

The Crucial Role of Metrology in Chemistry

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Metrology in Chemistry

- The science concerned with studying and providing the basis for comparability and traceability in chemical measurements
- Important to establish global mutual recognition of analytical results
- Provide technical foundation for wider agreements related to international trade, commerce and regulatory issues

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Why Metrology?

- Aiming global comparability of measurement and test results
- Measurement results traceable to the same long term stable references
- Globally credible, recognised and accepted measurement results
- Support international trade, improve life quality, avoid unnecessary errors and misunderstanding

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Need for Metrology

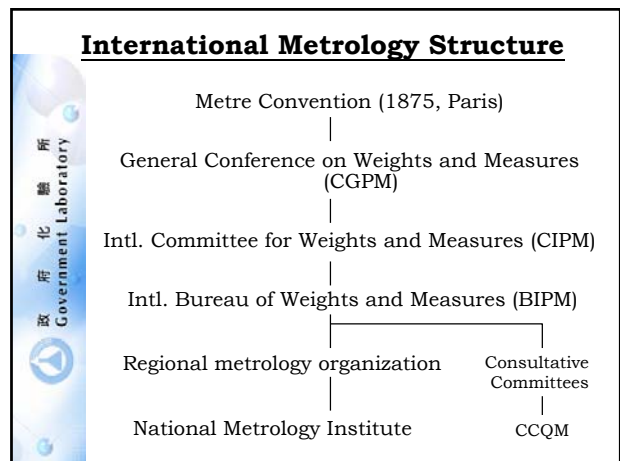
- Globalization of trade and industry:
Wrong measurement results may lead to large losses in money and subsequent consequence.
- Removal of technical barrier to trade:
Once measured/tested, everywhere accepted
- Import and Export:
Ban on tradings lead to unstable economy
eg. honey and beef from Argentine
wine and fish from Chile
fish from Kenya, Tanzania, Uganda
GMO products, chicken from Thailand

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Application in Hong Kong

- Law enforcement and implementation of regulations & ordinances involve chemical measurements.
e.g. ethanol content in blood - (Cap.374, Road Traffic Ordinance)
preservatives in food - (Cap.132, Public Health & Municipal Services Ordinance)
sulfur content in fuel - (Cap.311, Air Pollution Control Regulation)
pesticide residues in Chinese medicine - (Cap.549, Chinese Medicine Ordinance)
- International trading requires chemical measurements for product certification
e.g. heavy metal contamination in health products
veterinary drug residues in meat products

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Metre Convention

- First signed in 1875 by 17 nations
- An international multilateral agreement for the mutual recognition of national measurement standards and of calibration and measurement certificates issued by signatory national metrology institutes (NMIs)
- 51 member states and 17 associates

National Metrology Institutes (NMI)

Reliability and confidence in chemical measurements carried out in the country can be realised through the presence of a national traceability chemical measurement system maintained by the national metrology institute

- examples:-
- NIST – USA
 - NIM – China
 - PTB – Germany
 - LGC – UK
 - NMIJ – Japan
 - KRISS – Korea
 - BNM-LNE – France
 - NMi - Netherlands



Role

- International System of Units – SI
CGPM
- Dissemination of standards
BIPM → NMIs → ref. Labs → field labs
- Global mutual recognition arrangement (CIPM MRA)
 - establish the degree of equivalence of national measurement standards maintained by NMIs
 - provide for the mutual recognition of calibration and measurement certificates issued by NMIs
 - provide governments and other parties with a secure technical foundation for wider agreements related to international trade, commerce and regulatory affair

Chemical Metrology in HKGL

- Objectives
 - maintain traceability and comparability of its work in analytical measurements
- Quality system in full compliance with:
 - ISO/IEC 17025 (A&ASD)
 - American Society of Crime Laboratory Directors /Laboratory Accreditation Board (FSD)
- Related work
 - research of higher order/primary measurement methods
 - provide proficiency testing programmes

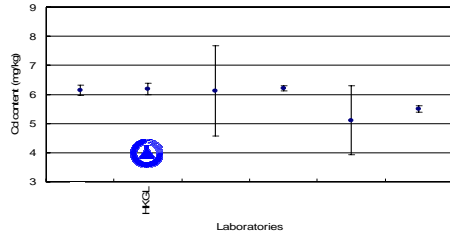
A Designated Metrology Institute

- March 1993
A founding member of Co-Operation on International Traceability in Analytical Chemistry (CITAC) 
- November 2004
Full Member of APMP 
- May 2005
Designated metrology institute under CIPM mutual recognition arrangement

Participation in APMP pilot studies

Title	Round No.	Participation Date
DDE in fish oil	APMP.QM-P1	Sep 2001
Determination of cadmium in rice	APMP.QM-P2	Nov 2001
Constituents in Non-fat Milk Powder	APMP.QM-P3	Apr 2003
Comparison of pH	APMP.QM-P6	Jun 2004
DDE in fish oil	APMP.QM-P4	Nov 2004
Analysis of Cu, Zn, Fe, and Ca in Nonfat Soybean Powder	APMP.QM-P7	Mar 2005
Analysis of Cadmium in oyster tissue	APMP.QM-P5	May 2005

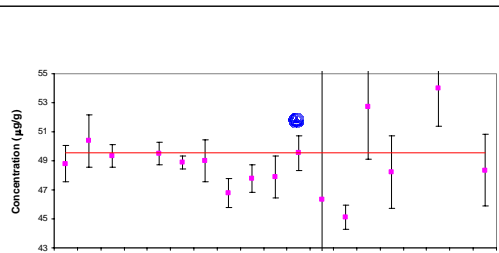
APMP.QM-P5 Results (cadmium in oyster tissue)



Participation in CCQM pilot studies

Title	Round No.	Participation Date
VOCs in Solvent	CCQM - P61	Jan 2005
PCB congeners in solution	CCQM - P31.b.1	Jan 2005
PAHs in solution	CCQM - P31.a.1	Jun 2005
Chlorinated pesticides in solution	CCQM - P31.c.1	Jun 2005
Anabolic steroids in urine	CCQM - P68	Jun 2005
PAHs in Soil/sediment	CCQM - P69	Jun 2005
Metals in non-fat soybean powder	CCQM - P64	Apr 2005
DNA extraction	CCQM - P60	Jun 2005

CCQM-P61 Results (Toluene in solution)



Provision of PT Programmes

Recent programmes

- Pharmaceutical Proficiency Testing Programme – chlorpheniramine maleate & pseudoephedrine HCl in oral solution (**2003, APLAC T038**)
- Product Safety Proficiency Testing Programme – Migration of soluble elements (heavy metals) (**2004, APLAC T039**)
- Herbal Medicine Proficiency Testing Programme – Determination of toxic elements (**2005, APLAC T043**)
- Herbal Medicine Proficiency Testing Programme – Determination of organochlorine pesticide residues (**2006, APLAC T049**)

Looking Forward

- Participate in inter-comparison programmes offered by CCQM, APMP
- Seek accreditation for role as PT provider
- continue to enhance measurement capabilities
- Provide assistance to establish comparability and traceability



**Thank You for
Your Attention !**