TECHNICAL SEMINAR ON THE USE AND PRODUCTION OF REFERENCE MATERIALS

PRODUCTION AND USE OF REFERENCE MATERIALS: INSIGHTS FROM THE GOVERNMENT LABORATORY AS THE DESIGNATED INSTITUTE FOR METROLOGY IN CHEMISTRY IN HONG KONG, CHINA

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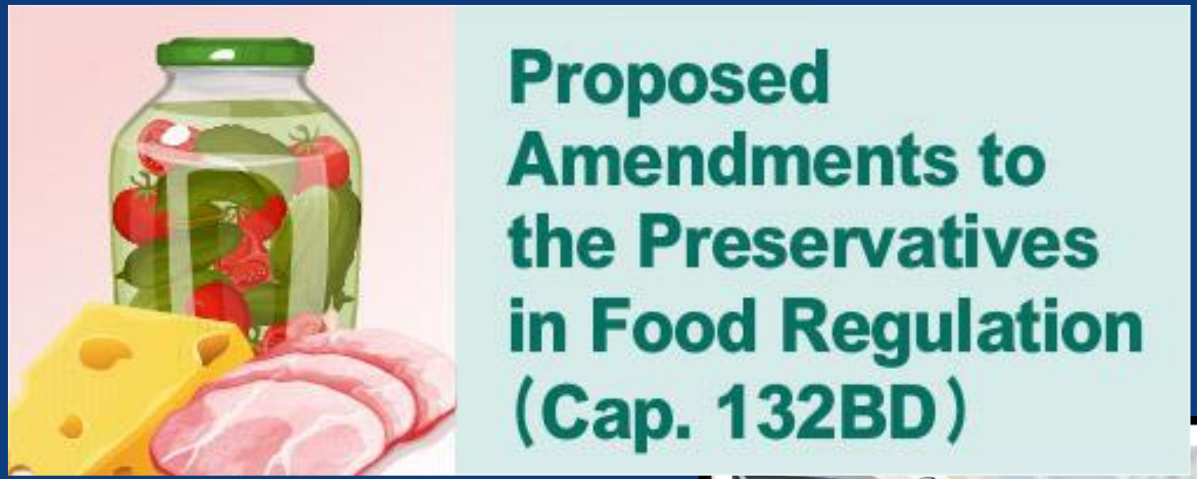
Why Accurate Measurement Matters to us ?

- Food safety testing



- Environmental monitoring

- Toy & consumer product testing
- Chinese Medicine/pharmaceutical product authentication

Why Accurate Measurement Matters to us ?

Traceability

Comparability

Measurement Uncertainty

Accurate & Reliable Measurement

What Are Reference Materials?

Reference Materials (RMs)

- **Types of Reference Materials**
- Certified Reference Material (CRM) are RMs with a certificate providing traceability to an accurate realization of the unit in which the property values are expressed. RMs included CRMs, secondary RMs, and in house RMs, each suitable for different applications.

- Importance of Reference Materials
- RMs are essential tools for ensuring the accuracy and reliability of measurements, supporting quality control, and facilitating international comparability.

Why Do We Need Reference Materials ?

Why Use Reference Materials (RMs) ?

➢ Calibration and Validation

- RMs are crucial for calibrating analytical instruments to ensure that they provide **accurate** results; they also help validate analytical methods, confirming their reliability and precision for specific applications.

➢ Quality Assurance and Control

- Using RMs allows laboratories to assess their measurement process internally and participate in proficiency testing (PT) schemes to demonstrate competence.

Why Use Reference Materials (RMs) ?

Accurate & Reliable Measurement

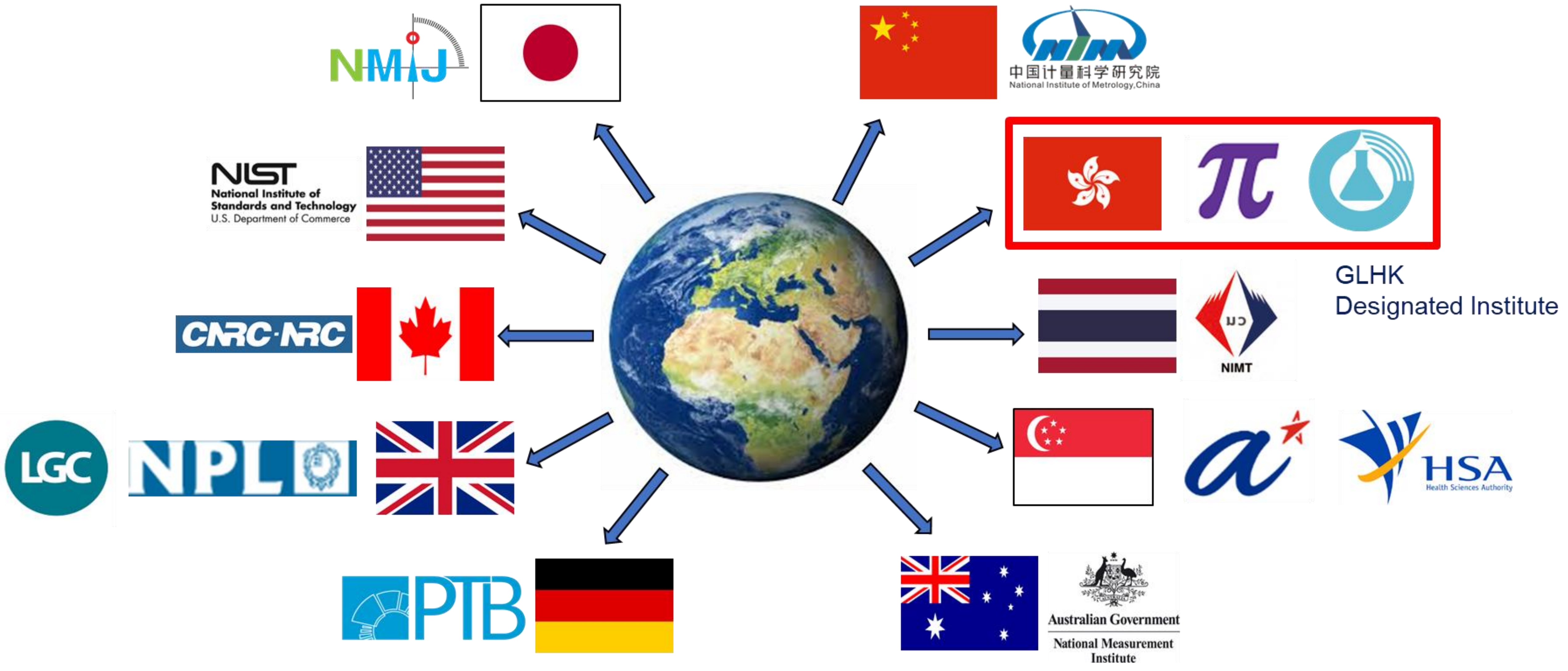
- Traceability
- Comparability
- Measurement Uncertainty

➢ Traceability and Comparability

- RMs enable traceability of measurements to international standards, enhancing the comparability of results across different laboratories and economies. This is vital for international trade and regulatory bodies.

GLHK – HK's Designated Institute (DI)

National Metrology Institutes (NMIs) / Designated Institutes (DIs)



Role of NMIs/DIs

- Play an important role in a country's measurement system
- Conduct scientific metrology, realise base units, and maintain primary national standards
- Provide traceability to international standards for a country, anchoring its national calibration hierarchy
- NOT all countries have a centralised metrology institute (e.g. NIST in USA); some have a lead NMI and several designated institutes specialising in specific national standards (e.g. NPL and LGC in UK; PTB, BAM and BVL in Germany)

Role of GL as HK's Designated Institute (DI)

- Designated Institute responsible for metrology in chemistry in Hong Kong, China under the International Committee of Weights and Measures (CIPM) Mutual Recognition Arrangement (MRA) in 2005

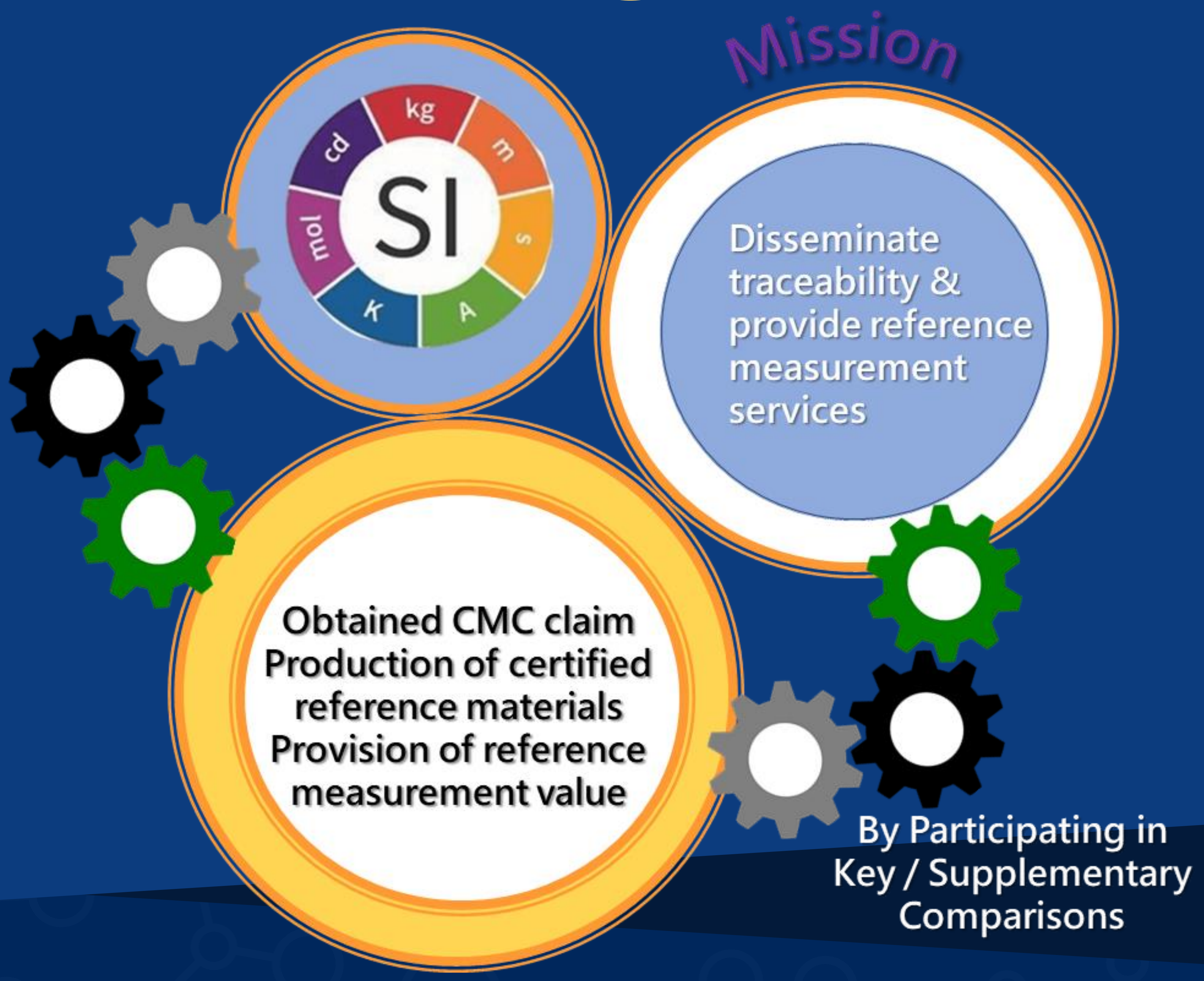
- To actively participate in comparison studies organised by the Asia Pacific Metrology Programme (APMP) and the International Bureau of Weights and Measures (BIPM)

Role of GL as HK’s Designated Institute (DI)

Key responsibilities

- To establish and disseminate traceability of related measurements to support the testing community in Hong Kong
- To produce certified reference materials
- To organize proficiency testing schemes with metrologically traceable reference values

Chemical Metrology in GL

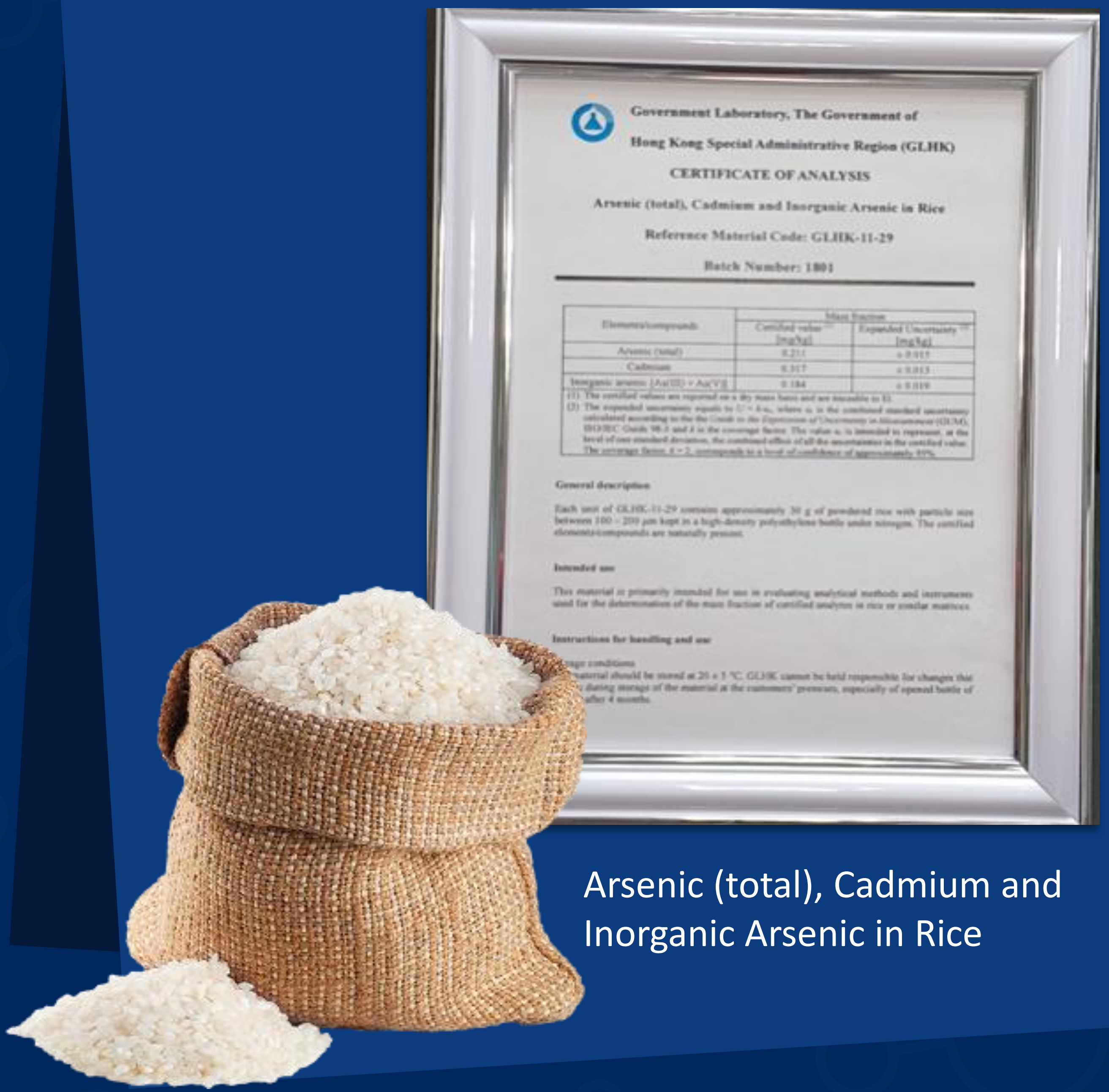


Chemical Metrology in GL

- Since 2004, GL has participated in more than 100 key comparisons, supplementary comparisons, and pilot studies organized by the Consultative Committee for Amount of Substance (CCQM) and regional metrology organizations.
- In 2010, GL obtained its first Calibration and Measurement Capability (CMC) claim, published in the International Bureau of Weights and Measures (BIPM) Key Comparison Database (KCDB)
- Till 2025, **133** CMC claims have been obtained.

How GLHK Produces RMs & Future Plan in RM Production

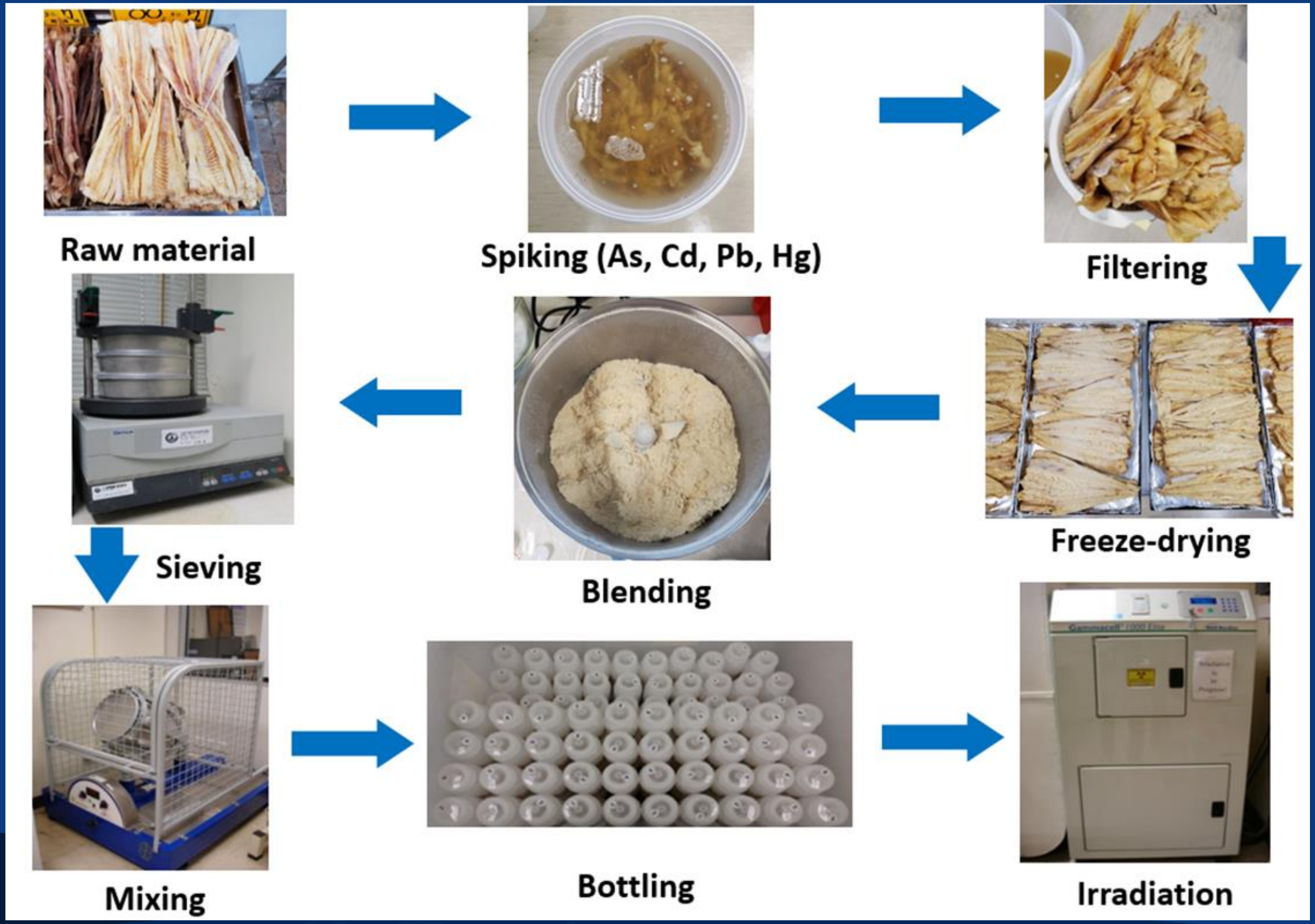
Reference Materials Production



Arsenic (total), Cadmium and Inorganic Arsenic in Rice

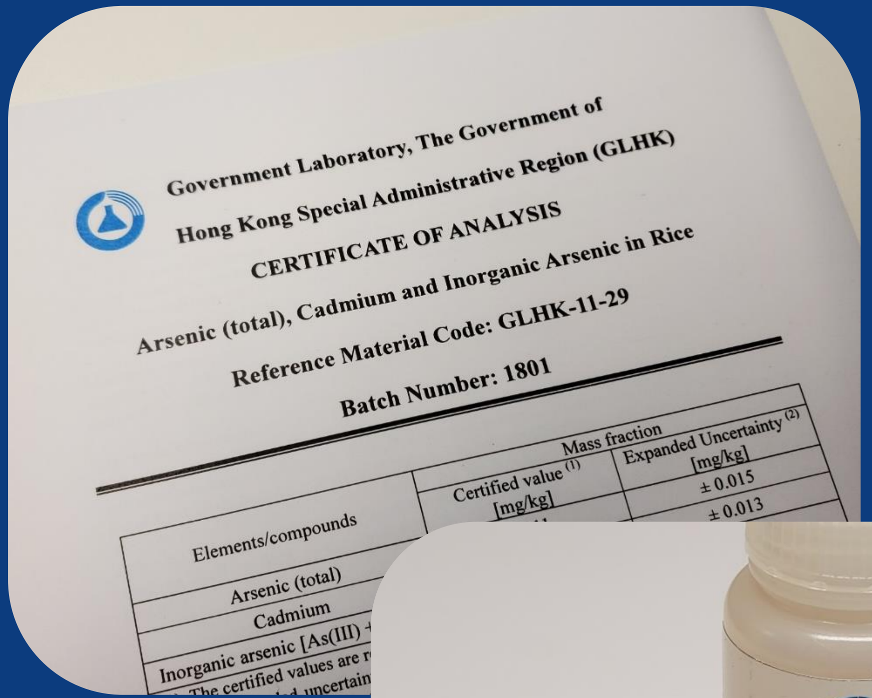
- With the support of relevant calibration and measurement capability (CMC) claims, certified reference materials were produced.
- GLHK also comply with ISO 17034, the international standard for RM producers, demonstrating competence and quality management; accreditation ensures that the production process meets rigorous requirement and standards.

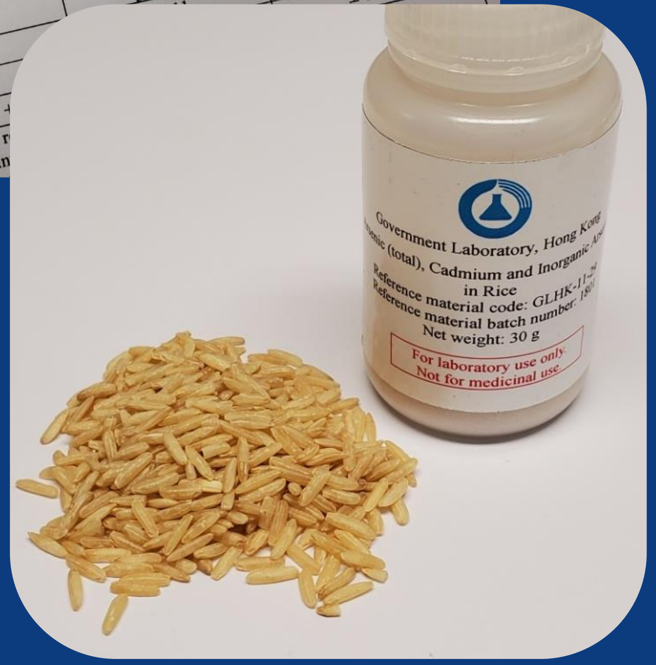
Typical Procedures of Reference Materials Production



Reference Materials Production

	CRM production
Between-bottle homogeneity	✓
Within-bottle homogeneity	✓
Short-term stability	up to 60 °C, 6 weeks
Long-term stability	✓
Repeated subsampling stability	✓
Shelf-life estimation	✓
Post-production stability monitoring	✓





Reference Materials Production

Hong Kong Accreditation Service
香港認可處

Certificate of Accreditation
認可證書

This is to certify that
特此證明

GOVERNMENT LABORATORY - Analytical and Advisory Services Division
政府化驗所 - 分析及諮詢事務部

7/F, Homantin Government Offices, 88 Chung Hau Street, Kowloon, Hong Kong

香港九龍何文田忠孝街八十八號何文田政府合署七樓

is accredited by the Hong Kong Accreditation Service (HKAS) to ISO 17034:2016 as a
獲香港認可處根據ISO 17034:2016認可為

Reference Material Producer
標準物質生產者

for the production of specific reference materials as listed in the scope of accreditation
並生產載於認可範圍內的指定標準物質

The common seal of HKAS is affixed hereto by the authority of the HKAS Executive
現經香港認可處執行總監授權在此蓋上香港認可處的印章

CHEN Kin-wah, Executive Administrator
執行幹事 陳健華
Issue Date : 3 January 2019
簽發日期：二零一九年一月三日

Registration Number : HOKLAS 001
註冊號碼：

Date of First Registration : 14 March 1986
首次註冊日期：一九八六年三月十四日

This certificate is issued subject to the terms and conditions laid down by HKAS
本證書按照香港認可處訂立的條款及條件發出

L001751

- Accredited reference material producer (RMP) since 2010

- Produced 10 Certified Reference Materials (CRMs)

Arsenic (total), Cadmium, and Inorganic Arsenic in Rice Certified Reference Material

Description Specifications | Product code: GLHK-11-29

Description
Each bottle includes a 30 g of rice powder

Description Specifications

Specification

Physical form	Powder
Unit of Issue	30 g
Expiration Date	16-June-2024
Analyte	Arsenic (total), Inorganic arsenic Cadmium

Future Plan in RM Production

Planned Production of new CRM

- Histamine in Fish

Feasibility studies for the production of new CRMs

- Pesticides in Chinese Medicines
- Elements in Botanical Material (Herbal Chinese Medicines)

Good Practices for the use of Reference Materials

Good Practices for the use of Reference Materials

How to select a Right RM?

- ➢Define Your needs
- ➢Check the Certificate
- ➢Consider the Matrix

Good Practices for the use of Reference Materials

Handling and Storage

- ➢Follow Instructions
- ➢Store Properly
- ➢Avoid Contamination

Conclusion and Q&A

Conclusion

- Importance of RMs
- GLHK roles as the DI of HKSAR
- Future Direction

THANK YOU

Good Practices for the use of Reference Materials

Best Practices in RM Use

- Implement a Quality System
- Regular Calibration
- Participate in Proficiency Testing