurements and (ii) it is practically impossible for a single institute or even for a country to provide all the tools needed to facilitate traceability in chemistry, it is a challenge for governments to set up a recognized metrological infrastructure and its management, that provides the necessary support for laboratories to guarantee a "continuous chain", as in the VIM definition.

As a world trend, even in industrialized countries, it is becoming evident that measurement services relating to metrology in chemistry can be delivered through a network of laboratories, working in a cohesive fashion, at the top of a traceability chain and serving as a virtual NMI.

So, to avoid duplication, and deliver the best cost and benefit results, many countries are adopting a distributed system, using institutes with preexisting capabilities to deliver their national standards for chemistry. Examples of networks can be seen in countries such as Denmark, Germany, Chile, India, Slovenia, Switzerland and others.

The activities of the Joint Committee for Traceability in Laboratory Medicine (JCTLM) provide an excellent example of how the infrastructure for providing traceability down to the working level can be achieved in a specific area. The tools provided through the JCTLM include a database with a list of laboratories which have been deemed qualified to provide reference measurement services to the in vitro diagnostic (IVD) industry and clinical measurements community. The JCTLM has as members NMIs and other national standards laboratories, academic and private reference laboratories, the international laboratory accreditation, medical professional communities and the IVD industry.

In summary, it is clear that establishing the framework for providing chemical measurements of known quality to support innovation and regulatory decision-making on a worldwide basis requires contributions from all of us. Other opinions and discussions on this topic are welcome.

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Contribution of the Vice Chair

Editorial: Hot Topics of Metrology in Chemistry

When the opening of the CITAC News Editor's position was discussed at the 20th CITAC members meeting in Paris, April last year, I imagined a freshly printed copy, smelling of printer's ink (which I love as every other editor) and the image enveloped me like a "fata morgana". I forgot the troubles of delayed papers, unanswered e-mails, disputes with the News designer and producer, financial difficulties, etc. Taking advantage of this moment, Dr. Laurie Besley, the CITAC Secretary, wrote in the meeting minutes: "IK indicated his willingness to continue in the position and this offer was gratefully accepted by the meeting." As my friend's wife said before giving birth to her second child, "How could I have forgotten that and agreed again?" A lovely girl was born...

Every year adds something to our knowledge of metrology in chemistry. Reliable/comparable analytical measurements and, correspondingly, metrology in chemistry are essential in all aspects of human activity. We are accustomed to proving and explaining this in our lectures, everyone using his/her own examples. However, the unique possibility of being proud of metrology achievements is the NASA success in investigation of comet Tempel 1. This event received wide coverage and I wish only to recall that on July 4, 2005 the NASA spacecraft was more than 133 million km from the Earth and 3.5 million km from the comet. The 372 kg copper impactor sent from the spacecraft hit the comet's surface at the angle of about 25° at the velocity of about 10km/sec, i.e. 37000 km/hour. Note, the comet is only about 5 km-wide and 11 km-long - fantastic accuracy! An immense cloud of fine powdery material was released when the impactor slammed into the nucleus of Tempel 1. The spectral chemical analysis of the material detected the significant increase of the amount of ethane (C_2H_6) in the cloud around the comet, resulting from the impact (http://www.nasa.gov/mission_pages/). Since the comet is 4.6 billion years old (close to the age of the Earth), the study of its nucleus chemical composition contributed to the understanding of the Earth's history. It was the goal of the 6 year project and of $330 million expenditure, and truly, accuracy of the chemical analysis at such a great distance from earth was no less important than the accuracy of the impactor hitting the target.

Another issue to be proud of is the request of the thermometry community to metrology in chemistry (K.H.Hill and S.Rudtsch. Metrology 42, 2005: L1-L4). The problem is that the International Temperature Scale (ITS 1990) assigns temperatures to solid-liquid phase transitions (triple points, melting and freezing points) of various substances. Since ideally pure substances are unattainable in practice, the influence of impurities is the dominant uncertainty component in realizing these most important reference temperatures. That is why the development of new certified reference materials of highest purity could improve the accuracy of temperature calibration and perhaps of some other physical properties, such as specific heat capacity and electrical or thermal conductivity.

Redefinition of the kilogram is also a challenge, important for both metrology in chemistry and metrology in physics (I.M.Mills et all. Metrology, 42, 2005: 71-80). The kilogram is the only unit among the seven base SI units still defined in terms of a material artifact (90% Pt and 10% Ir alloy since 1889). It is not linked to an invariant of nature, and its prototype with the six official copies kept at BIPM may be damaged or even destroyed. There are two approaches discussed for a new definition of the mass unit. The first is an experimental determination of the unknown mass standard using the Planck constant as a known quantity, as well as the watt balance linking electrical and mechanical quantities with the required accuracy. The second approach implies an experimental determination of the mass of a single silicon crystal, very pure and nearly crystallographically perfect, using the Avogadro constant as a known quantity, and the x-ray crystal density method with sufficient accuracy. When the kilogram is defined based on the value of the Planck constant, the mole can be redefined based on the value of the Avogadro constant. Such units tied to universal constants do not refer to properties of a particle or atom (P.J. Mohr and B.N.Taylor. Consultative Committee for Units, 2005: CCU/05-29; see more details in the contributions by Prof. Paul De Biévre and Dr. Robert Kaarls below).

Of course, the question of measurement uncertainty and metrological traceability is still a "hot topic" in analytical chemistry, especially in pharmaceutical industry, where the current situation is "traceability without uncertainty" (I. Kuselman, A.Weisman, W. Wegscheider. Accred. Qual. Assur. 8, 2003: 530-531). On the other hand, an evolution of understanding metrology concepts including uncertainty in the field of official USP reference standards was discussed recently (R.L. Williams et. al., J. of Pharm. and Biomed. Analysis, 40, 2006:3-15). Development of Eurachem / Eurolab / CITAC / Nordtest Guide "Estimation of measurement uncertainty arising from sampling" and Eurachem / CITAC Guide "Assessing performance in qualitative analysis / The expression uncertainties in qualitative analysis and testing" will expand this theme.

Quantitative assessment of reference materials adequacy to a sample under analysis, as well as quantitative assessment of comparability of analytical results obtained in proficiency testing are the subject of a fruitful discussion today (I. Kuselman. Accred. Qual. Assur. 9, 2004: 591-596; 10, 2006: 466-470).

Selection and use of proficiency testing schemes for a limited number of participants is an interesting problem that may arise when a proficiency testing scheme is to be organized for determination of analytes specific for a local region, for an industry under development, or for analysis of non-stable analytes, etc. (IUPAC current project: www.iupac.org/projects/2005/2005-019-2-500.html).

I think these facts could be helpful in any lecture or discussion on the importance of metrology in chemistry. One can also find many other interesting topics in the contents of the CITAC News 2006.

Dr. Ilya Kuselman
Vice Chair of CITAC
INPL, Israel

Message of the Honorary Secretary

The 20th CITAC Members' Meeting, Paris, April 2005

In April some 22 CITAC members assembled at the Laboratoire National d'Essais on a bright sunny Sunday afternoon in Paris to conduct the 20th such annual meeting of members, but the first to be conducted by our new Chairperson, Vera Poncano from Brazil. The geographic diversity of the members present was marked, with 9 from Europe, 5 from Asia, 4 from the Americas, 3 from Oceania, and 1 from Africa. There was a full agenda to address and everyone was keen to contribute.

After the traditional welcome from the Chair, the formalities of the previous minutes were dispensed with. The first issues addressed thereafter were those of finance because Wolfhard Wegscheider, who had come to Paris for the sole purpose of attending the meeting, had to leave us early to return to his home in Austria. Wolfhard, one of the past CITAC Chairs, has generously acted as Treasurer to CITAC for some time in an unofficial capacity and the first act of this meeting was to establish an official CITAC Treasurer's position, write it into the CITAC Terms of Reference, and elect Wolfhard to it (before he had the opportunity to escape). The new CITAC Executive will henceforth consist of Chair, Vice-Chair, Secretary and Treasurer.

Wolfhard's report showed that CITAC currently has plenty of money to continue its activities. However, the major expense, that of the production and dissemination of CITAC News, will soon drain the society of its lifeblood unless a sponsor is found to replace the generosity of the National Metrology Institute of Japan, which has footed the bill for a number of years but is now unable to continue to do so. It was decided that a consortium of national metrology institutes might offer the best solution, and that a number of them should be approached to see if they would assist.

Reports followed from CITAC's liaison officers to a variety of international and regional organisations, all showing that the business of metrology in chemistry is gathering great momentum and gaining acceptance as an important discipline in most areas of the world. Indeed this success is posing some problems for CITAC itself as other organisations take up the tasks that CITAC with only a few other partner organisations was undertaking in the early years of its activity.

A substantial part of the meeting was therefore spent in addressing the future role of CITAC, how best it can target specific activities given the growing number of other, perhaps better resourced, agencies adopting similar objectives. The predominant idea that emerged was that CITAC can now be most effective as a bridging organisation, bringing the messages developed in the past decade or so to new audiences both in new areas of the world and in new sectors of national economies. It was felt that CITAC's greatest strength is in its past successes, in the geographic spread of its membership, and in the depth of immersion that its members have in the world of chemical measurement. It needs to perhaps shift its emphasis from its traditional focus on developing the concepts of metrology in chemistry to the dissemination of these concepts throughout industry and society across the globe. A strategy is needed to develop this idea into an action plan, and the CITAC Executive was charged with the task of developing such a strategy and presenting it to the next members' meeting in 2006.

It was decided that CITAC should host a special workshop on some aspects of metrology in chemistry at the International Congress on Analytical Sciences (ICAS) in Moscow in June 2006. The Congress organising committee has formally invited CITAC to participate in this way and a detailed program will be developed with an emphasis on involving the local Russian scientific community.

Proficiency testing (PT) is being recognised as a major part of a metrology infrastructure and Werner Hässelbarth gave two presentations on developments in this area. The first was on the EPTIS database that lists the PT schemes available to testing laboratories throughout the world; the second was on the COEPT project, a European attempt to assess the performance of various PT programs in analysing identical sets of data. These initiatives are very valuable and both presentations were well received by members.

Our indefatigable Vice-Chair, Ilya Kuselman, offered to continue to act as Editor of CITAC News, an offer that was gratefully accepted by the meeting.

Finally, Vera Poncano, on behalf of all the CITAC members, made a presentation to the outgoing CITAC Chair, Kensaku Okamoto, thanking him for the hard work he had contributed to the development of the group. Indeed, Kensaku's contribution has been substantial and all of our members are immensely grateful to him.

After the close of the meeting a number of the members assembled to share a most convivial meal in one of Paris's many fine restaurants. The next CITAC members' meeting will be held during ICAS in Moscow, Russia in June of 2006.

This report is necessarily brief, but the full minutes of the meeting have been posted on the CITAC website, at www.citac.cc

Dr. Laurie Besley
Honorary CITAC Secretary
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Participants of the 20th CITAC members meeting

The Avogadro Constant: the Unit and the Scaling Factor

Introduction

It is hardly impossible to overestimate the importance of the Avogadro constant, and an enormous amount of effort has been spent in the course of the last centuries on its determination and improvement. As a "constant" it enters very important relationships between fundamental *constants* yet it is still the subject of big *measurement* programmes. It is a key to a possible new definition of the kilogram, the unit for mass, yet it is not (yet?) known with sufficiently small uncertainty to make the transition from the old definition to the new one.

For many years, two major international attempts have been going on to improve it, i.e. to reduce its uncertainty, yet the uncertainty aimed for ($1.10^{-8} N_A$) will be extremely difficult to achieve and take many years. It is related to the definition of the mole, yet it is not mentioned in that definition. It makes people think about a 'number of things', consistent with the particulate nature of matter, a fundamental characteristic known as the "numerosity" of entities, yet the definition relates it to the definition of the unit of mass, a property of matter which has nothing to do with "numerosity" but with inertia. Its numerical value is held to relate ratios of quantities measured on the macroscopic scale to ratios of the same quantities on the atomic scale, yet that does not sound as a "fundamental constant of nature", but just as a "scaling factor".

N_A as a scaling factor

We examine a few examples hereafter where the Avogadro number $\{N_A\}$ is used as a scaling factor.

1. The basic insight of thinking and working in *ratios of numerical quantity values, i.e., of numbers*, enables to know an unaccessible ratio of numbers on the atomic scale from measuring that ratio on an accessible macroscopic scale. The numerical value of the Avogadro constant $\{N_A\}$ plays the role of such a scaling factor (in principle, it could have been any other large number, but it was convenient to connect it to the kilogram in order to define an atomic mass unit in terms of the kg).

The concept enabling us to do so is simple and essential. Ratios of numbers on the macroscopic scale are identical to ratios of numbers on the atomic scale, hence measuring them on the macroscopic scale (which we can do), enables to know them on the atomic scale (where we cannot do that yet).

2. The ratio of the molar volume $V(E)$ and the atomic (or molecular) volume $V_O(E)$, in fact, the atomic volume fraction of a single crystal cell of the same entity E (element or molecule), is equal to the Avogadro number:

$$\{N_A\} = V(E) / V_O(E).$$

This is the equation which is used as the basis for a redetermination and improvement of the Avogadro constant through measurements on a "near-perfect" Si single crystal; that is possible because all input quantities in the above equation are accessible through direct measurement:

- the atomic volume is accessible through measurements of the interatomic distance a_O of the Si atoms (via the lattice constant d_{220}):

$$V_O = a_O^3 / 8 ;$$

- the molar volume $V(E)$ is accessible through measurements of molar mass $M(E)$ and density ρ:

$$V(E) = M(E) / \rho, \qquad \text{wherein}$$

* the molar mass $M(E)$ is accessed through measurements of the abundances $x(^iE)$ of the isotopes (^iE) of Si;

$$M(E) = \sum x(^iE) \bullet M(^iSi)$$

$$= \sum \{ [n(^iSi) / n(^{28}Si)] \bullet M(^iSi)] \} / [\sum n(^iSi) / n(^{28}Si)]$$

$$= \sum [R_{i/28}{}^{o} \bullet M(^iSi)] / \sum R_{i/28} ;$$

* note that the measurement of the abundance ratios of the Si isotopes

$$x(^iSi) / x(^{28}Si) = n(^iSi) / n(^{28}Si) = R_{i/28}$$

is an amount-of-substance measurement of ratios of numbers measured in a high precision mass spectrometer, which can therefore be called an amount comparator;

* the atomic or molar mass $M(^iE)$ of any Si isotope atom is compared with the mass of the ^{12}C atom, thus constituting a ratio of numbers (the number of cycles in a mass spectrometric

Fig. 1: A "near-perfect" 1 kg Si single crystal. Since "near-perfect", it acts as a "near-perfect" mirror for IMGC's Anna Peuto.

"trapped ion" measurement);

* the density ρ is accessed through measurements of the mass $m(Si)$ of a near-perfect Si single crystal and of its macroscopic volume $v(Si)$ by way of diameter (= length) measurements (fig. 1); again, ratios of numbers are measured; the mass of the sphere is measured through comparing it to the mass of the primary kilogram by means of a highly precise balance otherwise known as a mass comparator (fig. 2):

$$\rho = m(Si) / v(Si) .$$

Once more, it is a matter of measuring ratios of numbers.

Fig. 2: The balance, used in early chemistry, compares amounts of substance by comparing their weights or masses. From early times, weights (or masses) were compared by a single instrument: the balance. Recognising its status, science gave this measuring process a base (SI) unit, the kg, but science and technology discovered the fact that atoms combine in simple numbers, so chemists cannot use the balance directly to compare amounts of substance. They must divided each mass by "atomic weights" to get what they need. The balance does not take into account the particulate nature of matter.

3. The ratio of the molar mass M(E) to the atomic mass m(E) of the same entity is equal to the Avogadro constant:

$$N_A = M(E) / m(E) .$$

This equation enables the conception of a new definition for the unit of mass: the mass of the atomic mass unit (*defined* as 1/12 of the mass of a ^{12}C atom) is combined with a *defined* number, thus enabling to *define* the unit of mass as "the mass of a *defined* number multiplied by 1/12th of the mass of the ^{12}C atom". That number can be the Avogadro number:

$$1 \text{ kg} = 1000 \{N_A\} \bullet m(^{12}C)/12, \text{ where}$$

the factor of 1000 comes in because of the transition from g to kg.

N_A as a unit

Are there precedents?

Chemists do so much work with the balances which measure mass ratios of material that they sometimes forget that the old chemists, more than 100 to 200 years ago, exploited these wonderful instruments for the basic characteristic of matter known as "numerosity". That happened when they found out that ratios of mass values could be converted to simple ratios of integer numbers of atoms and molecules by applying the concept of atomic weight, a ratio of molar mass values. The discovery that matter is indeed of "particulate" nature, built up by a discrete numbers of entities, was an extremely useful new feature in our model of nature. It gave birth to the "amount-of-substance" measurement possibility: an amount of a specified substance can be measured in terms of a number of entities of that substance rather than being described in terms of its inertia, i.e., its mass. All chemical reactions go with numbers of atoms and molecules. For example, in the human body there are a number of entities which poison (e.g., Pb) or cure (e.g., acetylsalicylic acid), not their mass. Since this concept is applicable to bacteria, where again the numbers of entities are important and not their mass, that is an extremely useful and simplifying concept for microbiological measurements. Rather than looking for traceability of chemical measurement results to an "inertial" unit such as the kilogram, it is much simpler to look for traceability to a unit based on the "particulate" nature of matter and of bacteria: a defined number of entities.

With this insight, we now look whether there are other measurements in the SI system which are based on the "numerosity of things".

Length

A simple case of "numerosity" was the 1960 definition of the unit of length (before the latest change in the definition in 1986 which linked the definition of the metre to a defined value of the speed of light): "the metre is the length equal to 1 650 763,73 wavelengths in vacuum of the radiation corresponding to the transition between the levels $2p_{10}$ and $5d_5$ of the krypton 86 atom" [1]. What happened in fact, was that an atomic quantity, thought to be inalterable, one "wavelength of the radiation corresponding to the transition..." was taken as a unit on the atomic scale, then multiplied by a *defined* number to achieve a magnitude for the quantity length, which was practical on the macroscopic level: 1 650 763,73 = 1 "metre" / $^a\lambda(^{86}Kr)$, i.e., the 'length of one metre' was becoming the product of the length of one, specified, wavelength and a *defined* number. The fact that this definition was changed to attach the definition of the metre to the definition of the speed of light is also an example of "thinking in numbers".

Time

The nicest case of "numerosity" is probably the case of time measurement results. The unit of time, the second, is defined to be "the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the Cs 133 atom". This is an extremely simple and elegant definition valid up to this very day. It is built on what is believed to be an inalterable duration τ of one period of the radiation, generated by the transition between the two hyperfine energy levels of the ground state of the Cs 133 atom. One such period, or time interval, would have been the simplest base for a unit for length measurements: the duration of one period. But that would have been very inconvenient to express macroscopic time intervals since it would lead to huge numbers. Rather a multiple of that unit was selected by *defining a number* of durations. It was called the "second" and decided to become the unit for time interval measurements. It is an illustrative example of the usefulness of a "ratio of numbers".

Electric current I

The equation $n = I \bullet t / F$ is based on the insight that a number of electrons per second I multiplied by a number of transitions per second t (both are base units in the SI system), constitute a "charge" which can be expressed in Coulomb by dividing it by the coherent SI unit for charge, the Faraday F, resulting in a *ratio of numbers*. Thanks to the characteristic of "numerosity", a *number* of electrons per second and a *number* of transitions in the ^{133}Cs atom enables to express an amount-of-substance as a *number* of entities. This relation leads to the possibility of making amount-of-substance measurement results traceable to the mole, that other base unit in the SI, because the input quantities in the above equation are also traceable to definitions of SI base units.

Which possibilities does that open for measurements of chemical amount?

The definition of the unit for "amount-of-substance" measurements says: "the mole is the amount of substance of a system which contains as many elementary entities as there are atoms in 0,012 kilogram of carbon 12; its symbol is mol". And: "when the mole is used, the elementary entities must be specified and may be atoms, molecules, electrons, other particles, or specified groups of such particles". In time measurements, thinking in numbers of events is implemented without causing any problem, and it is impressive in its simplicity. A similar formulation of the measurement in terms of a number of entities can be used in amount-of-substance measurements.

Fig 3 shows how measurements of a number of entities are made by comparison to another number of entities, defined as the unit. Of course, we had already made mass measurement results "traceable" to their unit kilogram by comparing (by means of a balance) the inertia of the mass of an unknown number of entities to the inertia of the mass of an internationally agreed but conventional human-made artefact, the mass of which was defined as the unit, hence carrying the value "one". But the traceability of a time measurement result to its unit "second" is strikingly more similar to the traceability of an amount-of-substance measurement result: both can be conceived through the concepts "numerosity" of "things", either entities or events. In both cases it is the comparison of an unknown number of entities/events to a known number of entities/events *exactly* known *because defined*.

The simplest unit for amount-of-substance measurements would be "the amount of substance of a system which contains one elementary entity; the elementary entity must be specified". But that has the consequence that large numbers would have to be handled when

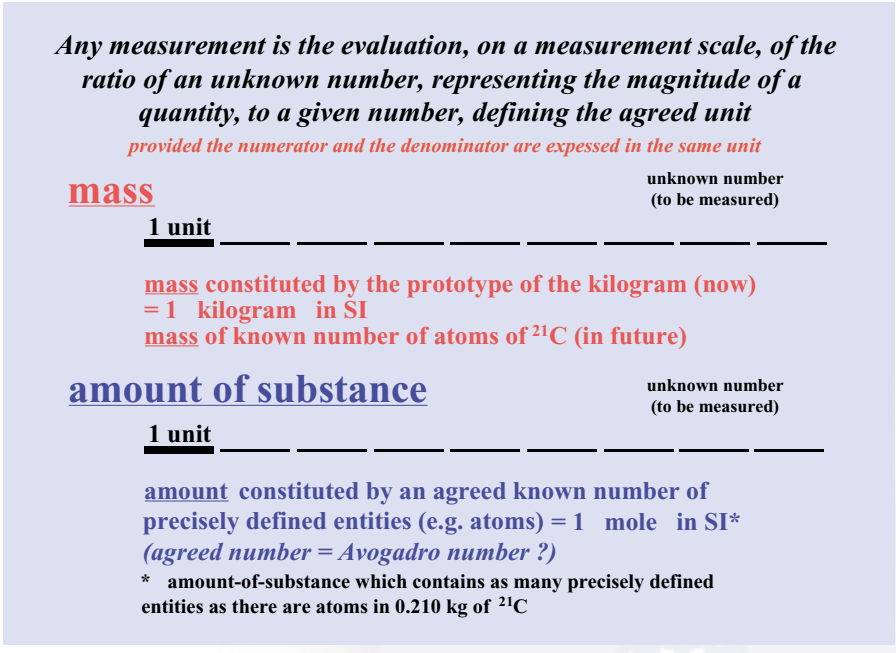

Fig. 3: A scheme of a measurement by comparison

measuring on the macroscopic level. Therefore, a known multiple of "one" can be chosen in order to arrive at a number which is convenient to use.

The question can be raised whether that multiple could not be agreed to be 6,022 14 • 10^{23} exactly and the unit for (chemical) amount-of-substance measurement be defined as 6,022 14 • 10^{23}/mol exactly.
Since the number used would be defined, it has uncertainy zero. The implied uncertainty of the Avogadro number used here before defining it, is 1,7 • 10^{-6} N_A , which is more than small enough for any chemical amount measurement: the best such measurements may have reached a relative combined uncertainty of 1 • 10^{-4} and only very exceptionally smaller (the few people who have ever achieved that, can actually be identified by name). Hence the implied uncertainty of our *measurement* of the Avogadro number is already more than small enough to suggest the possibility of defining it usefully. When this uncertainty would be reduced to 1 • 10^{-8} N_A as needed to redefine the kilogram, then this improved new value could obviously continue to serve to define the unit mole even better.

The clarity which this unit would create, would also be very useful when we think of the fact that the Si route to the Avogadro constant described above and which is a matter of measuring ratios of *numbers*, is sometimes thought of as a replacement of the Pt-Ir artefact in Sèvres by another artefact (!): a mol of Si, which does not make sense, but is interpreted in this way by many.

Conclusion

The question is raised whether it would not be useful already now to define the mole, the unit for amount-of-substance measurements, as follows: "The unit for amount-of-substance measurements is the mole, symbol mol. It is an amount-of-substance which contains 6,022 14 • 10^{23} entities exactly. The entities must be specified".

Any improvement of our knowledge of the Avogadro constant can easily be incorporated in this definition at any time by adding (a) significant digit(s).

Acknowledgement

The author is indebted to H. S. Peiser and G. Price for in-depth interaction on various concepts and their implications in the course of the last ten years

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EPTIS and COEPT
European Initiatives with Worldwide Relevance

The two European initiatives EPTIS and COEPT aim at increasing transparency and mutual trust in the field of proficiency testing. The PT database EPTIS was founded in 2000 and fulfills its role increasingly worldwide. The PT comparability study COEPT has just ended and delivered very useful results with potential relevance for the mutual recognition of PT activities worldwide.

EPTIS

EPTIS is an online database (www.eptis.bam.de) which contains comprehensive information on many of the PT schemes offered in Europe and the Americas. Laboratories and other parties can find much of the information they need to select a suitable PT scheme among those available on the market. The database is searchable on matrices, measurands, testing methods and other key factors. For every scheme on EPTIS, an additional fact sheet with quality related aspects based on ISO/IEC Guide 43-1 is included.

EPTIS started in 2000 as a joint publication of 16 organisations in Europe. The database has grown very well since then, in terms of public

interest (measured in terms of database queries), PT schemes registered (at present more than 800, figure increasing), and the number of participating institutes (now well over 20 in Europe and increasingly in the Americas).

These institutes are the authors of the information contained in EPTIS. Each of them has appointed a coordinator, who is responsible for acquiring details on PT schemes that are operated in his/her country. The coordinator enters this information into EPTIS and takes care of its regular update. This service has benefits for many parties involved in proficiency testing:

- EPTIS provides a renowned international platform where PT providers can market their schemes,
- EPTIS helps laboratories by listing many of the schemes available world-wide, and providing the details they need to make a well-considered selection among those schemes,
- EPTIS constitutes the list of locally available PT schemes that accreditation bodies must be able to present according to ISO/IEC 17011,
- EPTIS serves the goal of many national and regional authorities to reinforce the quality of analytical measurement by strengthening proficiency testing as a key element of laboratory quality assurance.

EPTIS relies on the information provided by the PT providers and offers the data as received. However, there are several mechanisms in place to safeguard the quality of the data. The coordinators perform a plausibility check before including a scheme in the database. The date of data entry or its last update is recorded and displayed on the fact sheet of a scheme as an indication of its topicality. As a further quality measure, EPTIS indicates whether a PT provider has been accredited or designated for its PT activities. The technical realisation of this feature was financially supported by ILAC. ILAC is one of the organisations that actively and officially support EPTIS and its aims, together with EA, Eurachem, Eurolab, IAAC and IRMM.

The increasing use of and interest in the system indicates that EPTIS serves its function well. EPTIS can be easily extended to other countries and regions worldwide, and further institutes who wish to participate are welcome. EPTIS is hosted by the Federal Institute for Materials Research and Testing BAM in Germany on behalf of the EPTIS consortium.

COEPT

Where laboratory customers, accreditors and authorities do not know or understand the differences and similarities between different PT schemes, they often require a laboratory to participate in their own preferred scheme - without recognising the laboratory's participation in another, but similar scheme. This is a costly barrier to trade.

To help improve this situation, a consortium of European organisations set up a project to study the degree of comparability of a number of PT schemes from four different analytical chemistry sectors: food, occupational hygiene, soil and water. The project was called COEPT for Comparability of the Operating and Evaluation Protocols of European Proficiency Testing Schemes in the Chemistry Sector. It started early 2003 and ended mid 2005. The project was funded by the European Commission.

COEPT was a large scale and unique "comparison of intercomparisons" in Europe. Many providers of PT schemes in the water, soil, food and occupational hygiene sectors took part, and 100s of analytical laboratories throughout Europe participated in the project's intercomparisons.

The project consisted of two studies. In the first study (2003), a collection of typical (partially artificial) PT datasets was generated for each of the four sectors. Some of the datasets contained anomalities or had non-normal distributions. These collections were then submitted to the participating PT providers for evaluation according to their regular statistical procedures. The evaluations that they returned were then compared sectorwise.

The second study (2004) was a field trial that followed a similar approach. This time, a typical reference material with certified values for a number of parameters was purchased and submitted to the participating PT providers. They distributed the samples to a number of laboratories in the frame of their regular PT scheme. As in the first study, the PT providers processed the laboratory results according to their regular protocol and then submitted their evaluations to the project team.

Both studies revealed two major trends that were similar for each of the four sectors under study. First, the PT providers within each sector reported assigned values that appeared to be well comparable within their reported uncertainties, even when the statistical methods applied were different. Second, the criterion that the PT providers used to rate the laboratory performance (mostly the denominator of the z-score equation) appeared to differ considerably among the PT providers.

These observations are particularly interesting, because they show that similar PT schemes can be comparable indeed, namely on the level of their technical operations and statistical evaluations, without the performance rating part. It is likely that these project findings can be generalised to other, similar schemes.

This opens up a valid and cost-effective way for laboratories who are required to demonstrate their competence with the help of PT to different parties (customers, accreditors and authorities) having different requirements. These laboratories may take part in only one scheme with sound statistics, and evaluate and assess their results according to the respective fit-for-purpose performance rating criteria of each partner. This possibility follows logically from the observations made in the COEPT project. It effects a degree of mutual recognition of PT activities that can be reached quite easily.

Coming to a close, COEPT has demonstrated a good degree of comparability between statistical evaluations and pinpointed problematic differences in performance rating. COEPT shows to laboratory customers, accreditors and authorities where differences and similarities between different PT schemes are to be expected. It shows how to benefit from the similarities to decrease the cost burden for laboratories and increase mutual recognition between all parties.

Many other interesting issues have been observed in the frame of this project, which will be subject of future publications. Interested parties are welcome to read the detailed reports from the project on the COEPT website. PT providers can benchmark their evaluations with the PT providers who participated in COEPT, since both the sample datasets and their evaluations are also available on the COEPT website at www.eptis.bam.de/coept

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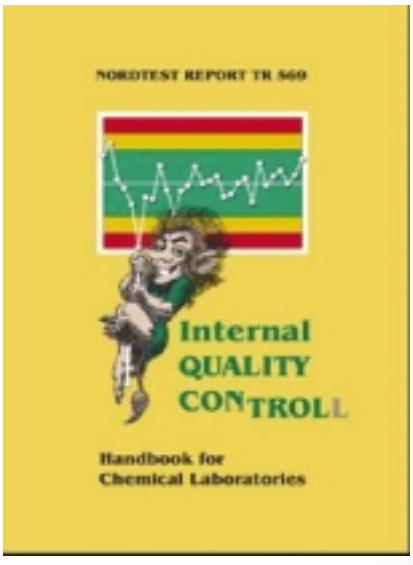
New approach on Internal Quality Control from Nordtest/NICe



Once upon a time there were a lot of trolls in the Nordic countries like the one you see on the title page. They sometimes were pestering us so we have a saying, "The troll is up to mischief" meaning, there are some odd things going on which we do not understand like a control value in the red area in the QC diagram.

The Nordic Innovation Centre initiates and finances activities that enhance innovation collaboration and develop and maintain a smoothly functioning market in the Nordic region. Here measurement quality plays an important role and there are several other publications from the Centre, e.g. TR 537 Handbook for calculation of measurement uncertainty in environmental laboratories and TR 581 Quality control manual for field measurements.

Background

The first version of Internal Quality Control - Handbook for Chemical Analytical Laboratories (Nordic cooperation) is from the 1980's best known under the name Trollboken. Later it was translated to several other languages and has been widely used as a tool in chemical routine laboratories - especially in environmental laboratories. This new version of the Handbook is an improved and extended edition, and the aim of it is - as has always been - that it be a practical tool for the analysts in their daily work with analytical methods. During the years since the first version of the handbook was prepared, there have been many developments in the field of analytical quality. First of all, the requirements for accreditation of analytical laboratories has put pressure on the laboratories to document their analytical quality, and internal quality control is an important part of this documentation. Also, when the laboratories estimate measurement uncertainty, the results from internal quality control are essential. These new demands, together with 20 years of experience using quality control, have led to a need for a revision of the "Troll book".

About Quality Control

Internal quality control involves a continuous, critical evaluation of the laboratory's own performance and working routines. The control should ideally encompass the process starting with the sample entering the laboratory and ending with the report. The most important tool in this quality control is the use of control charts. The basis is that the laboratory runs control samples together with the routine samples. The control values are plotted in a control chart. In this way, it is possible to demonstrate that the measurement procedure performs within given limits. If the control value is outside the limits, no measurement results are reported and remedial actions have to be taken to identify the sources of error, and to remove such errors. Fig. 1 illustrates the most common type of control chart, the X-chart.

Fig. 1: *Example of an X control chart for the direct determination of zinc in water. All control values in the middle area (green. within the warning limits) show that the determination of zinc performs within given limits and the routine sample results are reported. Control values in the red (dark grey) area (outside the action limits) show clearly that there is something wrong and no routine sample results are reported. A control value in the yellow (light grey) area is evaluated according to specific rules.*

The Trollbook starts, after an introduction, with two chapters on general issues of analytical quality, described with specific reference to internal quality control followed by an introduction to internal quality control.
The tools of control charting are described in the following chapters: control charts, control samples and control limits and an example on how to start a quality control programme. The next section describes how the data of internal quality control are used and managed - the interpretation of quality control data to be performed after every analytical run, and how the quality control programme should be reviewed periodically to investigate if the programme is still optimal to control the quality of analyses.

Quality control data can be used for a number of purposes other than just control of the quality in every run. Here is described how information on the within-laboratory reproducibility, bias and repeatability is derived from quality control data, and examples are given on other uses of quality control data and the principles of control charting.

The Trollbook contains nine examples illustrating how control charts can be started as well as practical application of the control rules and the yearly review. In one example we present a detailed review of preliminary control limits and setting new control limits based on more data. There are many guidance documents as well as ISO standards on quality control today. The most important issues that are stressed in the Trollbook for the analyst working in the laboratory are given below.

What is the important news in the Trollbook?

1. Emphasises the need for setting reliable control limits and a stable central line based on both many control values (> 60) and over a long time period in order to encompass long-term variations in the laboratory performance (> 1 year).
2. Gives a choice between setting control limits - control limits may be set according to the performance of the analytical method used irrespectively of the requirement on analytical quality - statistical control limits. This is the most common method to set the limits. An alternative is to start with the analytical requirements or

intended use of the results.
From the requirement within-laboratory reproducibility is estimated and then the control limits are set - target control limits.
3. Gives clear guidance on when the analyst can report analytical results based on the control values using a green, orange and red area in the control chart. For control values in the green area (within warning limits) the Trollbook distinguishes between in control and out of statistical control but in both cases analytical results can be reported.
The English version of the Trollbook, report 569, can be downloaded as a Nordtest report under www.nordicinnovation.net There are also versions available in French and Swedish and several other languages are in the pipeline, e.g. Italian, Polish and the other Nordic languages. Information of where to get the translated versions can also be found on the Nordtest website.

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The TrainMiC Adventure

The implementation of the ISO/IEC 17025 quality standard is fairly subtle. Specific concepts derived from "good metrology practice" - such as validation, uncertainty, traceability, reference materials and inter-laboratory comparisons - need to be properly applied. Why does the guide stress these issues in particular? How are they inter-related? These simple questions deserve a clear answer.

A common understanding of issues related to measurement science applied to chemistry is essential among European member states and acceding/candidate countries. In 2001, the IRMM launched its Metrology in Chemistry support program in the frame of Enlargement.

The Training in Metrology in Chemistry (TrainMiC®) project was set up as a training platform. The target audience for such courses is measurement practitioners from laboratories; - technical assessors involved in accreditation; and end-users of measurement data (e.g. from public bodies, enforcement agencies, etc.). Via this platform, a set of training modules has been constructed to provide understanding in basic measurement matters that apply across sectors (i.e., water, environment, food and clinical).
It offers interpretation of existing documents (cf. AOAC, EA, Eurachem, ILAC, ISO) and gives guidance by making available concrete examples. The training material strives towards a congruent and up-to-date view (e.g., regarding uncertainty, traceability of measurements).

The workshop "Improving the Scientific Base for Metrology in Chemistry (MIC) in EU Accession Countries" organised in February 2001 by the IRMM, initiated the TrainMiC concept. Renowned speakers representing established organisations in the field of metrology in chemistry gave plenary presentations. Several working group discussions followed [J.V. Norgaard, I. Papadakis, P. Taylor Accred Qual Assur 6 (2001) 443]. Accession / Candidates Country representatives from the academia, accreditation bodies and metrology institutes expressed their needs and expectations in the field of MiC. One of the conclusions was the need to improve the knowledge transfer of the basic MiC concepts - already implemented in the ISO/IEC 17025 - to the laboratory practitioners. The following key words were frequently cited: measurement uncertainty, traceability of a measurement result, validation of measurement procedure and the proper use of certified reference materials. The different ingredients of the TrainMiC curricula were defined.

The first TrainMiC event was held in September 2001 at Sinaia, Romania. Several speakers from different organisations were invited to lecture on the above topics. This interdisciplinary course was appreciated and well perceived by the participants, thus confirming the expectations expressed earlier in Geel. The next task was to prepare a structured and coherent training material to be systematically presented and distributed to participants.

A group of six enthusiastic experts "fluent in MiC" joined their effort and knowledge, under the guidance of Philip Taylor, to develop the first set of TrainMiC modules. The list of the TrainMiC pioneers consisted of:
- Ewa Bulska from the University of Warsaw and the Polish Centre of Metrology;
- Steluta Duta from INM (the Romanian National Metrology Institute);
- Margreet Lauwaars, former AOAC member (at present, TrainMiC observer);
- Nineta Majcen from the Metrology Institute of the Republic of Slovenia (MIRS);
- Miloslav Suchanek from the Technical University of Prague (CZ);
- Emilia Vassileva from the University of Sofia, Bulgaria;

joined later by
- Ivo Leito from the University of Tartu (Estonia);
- Bertil Magnusson from SP (Swedish National Testing and Research Institute, Boras) and
- Piotr Robouch from EC-JRC-IRMM, Geel.

Various brainstorming retreats of several authors in Dendermonde, Mechelen and Diest (Belgium) resulted in a set of "TrainMiC" slides (compiled in the EUR report 20841 EN), that were used throughout the different courses and constantly refined. As of today the 2nd edition of the training material includes the following seven theoretical modules:
- General introduction to MiC;
- Traceability of measurement results;
- Uncertainty of measurement results;
- Applied statistics;
- Validation of measurement procedures;
- Use of reference materials;
- Interlaboratory comparisons.

Additional practical exercise modules complement the series: how to build an uncertainty budget and a step by step validation. These TrainMiC handouts are available upon request.

TrainMiC is run in a distributed way, with national metrology institutes, selected academic faculties and national accreditation bodies together with their regional organisations EUROMET / EURACHEM and EA. The TrainMiC management board is chaired by the IRMM and consists of a total of 10 members: - the project leader (Philip Taylor), - a project co-ordinator (Piotr Robouch) and the seven authors mentioned above, originating from the academia or metrology institutes. The board sets the TrainMiC policies, creates and controls the processes (e.g., the type of training courses) and the products (e.g., the course content). Furthermore, TrainMiC relies on a network of national ambassadors (one per country). Their task is to coordinate all TrainMiC activities at the national level and refer to the

management board regarding ongoing courses, course content, new needs, etc.

Training seminars are performed using the TrainMiC material that has been reviewed, approved and edited by the board with the TrainMiC logo on each slide. Certificates for participation to TrainMiC courses are awarded via the TrainMiC board. The TrainMiC logo can be used on the invitation to events only when at least one authorised TrainMiC module is presented and the ambassador is responsible for the scientific programme of the specific event. Such events may contain complementary presentations addressing the needs of specific audiences without the TrainMiC logo.

TrainMiC courses are organised at the national/regional level by a local host organisation which is responsible for all practical arrangements (selection of participants and logistics). Seminars in various languages are lectured by native language TrainMiC trainers. They are initially proposed by the ambassador, selected and authorised by the board. They then attend dedicated "training for trainers" seminars (one per year) to share experiences, suggest improvements and get acquainted with the recent modules. The list of ambassadors and national trainers can be found on the TrainMiC web site www.trainmic.org.

The TrainMiC modules are regularly translated by the national trainers under the supervision of the national ambassador. National versions are already available in Bulgarian, Czech, Polish, Romanian and Slovenian. The Finnish, German and Italian versions are in progress.

After several years of successful events in the "new" member states, it is interesting to notice that "old" member states expressed in 2005 the interest to organise TrainMiC events. Two events were held in Vienna (March 05) and Helsinki (June 05) in collaboration with the respective National Accreditation Bodies (BMWA, AT and FINAS, FI). The success of these events can be demonstrated by the consequent request from both organisers to set up a National TrainMiC team in their respective country.

The reputation of the TrainMiC program is slowly but surely diffusing. Two events were organised in Brussels this autumn in collaboration with renowned international organisations, namely: the European Committee for Standardization (CEN), and the European co-operation for Accreditation (EA). Furthermore, a dedicated seminar for the community of NRLs (National Reference Laboratories) having participated to the IMEP©-20 inter-comparison is foreseen in 2006. Since the kick-off workshop "Improving the scientific base for metrology in chemistry in EU accession countries" in February 2001, a total of 57 TrainMiC events were organised in 18 countries, attended by a total of 2200 participants. All this was possible to achieve thanks to the enthusiastic fleet of one international and six national training teams (cf. Bulgaria, Czech, Estonia, Poland and Slovenia) propagating the MiC spirit. But TrainMiC certainly does not stop here. Three new modules are "under construction" to cover relevant issues such as "interpretation of results vs. legal limits"; "quality control" and "sampling".

TrainMiC's major assets

- Well established contacts with the major national stakeholders, such as academia, national metrology institutes and accreditation bodies
- Structured and coherent course material
- Experienced trainers
- Efficient national logistics and infrastructure

For further information, visit www.trainmic.org or contact trainmic@cec.eu.int.

TrainMic Board Members

Letter of Information from the Division of Analytical Chemistry

The European Association for Chemical and Molecular Sciences (EuCheMS) General Assembly 2005 and related meetings were held in Nicosia, Cyprus, in October 2005. In the previous year in Bucharest, Romania, the former Federation of European Chemical Societies (FECS) adopted the new name, so it was now the first time to meet as EuCheMS. The process of obtaining the legal status as an international non-profit organization under Belgian law has reached its final stage. The office with telephone and letter box (and with somebody to attend to these) will be opened soon.

The new constitution has opened EuCheMS for members other than European national chemical societies. These may obtain the status of an Associated Member. The General Assembly welcomed the European Chemical Industry Council (CEFIC) and CERC3, the Chairmen of the European Research Councils' Chemistry Committees, which both are EuCheMS partners in the Alliance for Chemical Sciences and Technologies in Europe (AllChemE), as well as the European Chemistry Thematic Network (ECTN). In this way the basis is broadened and the expertise is bundled, strengthening the alliance as the European voice of chemistry.

In Nicosia the recipients of awards were chosen: the EuCheMS Lecture will be given by Prof. Peter Seeberger during the EuCheMS Congress; Dr. Reto Bataglia, the former FECS President, who set the course towards the legal status of the Federation and its role in AllChemE, will receive the EuCheMS Award for Service. At the end of the General Assembly Prof. Giovanni Natile of the Italian Chemical Society took over Presidency from Prof. Gábor Náray-Szabó.

Under the auspices of EuCheMS the "First European Chemistry Congress" will take place in Budapest from 27 to 31 August 2006. It aims to be a showcase for chemical sciences in Europe and will bring together chemical and molecular scientist from industry, academia and government across Europe and from around the world. The programme, with invited speakers, is almost completed and comprises of plenary lectures of six Nobel Laureates and special topic symposia with top level keynotes and reports. Details on programme and organization such as submission of contributions and registration are available at www.euchems-budapest2006.hu

EuCheMS is considering to found additional divisions, particularly those devoted to the core fields. Since Division of Analytical Chemistry (DAC) is trying to intensify cooperation with the Divisions and Working Parties using a personalized network, we may need more liaison persons who keep contact and inform the Annual Meeting. The aim is to know about activities early enough to organize cooperation or contributions from either side whenever it seems appropriate and advantageous. As analytical chemistry is a central topic with ubiquitous impact, DAC plays a particular role within the EuCheMS divisional structure and should accept this challenge with satisfaction.

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www.dac-euchems.org

The Consultative Committee for Metrology in Chemistry - CCQM

Activities and growing interest of the chemical community in traceability and measurement uncertainty

In the year 2005 almost all of the CCQM Working Groups met twice. First, all working groups met in April at the BIPM in Sèvres and during the second part of the year the CCQM Working Groups on Organic Analysis, Inorganic Analysis, Electrochemical Analysis, Gas Analysis and Bio Analysis met at the premises of a number of CCQM members respectively at the IRMM in Geel, Belgium, at the PTB/BAM in Berlin, Germany, at CENAM in Queretaro, Mexico and at NML in Pretoria, South Africa. Having meetings at the institutes of the members of the CCQM is one of the elements contributing to building up mutual confidence by knowing better which capabilities are available and which staff is operating at the institute. Moreover, at the occasion of having a CCQM Working Group meeting in the country, in almost all cases the opportunity of having a number of world leading metrologists in the country is seized to organise a workshop or seminar for a wider public just before or just after the meeting presenting and discussing issues in metrology in chemistry. These awareness and training sessions are well appreciated.

The CCQM Working Group on Surface Analysis and the CCQM Working Group on Key Comparisons and CMC Quality met only once in April at the BIPM. The plenary meeting of the CCQM was also held in April at the BIPM.

Health care

During the CCQM week a workshop was held on "New Challenges for the Development of Primary or Higher Order Measurement Methods and Procedures for Physiologically-Significant Molecules". During this workshop NIST, LGC and PTB presented interesting and promising developments with respect to SI traceable determination of clinically relevant proteins. Further presentations by NPL and CENAM included structural analysis of proteins and metalloproteins. Presentations on comparability and uncertainty in gene expression metrology and strategies for DNA quantitation were given by LGC, NIST and KRISS. Other interesting presentations were given under the heading of "SI versus International Units (IU)" by Prof. Gerlich of the University of Giessen, Germany on "Hepatitis B surface antigen, relating biological activity to amount of substance" and on "Nucleic Acid Testing" by Dr. Minor of the NIBSC, UK, a major WHO laboratory.

Work by the Joint Committee on Traceability in Laboratory Medicine (JCTLM) is making very good progress. The Working Group 1 on Reference Methods and Materials has now published lists of reference methods and reference materials of higher order, as demanded by the EU Directive on In Vitro Diagnostic measurements (IVD Directive). An update of the data in the JCTLM database will be organised yearly. The lists are available on the website of the BIPM (www.bipm.org) and on the website of the International Federation of Clinical Chemistry and Laboratory Medicine IFCC (www.ifcc.org). Whenever possible the NMI's and other designated institutes recognised under the CIPM Mutual Recognition Arrangement will carry out comparisons of listed CRM's in order to check and demonstrate the comparability and reliability of the data in the database.

The JCTLM Working Group 2 on Reference Laboratories reported good progress on the organisation of inter-laboratory comparisons, demonstrating comparability, capability and competence of the participating potential Reference Laboratories. Quality manuals for both the working groups have been finalised. In principle potential Reference Laboratories are listed for their measurement services, which have traceability to standards of higher order and are deliverable to the wider clinical laboratory community. The quality systems of these potential Reference Laboratories have to be accredited in accordance with the ISO/IEC 17025 and the ISO 15195 and with respect to measurement procedures and CRM's delivered by the laboratories in compliance with respectively the ISO 15193 and ISO 34 and ISO 15194.

All the work under the JCTLM by the working and sub-working groups is carried out in close cooperation with all the stakeholders, involving the BIPM, NMI's, IFCC, hospitals, CRM producers, IVD manufacturer associations, PT and QA providers, ILAC and regulators. This close cooperation explains the success of the JCTLM.

Food safety and nutritional value

During the CCQM plenary meeting in April 2005 a strategic discussion took place on how to serve the food sector in establishing traceability, and through that making it possible to calculate measurement uncertainty. This strategic discussion is the follow up of two large stakeholder meetings which took place in 2003 and 2004. A programme of pilot studies and key comparisons has now been agreed. The CCQM Working Group on Organic Analysis will, among others, organise comparisons on pesticide residues in fruit products (fruit juices), butyric acid in milk, growth hormones in meat, antibiotics and trace contaminants in fish, vitamins and minerals, and dietary supplements. A programme on proximates in milk products is still under consideration. The CCQM Working Group on Inorganic Analysis will carry out pilot studies and key comparisons on nitrates and nitrites. The programme is chosen in such a way that major techniques and procedures used in the food sector can be supported by reliable traceability and uncertainty statements.

The programme is in support of food safety, which now, more and more has to comply with regulations, as well as in support of fair and reliable labelling. In many countries a labelling act defines criteria for labelling nutritional values and compounds in the product.

It is also recommended that NMIs and other designated institutes support as much as possible Proficiency Testing Providers in the food sector with highly needed traceable reference values. In several cases the results of PT schemes, only based on a consensus value, have led to completely wrong conclusions with respect to the capabilities and competence of the participating laboratories.

Environment and climate change

The cooperation between the BIPM and the CCQM Working Group on Gas Analysis with the World Meteorological Organisation WMO in the field of Global Atmospheric Watch has been intensified, delivering traceability to measurements of ozone and green house gases, which by doing so become anchored to the long term stable measurement standards of the SI. Also salinity measurements of ocean water give

an indication of possible climate changes and perhaps upcoming tsunamis. This is a programme organised under the UNESCO. The CCQM Working Group on Electrochemical Analysis is able to support the related issues on electrolytic conductivity measurements. It is remarkable that the salinity scale is still based on the International Practical Temperature Scale 1968 (IPTS-68), which has already been abandoned in 1990 by replacing it by the International Temperature Scale, ITS-90. The ITS-90 is much more accurate. The difference with the IPTS-68 can be calculated.

Gas analysis and industrial applications

Apart from the need for traceability and values with very low measurement uncertainties for specialty gases to be used in health care and environmental control, a major interest exists in the chemical composition of natural gas. Energy is very expensive, so it is clear that accurate flow and gas composition measurements are of importance to exporting countries as well as to importing countries. A lot of specialty gases are also used for etching and cleaning by the electronics and chip making industry. Combined with concerns about what remains behind after use and disappears in water or in the air, it is clear that also here accurate and traceable measurements are of great importance. For example, the economy of a country like South Korea depends for more than 50% on the electronics and IT industry, so accurate and traceable gas analysis is a major topic.

Bioanalysis

The CCQM Working Group on Bio Analysis has discussed road maps giving guidance on how to tackle this new field of gene, protein and cell and bio assay measurements. Progress is made in a number of pilot studies, like PCR quantitation, DNA quantitation and protein/peptide quantitation. The cooperation with the National Institute of Biological Standards and Control (NIBSC) has been strengthened, by bringing in a number of bio-activity related studies leading to more SI traceable reference materials in this field.

Surface analysis

The CCQM Working group on Surface Analysis appointed a new chairman, Dr. Wolfgang Unger from the BAM. He succeeded Dr. Martin Seah, who retired from the NPL. The CCQM thanked Dr. Seah for his great and stimulating work in the field of surface analysis, demonstrating that much more accurate and traceable measurements are possible than thought before. In particular work on Si-dioxide layers has demonstrated good results. The programme of work includes further N amount in surface layers of Fe, C amount in precipitates in Fe, standard free quantification in EDX, calibrated for absolute efficiency using the traceable radiation standard of PTB-BESSY II, thin film layers (Fe-Ni alloy and Co-Pt alloy), coatings (Zn in Zn/Fe), C amount as surface contamination, C amounts in different states in polymers, multilayer thicknesses and phase stability, etc..

Anti doping

In cooperation with the World Anti Doping Agency (WADA) a first comparison of 19-norandrosterone in freeze-dried human urine has been organised. This is seen as a good step forward in improving the reliability of the tests carried out by the WADA.

Forensics

The interest in metrology in chemistry is rapidly growing in all fields of chemical analysis. The International Association of Forensic Sciences (IAFS) and the European Network of Forensic Science Institutes (ENFSI) have indicated their interest in cooperation with the metrological community. Improvement of the reliability of the analysis of DNA, toxic materials and explosives and establishing global comparability becomes more and more an issue in the globalized world, where men are travelling around the world, animals, plants and goods are going and being transported all around the world. So, also crime and catastrophes have become global issues.

Engineering material properties

In the general field of materials properties international organisations, like VAMAS and ANMET, have indicated that there is an increasing need for internationally recognised traceability (VAMAS is the Versailles Project on Advanced Materials and Standards, a cooperation in which the EU and the USA participate; ANMET stands for APEC Network for Materials Evaluation Technology, where APEC is the Asia-Pacific Economic Community). So, an ad hoc working party of the CIPM is now studying the issues and will report in 2007 to the CIPM about the needs and the way to solve problems with respect to traceability and measurement uncertainty. One of the questions to be studied is which new quantities and measurands have to be considered and what are the issues to be addressed by the NMIs and other designated institutes and what is in fact sector specific standardisation (normalisation), to be solved by the industry sectors themselves.

Priority setting

An investigation under NMIs and other designated institutes in the Americas, Asia and Southern Africa has indicated that the following priorities exist:
(1) food safety and nutritional value (food safety and labelling acts);
(2) health care (a.o. IVD Directive, Pharmacopeia and others);
(3) environmental and pollution control, climate change;
(4) energy/natural gas flow and chemical composition (caloric value);
(5) industrial needs (e.g., electronics industry).
Depending on the economic and industrial situation in a country, priorities may of course differ, but in almost all countries the priorities (1) and (2) are the same.

As most of the activities in metrology in chemistry are carried out at once on the global level by the CCQM, regional metrology organisation activities in this field are limited and in many regions in particular focussing on awareness and training.

CIPM Mutual Recognition Arrangement

The CIPM MRA database KCDB now contains more than 17000 entries of recognised Calibration and Measurement Capabilities (CMC's). Of these 17000 entries some 3500 are entries in the area of metrology in chemistry. The CCQM Working Group on Key Comparisons and CMC Quality conducts a yearly update on these CMCs. It is expected that over the coming years, as more and more NMIs and other designated institutes bring in their capabilities, the number of recognised CMCs will increase further. The Working Group plays a major role in harmonising the criteria and procedures for approving claimed CMCs. In order to create a level playing field for all participating institutes it is essential that measurement uncertainty statements are based on the same considerations and treatment of contributing uncertainty components. For the CIPM MRA KCDB see www.kcdb.bipm.org

Redefinition of the kilogram and the mole

In the beginning of 2005 an interesting symposium was held at the Royal Society in London, dedicated to the role of fundamental constants in science and technology. An important issue was the proposal to redefine the unit of mass, kilogram, in terms of fundamental units. Redefinition of the SI base units in terms of the fundamental constants has a big advantage for fundamental physics, astrophysics and air/space research.

The international prototype of the kilogram is the only physical artefact still existing and in use as the primary standard of one of the base units of the SI. By definition the primary standard of the kilogram, being the international prototype as maintained and stored by the BIPM in Sèvres, is stable and does not vary in time. Now, regular comparisons with the platinum-iridium copies of the kilogram, which are maintained by many NMIs all over the world, indicate that it is not unlikely that the value of the international prototype at the BIPM in fact is drifting This problem can now be solved by defining the kilogram in terms of the constant of Planck *h* or as an alternative by the Avogadro number N_A. Unfortunately primary experiments based on the application of the so-called "watt balance" differ at about $1x10^{-6}$ from primary experiments based on silicon X-ray crystal density/molar mass measurements. Redefinition should only happen when one can take for sure that the kilogram is known at an uncertainty level smaller than $1x10^{-8}$.

A redefinition of the kilogram may make it possible to redefine also the *mole* as the amount of substance in terms of the Avogadro constant N_A. A possible definition could be that the mole is the amount of substance that contains exactly $6.022\ 141\ 5\ x10^{23}$ elementary entities, which can be atoms, molecules, ions, electrons, other particles or specified groups of such particles. Thus this definition is independent of the atomic mass of the isotope ^{12}C. It also means that the atomic mass of carbon becomes a value with a measurement uncertainty. It will also become possible to redefine the *ampere* in terms of the elementary charge *e* and the *kelvin* in terms of the Boltzmann constant *k*. The CCQM is of the opinion that no change in the definition of the base units should take place after sufficient scientific results are available and the difference between the watt balance experiments and the X-ray crystal density measurements have been solved. No changes are expected before 2011 when the CGPM has again a four yearly meeting. The CCQM will dedicate a special session to the possible redefinition during its next meeting in April 2006.

Dr. Robert Kaarls
Secretary CIPM, President CCQM
The Netherlands

ILAC Update

ILAC began in 2005 with a new Chair - Daniel Pierre - and an Executive Committee with a combination of old and new faces, and with some of the familiar faces taking on new roles. We also have the revised committee structure, confirmed in Cape Town last October and the ILAC Business Plan (now published as S3:2004) which outlines ILAC's goals and strategies for the next five years and the roles of the new committees.

ILAC also began the year in the same fashion as it finished 2004 - that is with the signing of a Memorandum of Understanding (MoU). ILAC entered into a new MoU with the International Accreditation Forum (IAF) and the United Nations Industrial Development Organisation (UNIDO) on 10 October 2004. This MoU was signed during the ILAC/IAF Joint General Assembly in Cape Town, with the UNIDO Director-General Mr. Carlos Magariños, participating via video conference.
This marks a new and very significant phase in the development of the relationship between ILAC, IAF and UNIDO, the benefits of which will hopefully be seen by our developing accreditation bodies in developing economies.

ILAC also entered into an MoU with the International Electrotechnical Commission (IEC), on 9 February 2005. The MoU has the effect of making official a working relationship which has been developing since December 2002.
The laboratory community common to both the IEC Schemes and ILAC membership have endured duplication of effort for too long. This cooperation, now formalised through the MoU, will go a long way to relieving this burden whilst enhancing the assessment process overall.

Details of both MoUs can be downloaded from the ILAC website at www.ilac.org under International Partnerships.

ILAC Meetings

Our mid year suite of executive and joint meetings with IAF was held in Frankfurt, Germany in June. It was a productive week culminating with the joint ILAC/IAF/ISO working group meeting where the Communique on the recent alignment of ISO/IEC 17025 with ISO 9001 (2000), in relation to accreditation statements, was finalised. This was sent out to all members in August 2005 and can also be found on the ILAC website. Our Laboratory Committee (LC) made a very active contribution to this and hopefully it will assist those members who feel that this information is needed, particularly for new and existing clients of accredited laboratories.

Also, in Frankfurt, an ILAC workshop on Reference Materials was held for developing and developed countries. The presenters were Tony Russell, Orna Dreazen and Alan Squirrell and the discussion reinforced the fact that the regular use of (values associated with good quality) Reference Materials is essential for establishing and maintaining traceability and thereby giving confidence in the measurement results provided by accredited laboratories.

In September, the annual ILAC/IAF meetings and General Assemblies were held in Auckland, NZ. It was a very successful two weeks and the Adopted Resolutions are available in both the Members Area of the ILAC website and in the latest edition of ILAC News (also available on the ILAC website).

The 2006 Annual Meetings for ILAC and IAF will be hosted by the Entidad Mexicana de Acreditación a.c. (EMA) and held in Cancun, Mexico, from 6-14 November 2006. The conference website address is www.ilaciaf2006.com

The ILAC Arrangement

As at the end of November 2005, there were 53 Signatories (Full Members) to the Arrangement, representing 43 economies.

ILAC continues to focus on enhancing a more widespread understanding of the benefits of the Arrangement amongst the international community, particularly governments and regulators.

Joint ILAC/IAF Activities

The joint activities between ILAC and IAF continue to be managed through a Joint Committee for Closer Cooperation (JCCC). Currently operating under the stewardship of this committee are the following:

- joint working group for inspection,
- joint development support committee.

With the publication of the Joint IAF/ILAC A-Series documents the work of the Joint working group on harmonisation of peer evaluation procedures has been completed. As a result, it was decided by both organisations in Cape Town, that this group should be disbanded and replaced by three Joint Working Groups, covering the following areas:

- maintenance of the A-Series documents,
- training of Peer Evaluators,
- transition/guidance for ISO/IEC 17011:2004.

Each of these Joint Working Groups reported on their work programs and progress at the September 2005 Joint ILAC and IAF General Assembly in Auckland.

At the Auckland meetings, ILAC and IAF also signed an Agreement for Closer Cooperation. This is a further reflection of the joint work being undertaken in areas of common interest and mutual benefit to both organisations. A copy of the agreement can be downloaded from the ILAC website at www.ilac.org under International Partnerships.

Publications

Since April 2005, the following ILAC documents have been published:

- *ILAC G9:2005 Guidelines for the Selection and Use of Certified Reference Materials;*
- *ILAC P9:2005 ILAC Policy for Participation in National and International Proficiency Testing Activities.*

In the "pipeline" are:

- *Guideline for the Determination of Calibration Intervals of Measuring Instruments* (voting period closed on 23 October 05);
- *ILAC-P8:200x ILAC Mutual Recognition Arrangement. Supplementary Requirements and Guidelines for the Use of Accreditation Body Symbols and for Claims of Accreditation Status by Accredited Laboratories* (document out for comment).

ILAC Liaisons

The review of liaison activities - both for ISO and other external bodies, continues to be a major focus of the Executive Committee, who seek to ensure that ILAC interests are represented in areas which have an impact on the activities of ILAC and its members. To assist with the management of the ILAC liaisons, the Liaison Database has been established, for the information of ILAC members. It can be accessed via the members area of the ILAC website.

The appointed ILAC liaison officers continue to be busy; it is no small task to prepare for, present (a consolidated ILAC position) and report on meetings all over the world with important external organisations that vitally impact on ILAC's current and future work. Since April 2005 there has been much activity in metrological matters (e.g., BIPM and associated committees, ISO REMCO (reference materials) - and also various ISO groups and committees - e.g., TC 212 (medical) and TC 176 (ISO 9000). ILAC's continuing close cooperation and liaison activity with EURACHEM and CITAC supports these important metrological initiatives in chemical measurement.

In November this year, further ISO meetings (e.g., CASCO Plenary and ISO/ILAC/IAF Joint Working Group) took place, as did a meeting of the Joint Committee on Traceability in Laboratory Medicine (JCTLM). ILAC was represented at all of these meetings.

ILAC and the World Anti Doping Agency (WADA) have continued the cooperation begun in 2003 with representatives from WADA attending part of the ILAC Technical Accreditation Issues Committee (now Accreditation Committee) meeting in Cape Town. In addition, the WADA representatives met with a smaller ILAC Working Group, consisting of representatives from accreditation bodies involved in the accreditation of sports drug testing laboratories. Firm progress has been made in the collaboration between both organisations in the area of accreditation and assessment of sports drug testing laboratories. WADA held its second training course for Technical Assessors in April 2005.

Highlights from the Laboratory Committee, PT Consultative Group and Accreditation Committee

The Laboratory Committee (LC) met twice during the past year. It members contribute to the work of all ILAC's committees and they were instrumental in highlighting the issue concerning reference to ISO 9001; 2000 on accreditation certificates. This matter has been successfully resolved with the issuing of a joint communiqué by ILAC, IAF and ISO as mentioned earlier in this article. The LC has also been responsible for the drafting of information for laboratories concerning the transition to ISO/IEC 17025:2005 and this is available on the ILAC website.

The LC has reviewed its membership and would like to address the under-representation in the medical/clinical and forensic areas. They would welcome expressions of interest from relevant associations or networks.

The PT Consultative Group (PTCG) met before the ILAC General Assembly in Auckland and the following work items were tabled:

- for the immediate future, 2 meetings a year will be needed and the next meeting is planned for May 2006 in Madrid;
- membership representation of PT Providers will be reviewed over forthcoming meetings;
- a document on the application of relevant technical issues (such as stability and homogeneity testing) in operating a PT program will be developed;
- a discussion paper will be developed on the problem of timely access of PT data for use by accreditation bodies;
- a draft discussion document will be developed on the interpretation of how accreditation bodies can judge suitability (competence) of PT Providers for compliance with ISO/IEC 17011 (clause 7.15.3);
- a discussion paper will be developed on the possibility of establishing a single ILAC process for global recognition of accredited PT Providers, as a possible alternative to the establishment of an MRA for PT Providers;
- a paper will be developed on the various objectives of participating in PT in addition to its use for accreditation purposes;
- an ILAC policy needs to be developed for a harmonised approach to the accreditation of PT Providers.

The Accreditation Committee (AIC) met twice in 2005 and worked in conjunction with the LC on the document outlining the changes to ISO/IEC 17025. The committee has set up a number of working groups to deal with technical matters that will perform their tasks by e-mail. Terms of reference for the following working groups have been reviewed and endorsed by

the ILAC Executive Committee Liaison with the Marketing and Communications Committee (MCC); calibration and traceability issues; reference materials issues; scopes and related assessments G 18; accreditation of sampling; accreditation in the medical field; accreditation of horse racing laboratories; accreditation of fire testing laboratories; issues relating to the world antidoping agency (WADA); disaster victim identification. The Sampling Working Group is surveying accreditation bodies to ascertain how they approach the accreditation of sampling.

Remote calibration is a developing area and will require attention in the future. In order for ILAC to prepare for other state of the art developments, which could impinge on accreditation, the AIC Chair has asked members to keep her informed of any such developments as they become aware of them.

ILAC would also like information from members, including laboratories, on the economic impact of accreditation, e.g. where it has assisted with trade problems, saved an organisation money, or solved a problem.

Secretariat Staff

We are sad to report that Paul Davies has moved on to "greener pastures". Paul has actively contributed to the work of the ILAC Secretariat over the last 9 years, particularly in the areas of ILAC publications (including his role as editor of ILAC News), other publications (including ACQUAL), website, general enquiries and an important role with links to the ILAC Marketing and Communications Committee (MCC). We wish Paul all the very best for the future in his new employment. We are pleased to introduce Alison Hay who started working part time with us in April 05, providing administrative support. Welcome also to Agi Koltai who has stepped into the position of ILAC News Editor and is helping us with other ILAC publications, and Andy McKenna who is assisting with the ILAC website.

The Work of the ILAC Secretariat

Work continues on improving the ILAC website (regular internal audits and close communication with the MCC and other ILAC Committees). As always, suggestions for improvements to the website are welcome.

The ILAC-MRA Mark registration process continues and as at 30 November 2005, 34 ILAC Full Members had signed Licensing Agreements with ILAC, for the use of the Combined MRA Mark. The Combined MRA Mark is the ILAC-MRA Mark used in combination with the accreditation body's own mark. The Secretariat continues to receive a variety of enquiries on various aspects relating to the registration, licensing and use of the ILAC-MRA Mark. To assist in this area, a list of "Frequently Asked Questions" on ILAC-MRA Mark matters, was compiled earlier in the year. It can be downloaded from the Member's area of the ILAC website.

At the recent meetings in Auckland, the ILAC General Assembly voted to amend the ILAC Laboratory Combined MRA Mark Sub License Agreement (ILAC Resolution GA 9.15), to expand the provisions for the use of the Laboratory Combined MRA Mark, by accredited testing laboratories and calibration facilities (who have entered into a sub-licensing agreement with their accreditation body). The revised sub-license agreements have been issued to ILAC Full Members and those who have entered into licensing agreements with ILAC are now able to commence using the new version of the sub-license agreements.

Other on-going activities for the Secretariat include the ILAC accounts, general and specific enquiries, publications and updating membership and liaison activities.

ILAC Membership

ILAC membership as at 30 November 2005 is as follows:

- 53 Full Members (Signatories to the ILAC Arrangement) representing 43 economies;
- 16 Associates representing 15 economies;
- 22 Affiliates representing 20 economies;
- 5 Regional Cooperation Bodies;
- 1 National Coordination Body;
- 18 Stakeholders.

The ILAC membership (total 115 bodies) now covers a total of 83 different economies worldwide and approximately 26,000 laboratories and inspection bodies are accredited by the 69 ILAC Full Members and Associates.

Further information on ILAC can be obtained from the ILAC website at www.ilac.org, or email the Secretariat on ilac@nata.asn.au

Alan Squirrell, Annette Dever, Australia
Dr. Máire Walsh, Ireland
ILAC

Indian Programme for Certified Reference Materials

In the present scenario of globalization of economy, use of Certified Reference Materials (CRMs) and Reference Materials (RMs) in measurements is becoming essential for global acceptance of products and test reports. Use of certified reference materials ensure high quality in measurements and provide traceability to the analytical measurements with national /international measurement system (SI unit).

Their use fulfills a mandatory requirement of international level quality systems (ISO 9000, ISO/IEC standard 17025), accreditation bodies and of World Trade Organization (WTO). Large number of CRMs and RMs are required in India for quality control in industries and various sectors of science and technology. Presently, the requirement for CRMs in the country is being met by from imports from foreign national metrological institutes, which is a costly and time-consuming affair. To minimize these problems and meeting the demand of CRMs indigenously at a reasonable cost, National Physical Laboratory, India (NPLI) initiated a national programme on preparation and dissemination of certified reference materials in 1990. It created a network of Indian laboratories belonging to various sectors throughout the country to undertake this programme. The programme was initiated with the preparation and dissemination of CRMs of mono and multi-elemental solutions of various elements. Network of the laboratories participating in the programme is shown in fig.1.

Later 10 satellite groups were created for preparation of CRMs in other areas namely gas mixture, X-ray diffraction, pesticides, petroleum, metal & alloys, food, building materials and minerals. The most experienced laboratory has been designated as a lead laboratory. NPL had extended the metrological support to these satellite groups.
The areas covered under this programme have been shown in fig. 2.

Fig. 1: Network of the laboratories

Following laboratories have been designated as lead laboratories to prepare the CRMs in the areas of their specialization on the basis of their long experience in that area. The names of the lead laboratories and their areas are given in table 1.

With the efforts of these laboratories, several CRMs had been prepared under this network programme. Following are the details of the CRMs produced and under preparation:

Mono elemental solutions: These 16 CRMs have been prepared at NPLI and released so far. Other 11 CRMs of mono elemental solutions are under preparation and likely to be released by June 2006.

Multi elemental solutions: A solution CRM containng certified values of Cu, Fe and Zn concentrations have been prepared at NPLI. Two other serums of natural water with various anions are under preparation.

X-ray diffraction: XRD CRM of high purity polycrystalline silicon have been prepared at NPLI. Alumnia powder serum is under preparation.

Pesticides: Two CRMs of pesticides chlorpyriphos and isoproturon have been prepared and purified at Indian Institute of Chemical Technology (IICT); Hyderabad and their purity is certified by NPLI; two other CRMs of cypermethrin and fenvelarate are under preparation.

Gas Mixture: CRM of methane in nitrogen has been prepared at NPLI. Carbon dioxide in nitrogen CRM is under preparation.

Petroleum: CRM containing Na, Ca, Mg, Fe, V in petroleum has been prepared at Indian Institute of Petroleum. It is under certification at NPLI.

Minerals: This work has been initiated in collaboration with National Geophysical Research Institute (NGRI) and M/s Hatti Gold Mines Ltd. (HGML). Samples had been collected from the mine, crusted and powdered to > 200 mesh at HGML and homozonized at NGRI.

Fig. 2: Areas of the certified reference materials covered under CMR Programe

Metals and Alloys: CRMs of ferrous alloys are under preparation at National Metallurgical Laboratory, Jamshedpur. They are started with the preparation of plain carbon steel. Concentration of C, S, P, Si and Cr elements in plain carbon steel will be certified at NPL.

Food Standards: This programme is initiated with the preparation of trace constituents in skimmed milk powder. Central Food and Technology Research Institute is the laboratory for this programme. Skimmed milk powder is under preparation there and Cu, Cd, K, Mg, Na, Pb, Zn, Cr, Fe elements are likely to be certified.

SEM/TEM Resolution Standards: It is planned to prepare high-resolution standards of gold films for calibration of Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM). The material is under preparation at NPLI and preliminary results are encouraging.

Metrology in Chemistry: It was decided to initiate the work in the field of metrology in chemical measurement and to create a network of laboratories in India to achieve this goal. NPLI has initiated the action and started work in the area of gravimetric and volumetric measurements and gas metrology. Equipment required for this work is under procurement. Lead laboratories of the CRM programme were also advised to start the work in metrology in chemistry related to their areas as soon as possible. NPLI is already participating in the key comparison programme of CIPM, APMP, IRMM, NATA etc.

Every lead laboratory is advised to participate in key comparison programmes or other inter-comparison programmes being organized by several international organizations to demonstrate their capability in measurements.

Dr. A.K. Agrawal
NPLI
India

Table 1. Lead laboratories identified for preparation of CRMs

Area of CRM	Name of the Lead Laboratory
Mono elemental solutions	National Physical Laboratory
Multi elemental solutions	National Physical Laboratory
Silicon powder for X-ray diffraction	National Physical Laboratory
Gas Mixture	National Physical Laboratory
SEM/TEM resolution	National Physical Laboratory
Pesticides	Indian Institute of Chemical Technology
Petroleum	Indian Institute of Petroleum
Food	Central Food Technology Research Institute
Alloys	National Metallurgical Laboratory
Minerals	National Geophysical Research Institute

Reorganization of Metrological Systems

The Reform of French Metrology: New Ambitions at the Crossroads of Science and Industry

1. An omnipresent science that progressively requires more

Today, metrology, the science of measurement, is a key element in the advance of science, industry and society:

- at the *scientific level*, discoveries in quantum physics will lead to the re-definition of some units of the international system by basing them on fundamental constants. Logically, this evolution is in line with an approach consisting of bringing together the different fields in physics including a greater consistency between units and uncertainty levels, and which will then contribute to the solution of future technological problems.

- in *industrial terms,* the quality of products and services and the development of trade in general are closely linked to better measurement control. The mutual recognition among the national institutes of metrology of their measurement capabilities in the context of a mutual recognition agreement, is clear evidence of this. The increasing requirements of high technology industries in terms of measurement uncertainties must be met to allow the development of our industry and the only way to do this is by continuing to improve our measurement standards.

- finally, *concerning the expectations of society as a whole,* metrology is now a high priority in the medical and environmental fields to improve the uncertainty levels of the many measurements carried out and to ensure their traceability.

In this context, many countries have heavily invested in the development of their metrological infrastructures which are considered an essential component of their national independence. In the same way, the exponential expansion of the costs of such development has led to the strengthening of international cooperation, particularly at the European level, to avoid unnecessary duplication. France has been deeply involved in this effort to better organize and modernize metrology, but it is, however, still placed far behind the leading countries which include Germany, the United Kingdom, the United States of America and Japan.

2. Metrological organization in France: a classic example and the need for reform

In 1969, France created the "Bureau national de métrologie", with the initial task of encouraging the laboratories to carry out research in metrology and then, when it joined the Ministry of Scientific and Industrial Development, to take on broader tasks: namely, choosing the primary laboratories where standards are maintained, initiating studies, harmonising work, examining budget submissions, enabling industry to refer to standards, ensuring proper French representation at the scientific level, worldwide. For management reasons, the BNM changed its status and become a Public Interest Group (GIP) in 1994. Today, the GIP consists of four National metrology laboratories that come respectively under the CEA, CNAM, LNE and the Paris Observatory and six associated laboratories.

The work carried out by the GIP during the decade enabled significant progress to be made, notably in the fields of time and frequency, pressure, temperature, electricity and chemistry. As for certain ambitious projects concerning nanometrology, the watt balance experiment and optical 'clocks', they obviously show that the GIP has both the ability and intention to be among the world leaders.
These results have been obtained thanks not only to the quality of the scientific teams of the laboratories concerned but also to the "volunteer" involvement of a great number of experts and persons coming from the scientific, industrial and administrative worlds outside, notably through the scientific and technical assessment committee, the strategic policy committee and the General Assembly of the BNM. We warmly thank all of them and particularly the Chairman of the GIP, Prof. Jean Kovalevsky, during this period.

LNE, France

However, the organisation as a GIP presents two principal disadvantages: first, its temporary nature whereas metrology is essentially a perennial task; and second, its posing as an intermediary which does not contribute to high visibility at the international level as most countries have only chosen one National Metrology Institute (NMI) linked to designated bodies, if necessary.
The Government has now decided to reform the management and organization of French metrology in order to optimise the means and to increase its weight at the European and international level in the context of the creation of networks of excellence.

3. The Main Points of the Reform

3.1 The control of metrology has been assigned to the LNE

A joint decree from the Ministries of Industry and Research has just announced the dissolution of the "Bureau national de métrologie" and the transfer of the central task of metrology to the LNE. Two main elements have led to this decision:

- In these last five years, the LNE has become the major contributor to the BNM with the successive integration of work in the field of legal metrology in 1999, in basic electrical metrology in 2001, and most recently in the joint services in the electrical field in 2004. At the same time, LNE has strengthened its effort in Research and Development and in investments in new laboratories, most particularly in the measurement field.

- The status of an Industrial and Commercial Establishment seems to be the most appropriate for the control of metrological activities in order to link most effectively research activities and joint services to industry.

Reorganization of Metrological Systems

On this occasion, the LNE's name has been changed to *"Laboratoire national de métrologie et d'essais"*, but keeping the well-known acronym LNE. The LNE is thus firmly placed at the *crossroads of science and industry,* with a wide openness to Europe. The BNM's teams have become integrated into the LNE in the management of scientific research, with responsibility for metrology control at the national level and for the follow-up of research work relating to the fields of expertise of the LNE and in the field of test measurement. Luc ERARD, the former director of the BNM has recently been appointed director of this new LNE directorate.

3.2 A metrology committee: to ensure monitoring

As specified in the decree, the LNE will ensure the monitoring of French metrology through the support of a metrology committee made up of fourteen people, including seven scientific and industrial qualified persons that cover as far as possible the different fields of metrology, and seven representatives of bodies, coming respectively from the LNE and three other national laboratories (CEA, CNAM and Paris Observatory); from the CNRS and from the ministries of research and industry.

This committee will examine the proposals coming from the different actors in French metrology to determine priorities, to assess the projects' relevance and to monitor the results obtained. It will make proposals concerning medium-term planning of work. The committee's secretary will be under the responsibility of the Research and Development Directorate of the LNE. The committee will express its opinion and make proposals to the LNE management which will be responsible for their implementation after preliminary consultation with the partners involved.

3.3 The optimisation of the basic organization

The basic organization, which worked efficiently, is maintained, i.e., the LNE and the three National metrology laboratories will carry on their tasks in the context of their contracts with the LNE. This will also concern the laboratories that were associated with the BNM and that will, from now on, be associated with the LNE. The more selective cooperation, in the form of incentive actions, will also be carried on in order to extend the group of actors in metrology.

However, the new organization will provide more *flexibility to optimise the means dedicated to metrology work in the different laboratories,* where any improvement of performance requires investment of space and facilities that are more and more expensive: in particular, joint units or common laboratories will be created, to enable work on the same site to be carried out by scientific teams from different business enterprises relying on pooled reference facilities. In addition, the *strengthening of cooperation with industry* and the definitive *integration into the network of excellence* at the European (EUROMET) and international levels is foreseen.

4. Priorities for the coming years

Three major lines of development are proposed:

- Metrology in biology and chemistry, to meet the many demands in the field of health (more precisely concerning the use of ionising radiation) and of sustainable development, by the development of analysis and material reference methods recognized worldwide and which enable measurement traceability to be assured to the International System of Units (SI).
- New needs for metrology in traditional fields, such as time and frequency (notably for the Galileo project), temperature scales (notably for very high and very low temperatures), in the fields of energy and transportations, in optics and high-frequency electricity (telecommunications, information technologies).
- Nanometrology, which consists of using all possible means to measure and specify materials and components in the nanometre range, to enable industry to fully appropriate the new emerging technologies, more precisely in microelectronics, telecommunications and biotechnologies.

Of course, those priorities will be reviewed and, if necessary, modified during the work that will be carried out by the metrology committee during the year 2005.

Dr. Philippe Charlet
LNE
France

Reorganization of the Metrology System in China

The National Institute of Metrology (NIM) and the National Research Center for CRMs (NRCCRM) were incorporated in September 2005 forming a new NIM. This is one of the important components of the reform of China's S&T system, to face the international developing trend in the field of metrology, the needs for sustainable development of our national S&T, economy and society. The new NIM consist of 9 research divisions:

National Institute of Metrolory, P.R. China

- Division of Mechanics and Acoustics;
- Division of Metrology in Chemistry;
- Division of Optics;
- Division of Precision Engineering;
- Division of Ionizing Radiation and Medicine;
- Division of Thermometry and Materials Evaluation;
- Division of Electronics and Information Technology;
- Division of Biological, Energy and Environmental Measurement;

and two services:

- Administrative Service;
- Technical Supporting Service.

Reorganization of Metrological Systems

The increased subjects, which will be involved or enhanced in the new NIM, are:

- Quantum Metrology such as electrical quantum standards, natural standard of mass and relative quantum devices,
- measurements of fundamental physical constants,
- nano-metrology and relative apparatus,
- materials evaluation and measurements of thermal, electrical, magnetic, optical properties of new materials,
- clinical chemistry, biological measurement, food safety, environmental measurements and speciation analysis, standards and relative testing methods for optical, chemical and electrical medical apparatus,
- evaluation of measurement software and protocols.

The new NIM runs as a non-profit organization with a formal staff of 755. Its reformation is almost finished now, and obviously, this will produce an active effect to accelerate and to promote the development of metrology in China.

Dr. Yu Yadong
NIM
P.R. China

Government Laboratory: From an Integrated Analytical Laboratory to a Designated Metrology Institute

The history of the Government Laboratory goes back to the 1870s when the then Government Apothecary also discharged duties of an analyst. In the early days, the growth of the Laboratory was very modest as evident by the increase of staff numbers from one in 1879 to eight by the time of the Japanese invasion of Hong Kong in 1941. More rapid growth of the Laboratory commenced in the 1960s and to date, the Laboratory has a staff of about 420, of which one-third are professionals in various scientific disciplines.

At present, the Laboratory is the largest analytical laboratory in Hong Kong providing a comprehensive range of analytical, investigatory and advisory services relating to food, pharmaceuticals, Chinese medicines, consumer products, the environment and forensic science, to its clients in various departments of the Government of the Hong Kong Special Administrative Region (HKSAR). The scientific services are provided through two operational divisions, namely the Analytical & Advisory Services (A&AS) Division and the Forensic Science (FS) Division.

The A&AS Division previously adopted a quality system in compliance with ISO 9001 and had tests accredited to ISO/IEC Guide 25, now operates under a quality system in full compliance with the ISO/IEC 17025 and a substantial part of its analytical scope accredited to the standard. The FS Division chose a somewhat different route for its accreditation and in 1996 obtained its accreditation status from the American Society of Crime Laboratory Directors / Laboratory Accreditation Board (ASCLD/LAB).

With a vision to be recognized as a laboratory providing world-class scientific services, the Government Laboratory has made numerous efforts to foster quality, traceability and comparability of its analytical work and is one of the founding members of the Co-operation on International Traceability in Analytical Chemistry (CITAC). Since the year 2000, the Government Laboratory started participating in some regional and international activities related to metrology in chemistry. In 2004, the Government Laboratory became a Full Member of the Asia Pacific Metrology Programme (APMP). In May 2005, the Laboratory was designated as a Metrology Institute under the Mutual Recognition Arrangement of the International Committee for Weights and Measures (CIPM MRA). This formally signifies the commitment of the Laboratory towards a secure technical foundation and for wider agreements related to international trade, commerce, public health and regulatory affairs.

HKGL, Hong Kong

Over the years, the Laboratory has participated in a number of studies organized by various working groups of the Consultative Committee on Amount of Substances (CCQM) and APMP's Technical Committee of the Amount of Substances (TCQM). Very often, our results were comparable to those reported by leading national metrology institutes (NMIs).

Being an integrated government laboratory providing a diversified range of chemical and biochemical measurements and being given the task of a designated metrology institute in the area of metrology in chemistry within the economy of HKSAR, the Government Laboratory is committed to sustain the very fine spirit of its predecessors and continual the strive for excellence in quality. Looking ahead, the Laboratory is adamant that it will continue contributing to the international efforts in promoting a harmonized scientific framework based on metrology and keeping close contact with NMIs through, amongst others, participation in the activities organized by the CCQM, APMP and CITAC.

Dr. T.L.Ting and Dr. D.Sin
HKGL
Hong Kong

Eurachem Workshop in Slovenia - Focus on Accreditation of PT Providers

120 participants from 28 countries met in Portoroz, Slovenia, 25-27 September 2005 for the 5th Workshop on Proficiency Testing in Analytical Chemistry, Microbiology and Laboratory Medicine.

Proficiency testing (PT) and external quality assessment (EQA) are topics where cross-fertilization of ideas is indeed possible between sectors. Sverre Sandberg (Norway) clearly demonstrated this in his lecture on pre- and post-analytical PT. The subsequent working group discussions triggered many good suggestions for schemes covering more than just the measurement step.

Anthony Russell (Australia) was one of the lecturers that demonstrated the strong trend towards accreditation of PT/EQA providers. He heads the newly established consultative PT working group of ILAC and informed the meeting about adopted resolutions that are likely to lead to further harmonisation of PT accreditation. Many participants argued in favour of a common generic standard that can be applied in all sectors.

Computers and Internet are becoming increasingly important to the PT/EQA provider. Jean-Claude Libeer (Belgium) illustrated how the use of digital samples and video sequences enable new EQA applications but also that smart applications of existing schemes become possible. International collaboration between providers for digital sample libraries and for software applications opens up new training and education possibilities.

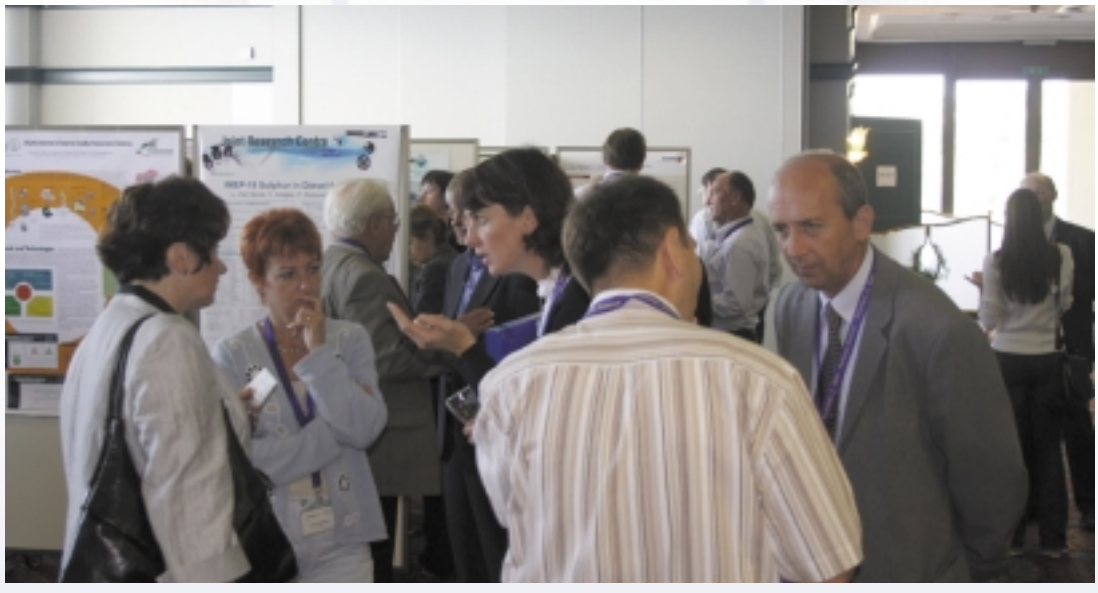
Cas Weycamp (the Netherlands) concluded that going on-line is not just using another tool to handle data but a different way of living with impact on all aspects of PT organisation. He shared many good pieces of advice with the participants. The subsequent WG discussions showed that many of the present PT providers already operate a website for their schemes. All felt that participants appreciate real-time reports and that these reports contribute to daily management of the laboratory. Mr. Weycamp argued in favour of using the Internet to cover all aspects possible in the organisation. Many delegates, however, believed Internet is useful if only parts of the schemes are covered.

Piotr Robouch (European Commission) and Steve Ellison (England) lead a well attended and much appreciated training course on measurement uncertainty. By using a simple measurement task - the length of the diagonal of the meeting room - they triggered the participants to think and discuss several fundamental aspects of uncertainty estimation.

A special issue of Accreditation and Quality Assurance (Springer Verlag) is being prepared to cover keynote lectures, working group discussions and poster contributions. More than 20 manuscripts have already been submitted. The issue is expected during spring 2006. Copies of the speakers' presentations will be available at www.eurachem.ul.pt.

The 5th workshop seems to have met the expectations. The next workshop is scheduled for the autumn of 2008.

Dr. Ulf Örnemark, Dr. Nineta Majcen
Eurachem Proficiency Testing Working Group



Participants of the Eurachem Workshop in Slovenia

International Congress on Analytical Sciences ICAS-2006

25-30 June, 2006, Moscow, RUSSIA

In October 2005 the second circular of ICAS-2006 was issued and distributed among analysts. The second circular contains call for abstracts, detailed rules how to prepare and submit abstracts and other important information (organizing fee, presentations, exhibition of analytical equipment, deadline dates, etc.). The full text of the second circular may be downloaded from the Congress website www.icas2006.ru

Organization

The Congress is organized by Russian Academy of Sciences (RAS) with participation of:

- Vernadsky Institute of Geochemistry and Analytical Chemistry, RAS
- Kurnakov Institute of General and Inorganic Chemistry, RAS
- Lomonosov Moscow State University

In cooperation with

- International Union of Pure and Applied Chemistry (IUPAC)
- Analytical Chemistry Division of the European Association for Chemical and Molecular Sciences (EuCheMS)
- Co-operation on International Traceability in Analytical Chemistry (CITAC)

Scientific Program

The program of the Congress will consist of invited plenary and keynote lectures, oral presentations and poster sessions. Your active participation is highly appreciated. Oral and poster presentations are welcome on subjects within the scope of the Congress.

A workshop on metrology and quality assurance in chemistry (in cooperation with CITAC) will be held during the Congress (on 28 June 2006 the Workshop and a correspondent session of the Congress, and on 29 June 2006 the CITAC members meeting are planned).

A post Congress 7th European Furnace Symposium (EFS'2006) devoted to 50th. anniversary of the furnace AAS method will be held in St. Petersburg (July 2-7, 2006).

Provisional list of invited speakers

The list of plenary and keynote lecturers who already have agreed to give a lecture at the Congress is available. Invitation of prominent scientists all over the world should guarantee high scientific level of the coming event.

Plenary lectures

D. Gunther (Switzerland): *Laser ablation inductively coupled plasma mass spectrometry on the way to become mature*
P. Haddad (Australia): *New developments in ion chromatography*
G. Hieftje (USA): *New sources, spectrometers, and capabilities for the analytical laboratory*
A. Manz (Germany): *Continuous-flow focusing and separations on chip*
M. Mascini (Italy): *Analytical applications of DNA biosensors*
K. Tanaka (Japan): *Innovation from fusion of interdisciplinary analytical sciences*
S. Terabe (Japan): *Micellar electrokinetic chromatography: Fundamentals and applications*
M. Valcarcel (Spain): *Carbon nanotubes in capillary electrophoresis*
E. Wang (China): *Some aspects of self-assembled nanostructures and electrochemistry*
P. J. Worsfold (UK): *Flow injection techniques for investigating dynamic environmental systems*
Yu.A. Zolotov (Russia): *Analytical chemistry in Russia: most important achievements*

Keynote lecturers

H.Y. Aboul-Enein - Saudi Arabia: I. Ali - India, H. Becker-Ross - Germany, B. Huang - China, P. de Bievre - Belgium, W. Buchberger - Austria, P. K. Dasgupta - U.S.A., S. Dong - China, N. El Murr - France, G.A. Evtugyn - Russia, M. Grasserbauer - Austria, L.A. Gribov - Russia, K.G. Heumann - Germany, B. Karlberg - Sweden, Yu.A. Karpov - Russia, T. Kitamori - Japan, R. Koncki - Poland, S.N. Krylov - Canada, O. Lev - Israel, R. Lobinski - France, K. Matsumoto - Japan, T. Mitchell - Germany, B.F. Myasoedov - Russia , A.I. Nadezhdinskii - Russia, T. Nishioka - Japan, W. Olthuis - Netherlands, N. Omenetto - U.S.A., M. Otto - Germany, G. Palleschi - Italy, R. Salzer - Germany, A. Sanz-Medel - Spain, O.A. Shpigun - Russia, B.Ya. Spivakov - Russia, K. Suzuki - Japan, S. Tanner - Canada, D. Tsalev - Bulgaria, Yu.G. Vlasov - Russia, J.H. Wang - China, H. Watarai - Japan, C. Wilkins - U.S.A., E. Zagatto - Brazil, V.N. Zaitsev - Ukraine.

Registration form and Abstracts Submission

It is highly advised to use on-line abstract submission. For it, first prepare the text of your abstracts according the rules (see, http://www.icas2006.ru/Abstracts/Guidelines.htm). Then, go to the Congress web-site (http://www.icas2006.ru/Abstracts/OnLineSubmission.htm), fill in on-line registration form consisting of two parts (submitter's data and abstracts information) and submit it. You will receive registration number for the submitted abstract and the registration system will be ready to accept a text of abstract via e-mail. Your will receive additional confirmation of your submission from Organizing Committee via e-mail. Deadline for abstracts submission extended for CITAC members 15 March 2006.

Welcome to the Congress !
Welcome to Moscow and Russia !

Prof. Vladimir Kolotov
ICAS-2006 Secretar

ANNOUNCEMENTS

Third International Conference on METROLOGY
Trends and Applications in Calibration and Testing Laboratories
Tel Aviv, Israel • November 14 - 16, 2006

Dear Colleague,

The 3rd International Conference on ***Metrology - Trends and Applications in Calibration and Testing Laboratories*** will take place November 14-16, 2006 in Tel Aviv. It is being organized, as were the previous two (May 2000 in Jerusalem and November 2003 in Eilat), by the National Conference of Standard Laboratories (NCSL International), Co-operation on International Traceability in Analytical Chemistry (CITAC) and the Israeli Metrological Society (IMS).

The International Measurement Confederation (IMEKO), the Israel Society for Quality (ISQ), the Israel Society for Analytical Chemistry (IASC) and the National Physical Laboratory of Israel (INPL) are the conference co-sponsors.

The conference will be held in conjunction with the 16th International Conference of the Israel Society for Quality. Since the Society's biannual international conferences are very popular and generally attract 1500-2000 participants, both specialists in metrology (measurement, calibration and testing, including chemical analysis) and quality professionals will have a unique opportunity to network with each other, interact with senior management and learn how to bring the "message" to as many people as possible.

In addition, a combined commercial exhibition within the framework of the two conferences on Metrology and Quality will be attractive for numerous participants and for producers of measuring instruments and quality products.

This 3rd International Conference is aimed at helping participants learn and develop new tools and techniques that will improve accuracy/quality of measurement, calibration and testing / analytical results. Thus the conference will have a strong practical focus.

It is my pleasure and privilege to invite you to take part in the 3rd International Conference on Metrology in Israel, to be an active partner in a challenging and fruitful endeavor and to contribute to its success. Joining us at the conference will also enable you to enjoy exploring the Land of Israel, birthplace of the three great monotheistic religions.

We look forward to a peaceful 2006 and to welcoming you and your colleagues to Tel Aviv.

Dr. Ilya Kuselman
Conference Chair

Topics

- Trends in metrology
- Metrology as a business
- Measurement methods and their validation
- Measuring instruments and their qualification
- Measurement standards (etalons) and reference materials (RMs)
- Uncertainty estimation in measurement and testing/chemical analysis
- Traceability
- Inter-laboratory comparisons and proficiency testing (PT)
- Conformity assessment
- Accreditation of calibration and testing / analytical laboratories
- Accreditation of RM producers and PT providers
- Legal metrology
- Metrology in chemistry, petrochemistry, pharmaceuticals and environmental & clinical analysis
- Software for metrology
- Ethical problems in metrology
- Education

General Information

Venue: The conference will take place at the David Intercontinental Hotel in Tel Aviv.
Date: November 14-16, 2006
Language: The conference will be conducted in English.
Welcoming Reception: A welcoming reception will be held Monday evening, November 13th at 19:00.
Gala Banquet: A festive evening will be held on Tuesday, November 14th at 20:00. The evening will include entertainment and dinner.

Conference proceedings: All attending participants will receive a book of the oral and poster contributions.
Exhibition: A commercial exhibition will take place within the framework of the conference. For further information please contact meetings@isas.co.il
Abstracts: Abstracts of 200 words should be submitted in MS WORD format by e-mail to confer@isas.co.il and a fax copy to +972-2-6520558 by April 1, 2006.
Please attach a short CV. It is understood that this material has not been nor will be presented elsewhere prior to the Conference.
Presentations: There will be oral and poster presentations.Oral presentations will be limited to 30 minutes. Presented papers will be published in the Conference Proceedings and selected papers will be published in a special issue of the international journal "Accreditation and Quality Assurance" (Springer-Verlag). Round Table Discussions between panel and audience will be presented.
Conference Secretariat:
ISAS International Seminars, POB 34001, Jerusalem 91340, Israel
Tel: 972-2-6520574
Fax: 972-2-6520558,
email: congress@isas.co.il

Webpage: www.isas.co.il/metrology2006

ANNOUNCEMENTS

IV Congress on Metrology in Chemistry

June 11- 14, 2007, São Paulo, Brazil

Organized by Institute for Technological Research (IPT)

In cooperation with

- Co-operation on International Traceability in Analytical Chemistry (CITAC)
- Metrological Network of the State of São Paulo (REMESP)
- Brazilian Metrology Society (SBM)

The main focus of this Congress will be on Traceability of Measurements in Analytical Chemistry.

The scientific program will cover multidisciplinary aspects on traceability of measurements in chemistry related to uncertainty, reference materials, analytical measurement process, proficiency testing programs, accreditation, legal requirements, dissemination and technological management in different areas, such as: Pure Chemistry, Health, Environment, Food, Industrial Hygiene among others.

Complete information will be available at:
www.ipt.br/areas/cmq
Contact person: Ms. Vera Poncano
e-maill: vponcano@ipt.br

Mrs. Vera Poncano
IPT, Brazil

Workshop

Metrological Concepts for Strengthening Food and Nutritional Measurements

June 26-30, 2006, Mysore, India

Central Food Technological Research Institute (CFTRI) in association with the United Nations University, International Union of Nutritional Sciences, International Nutrition Foundation, Tufts University, among others, is proposing to hold this workshop as a supplement to the International Symposium on Building Leadership Skills in Food and Nutrition Essential for National Development, June 23-25, 2006 at CFTRI, Mysore - 570 020, India, aimed at strengthening the leadership and capacity development efforts in food and nutrition.

The workshop facilitates public health and nutrition investigators to develop awareness for current concepts in measurement practices. Understanding the steps of a measurement process and the associated metrological principles enhances the reliability of the result generated, thereby contributing to sound decisions. The workshop emphasizes the economic benefits associated with reliable analytical results and stresses the need for sustainability of analytical quality assurance in several areas of food, nutrition and related physiological measurements.

The symposium will be preceded on June 19-22 by another workshop on Enhancing Efficiency of Nutritional Investigations (contact: nsscrimshaw@inffoundation.org).

For details please contact:
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Prof. V. Iyengar
Tuffs University, U.S.A.

Messages from New Members

Introduction of Máire Walsh

While I have only recently become a member of CITAC, I have been associated with it for many years having lectured at CITAC symposia and joint EURCAHEM / CITAC events and am a member of the joint working group that developed the Guidance document "Traceability in Chemical Measurement" and which is currently working on a document concerning the "use of uncertainty in compliance assessment". I was also a co-author of the 2nd edition of the Guide to "Quality in Analytical Chemistry: an aid to accreditation".

Last year I retired as The State Chemist and the head of the Irish State Laboratory. The State Laboratory is the Irish Government's principal analytical chemistry laboratory and has statutory and referee functions under Irish and European Union (EU) legislation. It is a designated NMI for the chemical and bio sciences and a National Reference Laboratory for sectorial aspects of EU food and agricultural legislation. The laboratory engages in a wide range of chemical and bio analysis such as, food and agriculture, customs and excise, residues, contaminants, drugs of abuse, health and safety, environment, plant health and analysis in support of conservation of national monuments and cultural heritage. As State Chemist my duties encompassed the analytical and financial management of the State Laboratory, crafting strategy and interacting with government departments and the EU. I served on many government committees including the committee overseeing "the Reform of the Civil Service and Local Appointments Commission".

During my career I worked in the food & agriculture, residue testing and illegal drugs, EU subsidies, toxicology and conformance testing areas of the laboratory. I negotiated technical legislation at EU meetings and was a member of several committees that were responsible for validating analytical methods for regulatory purposes. I chaired many EU working groups and represented Ireland on various management committees that were concerned with the measurement and testing strand (which no longer enjoys a political profile) of the EU Framework Research Programmes.
I was Chair of EURACHEM in the late 90s and am currently a member of its executive committee, the uncertainty and traceability working group, and am its representative to the ILAC laboratory committee

I was elected as a member of the Board of Directors of AOAC International in 1999 and am its current President (Sept 05 - Sept 06) and have served on a number of AOAC committees and two task forces dealing with method validation.

Currently, I chair the Irish National Accreditation Board and am a former member of the Scientific Committee of the Food Safety Authority of Ireland. Up to retirement I was head of the Irish delegation to the CODEX committee on methods of analysis and sampling (CCMAS).

My chairpersonship of EURACHEM (95/98) brought me into close contact with CITAC and I now hope that I can make a positive contribution to its activities and act as a conduit between it and other international organisation who are concerned with quality and traceability of analytical results.

Dr. Máire Walsh,
AOACI Chair, Ireland

Short message from Philippe Charlet

It was a great pleasure to host the CITAC members in Paris, for the annual meeting, at LNE (Laboratoire National de Métrologie d'Essais), the French NMI, this spring and not only because I have been elected as a new member of CITAC! It is really a great pleasure to accept this membership and I would be very pleased to take an active part in CITAC activities.

Just a few word of presentation about my past activities. I obtained my Doctorate in Analytical Chemistry (University of Lyon, France) and post-Doctorate (French Leather Institute) in 1983. I have more than twenty years experience, including international, in a broad spectrum of industrial sectors.
I started my professional carrier as Lab manager in environment area at the French Pulp and Paper Research Institute, for ten years. Then I have had the opportunity to move to Brazil as consultant in the Research and Technology Center of Aracruz Celulose, for four years. Aracruz Celulose was, at that time, the largest bleached pulp mill of the world. Still enjoying Brazil and its tropical climate, I joined a new company, White Martins (Praxair Brazil) to be senior research scientist at the Rio Technology Center, for three years. I have had the chance to file industrial patents in the field of ozone application and I became "Praxair World Specialist" for Ozone Chemistry and for Analytical Chemistry.

After all these years in South America, it was time to come back to France and I joined LNE four years ago, as coordinator in the field of Chemical Metrology. At the beginning of this year, I took a new position in the recently created R&D Department, as Deputy Director in charge of Scientific Coordination. Despite this change, I was willing and fortunately kept my mandates in metrology, as French representative at CCQM and, above all, Technical Committee Chairman of METCHEM, the joint Committee between EUROMET and EURACHEM.

My new duties, mixing, in synergy, metrology and testing, gave me the opportunity to serve LNE in a key position as Scientific Coordinator. New ambitions, at the crossroads of Science and Industry, are expressed by LNE, through the opportunities offered by the reform of the French Metrology.

Dr. Philippe Charlet
LNE, France

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CITAC PUBLICATIONS

CITAC mission, objectives and strategies (2004)

See the journal "Accreditation and Quality Assurance" (2004) 9:172.

Traceability in Chemical Measurement. A Guide to Achieving Comparable Results in Chemical Measurement (2003)

This guide has been produced primarily by a joint EURACHEM/CITAC Working Group in collaboration with representatives from AOAC International and EA. Production of the guide was in part supported under the contract with the UK Department of Trade and Industry as part of the National Measurement System Valid Analytical Measurement (VAM) Program.

The purpose of the guide is to provide guidance on identifying traceability requirements in chemical measurements and establishing traceability of measurement and test results.

Guide to Quality in Analytical Chemistry, the Second Edition (2002)

This document has been produced primarily by a joint working group of CITAC and EURACHEM and is based on earlier documents, including CITAC Guide 1, published in 1995 and the EURACHE / WELAC Guide published in 1993. This edition deals with the new requirements of the standard ISO/IEC 17025:1999 "General Requirements for the Competence of Testing and Calibration Laboratories".

The aim of this guide is to provide laboratories with guidance on best practice for the analytical operations they carry out.

Quantifying Uncertainty in Analytical Measurement, the Second Edition (2000)

This guide has been produced primarily by a joint EURACHEM/CITAC Working Group in collaboration with representatives from AOAC International and EA. Production of the guide was in part supported under the contract with the UK Department of Trade and Industry as part of the National Measurement System Valid Analytical Measurement (VAM) Program. The first version of this guide, which was published in 1995, has been very well received. After reciving many helpful comments on the contents of the first edition, many significant changes and improvements have been made in this second edition. The most important change deals with the use of method performance data and in particular the use of method validation data, from both collaborative validation studies and from in-house studies. The new sections dealing with the use of method performance data show that in many cases such data gives all, or nearly all information required to evaluate the uncertainty. The format of the guide is very similar to that of the first edition. Chapter 3, Analytical Measurement and Uncertainty, is completely new and covers the process of method validation and conduct of experimental studies to determine method performance and their relationship to uncertainty estimation. There is also a new section on traceability. The chapter on uncertainty estimation in the previous guide has been considerably expanded and split into four separate chapters dealing with the four steps involved in estimating uncertainty. The examples have been completely revised and new ones added. They are now all in a standard format, which follow the four steps described above. They all utilize the cause and effect diagram as an aid to identifying the sources of uncertainty and to ensuring that all the significant ones are included in the evaluation of the uncertainty. In addition, a web site has been set up at URL which contains an indexed HTML version of the Guide. This site hosts a discussion forum on the application of the guide and has a section for the publication of additional examples.

Quality Assurance for Research and Development and Non-routine Analysis (1998)

This guide, produced by a joint EURACHEM/CITAC working party representing industrial, academic, and governmental interests, promotes and describes the concepts of quality assurance in the non-routine environment. The guide promotes a nested approach to quality assurance, dealing with it at a general organizational level, a technical level and a project specific level. It is intended to promote the use of QA as an effective tool for establishing and maintaining quality in R&D and non-routine operations. It does not seek to set criteria for accreditation of R&D although there is a section describing various methods for third party assessment of quality systems.

The guidance may form the basis on which accreditation criteria can be set in the future. The guidance is intended to complement the existing CITAC Guide 1 which describes QA in the routine environment.

It is primarily directed towards analytical chemistry establishments but is, in principle, applicable to other sectors. An extensive bibliography is included.