

Elevating Food and Water Safety through Advanced Metrology: How GLHK Inspires Excellence in Contaminant Measurement and Reference Material Development

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Food contaminants can enter the food supply from natural sources, environmental pollution, or food processing, posing significant risks to public health. The Government Laboratory of the Hong Kong Special Administrative Region, China (GLHK) plays a pivotal role in ensuring food safety by offering high-quality measurement and advisory services to support the local food authority. By utilizing advanced techniques such as isotope-dilution mass spectrometry (IDMS), in combination with ICP, GC, and LC methods, GLHK achieves accurate and reproducible measurements of contaminants in various food matrices.

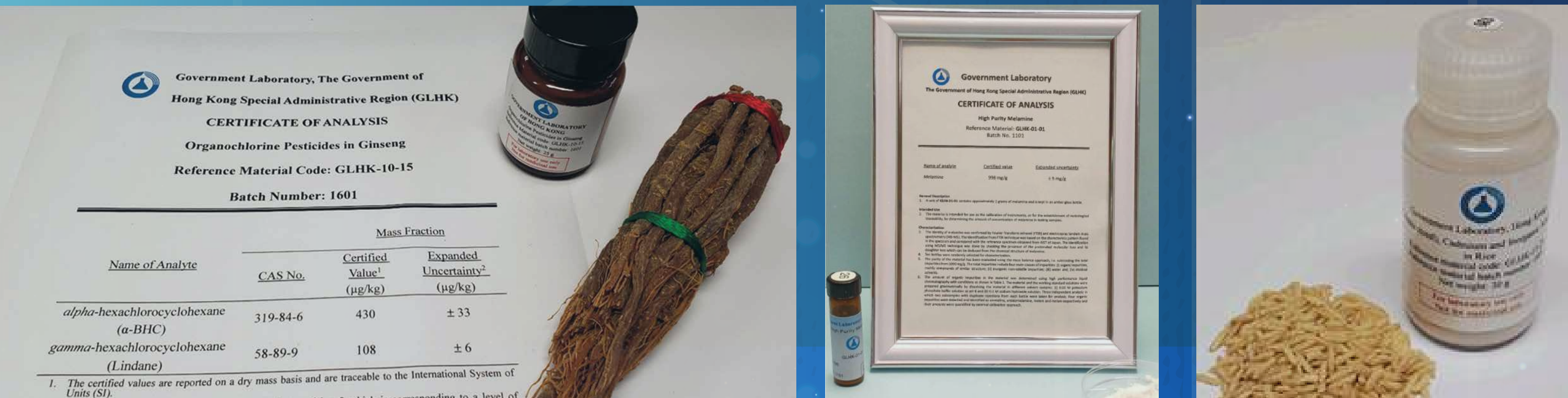


Promotion of drinking water safety

GLHK co-organised the CCQM Key Comparison CCQM-K124 in 2014, focusing on chromium speciation in drinking water. Additionally, we co-organised an Inter-American System of Metrology (SIM) Supplementary Comparison SIM.QM-S12 in 2021, addressing the measurement of trace-level elements in natural water.

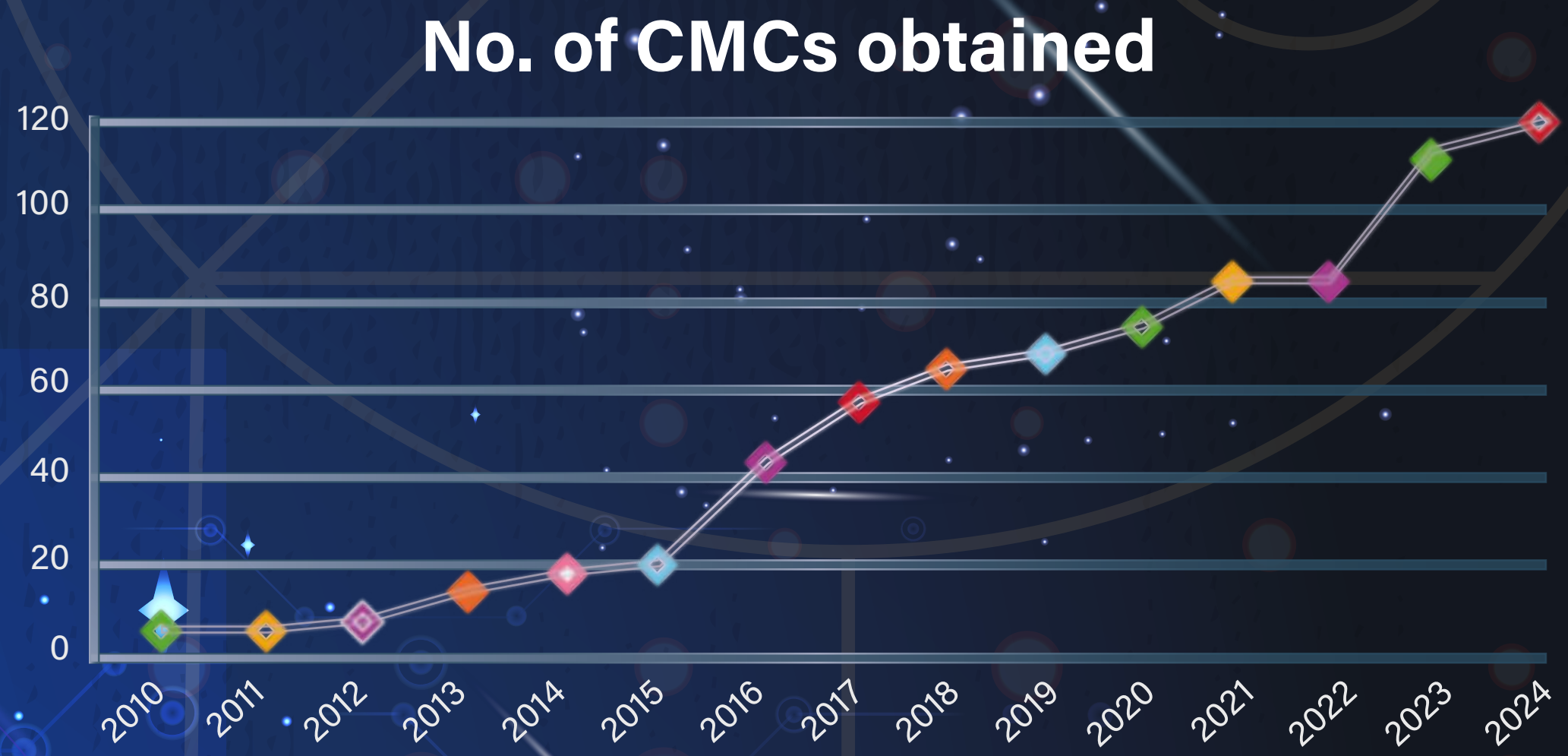
Production of certified reference materials (CRMs)

GLHK is accredited as a Reference Material Producer in accordance with ISO Guide 34 in 2010, and transitioned its accreditation to the latest ISO 17034 in 2019.



Calibration and Measurement Capability (CMC)

In 2010, GLHK obtained its first Calibration and Measurement Capability (CMC), which was published in the International Bureau of Weights and Measures (BIPM) Key Comparison Database (KCDB). As of 2024, a total of 120 CMC claims have been obtained.

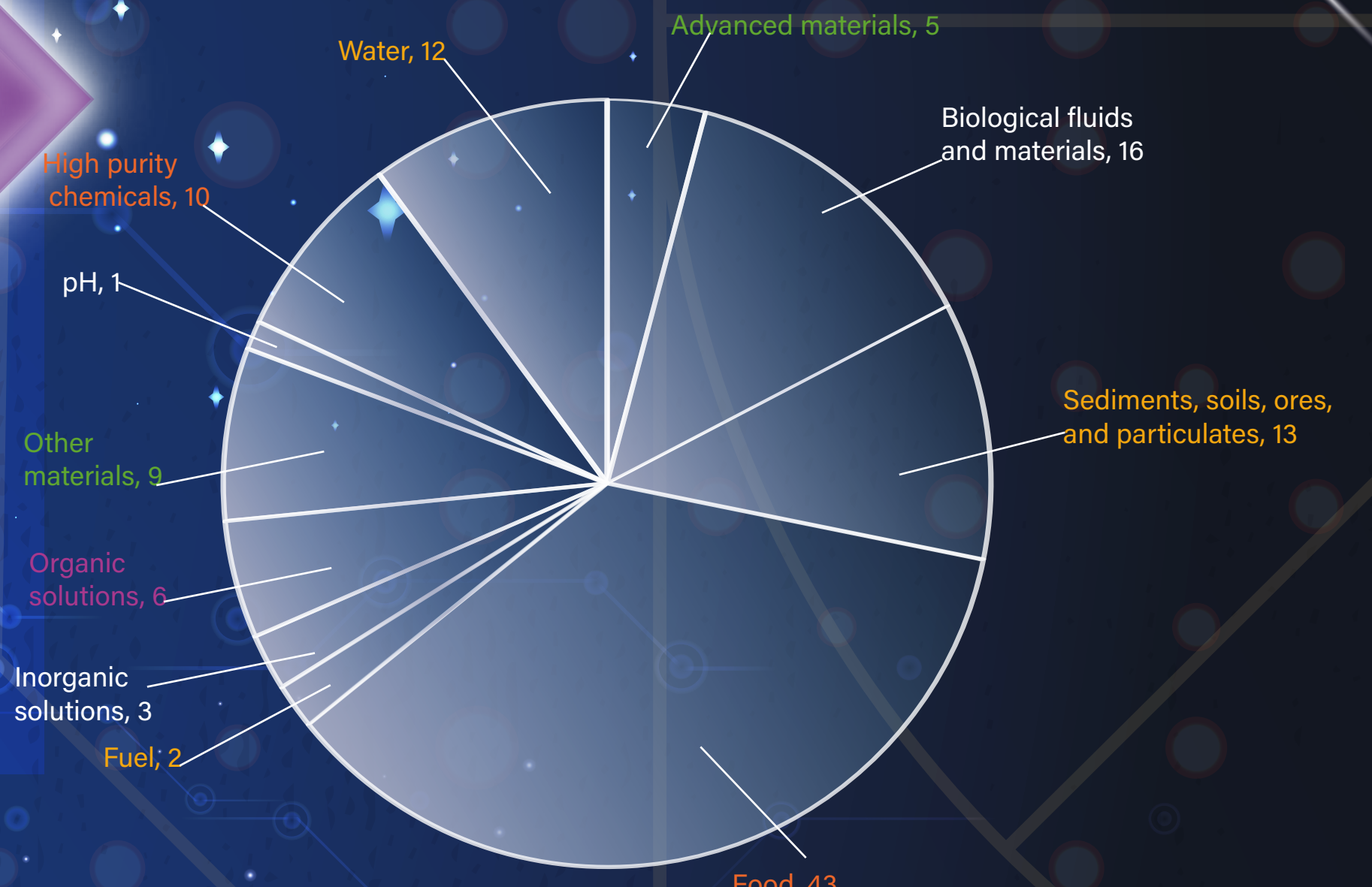


Promotion of food safety

GLHK facilitated the Asia Pacific Metrology Programme (APMP) Supplementary Comparison APMP.QM-S11 on organochlorine pesticides in plants in 2016 and launched a joint proficiency testing program on the same theme with APMP and the Asia Pacific Laboratory Accreditation Cooperation (APLAC). In 2021, GLHK led another comparison APMP.QM-S19, concentrating on the measurement of toxic elements in seafood. This initiative assessed the capabilities of metrology institutes in measuring toxic elements within high-protein food matrices. Additionally, GLHK organised a Pilot Study CCQM-P215 within the CCQM framework, focusing on the complexities of arsenic speciation and relevant sample extraction in seafood, to investigate and address the challenges encountered by testing communities.



Distribution of Categories of CMCs



Promotion of metrological traceability

Home > Accreditation and Quality Assurance > Article

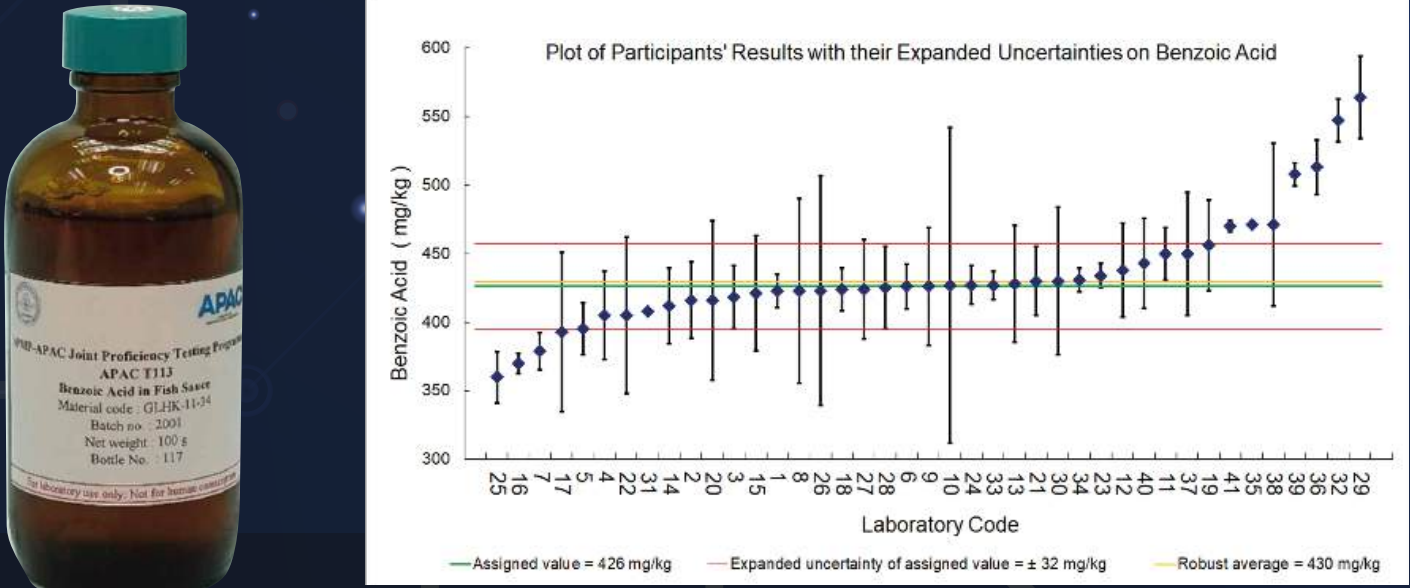
Promotion of metrological traceability through the provision of a metrologically traceable proficiency testing reference value for the mass fraction of benzoic acid in fish sauce

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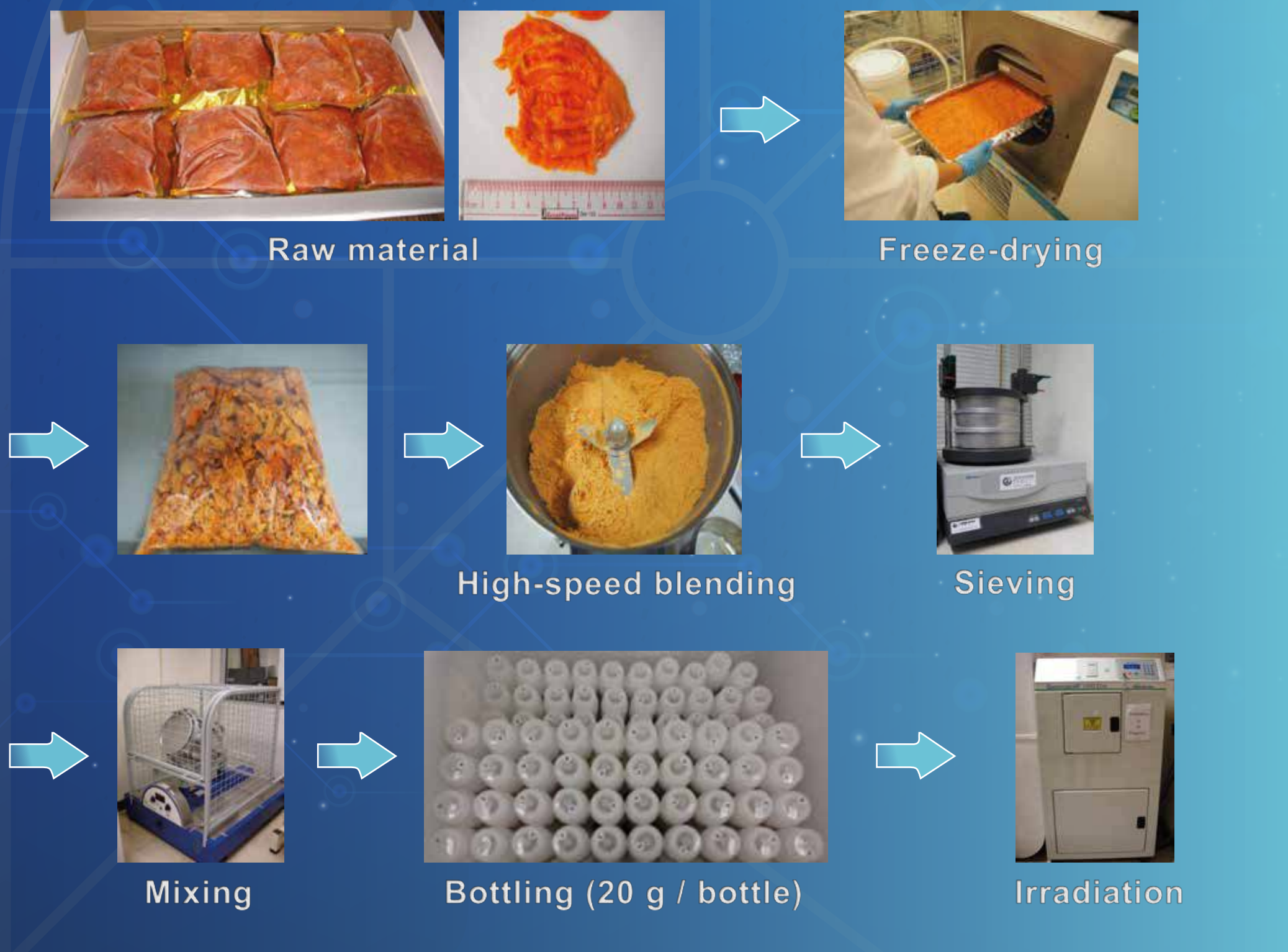
In 2024, GLHK published its work on an APMP-APAC joint PT programme focusing on the quantification of benzoic acid's mass fraction in fish sauce. Participation in a PT with an assigned reference value can significantly enhance and strengthen the quality and traceability of laboratory results. This is achieved by connecting participants' results to the SI-traceable reference value, along with the associated uncertainties. The utility of the reference value extends beyond factors such as the number of participants, the dispersion of results, and potential biases inherent in the data, which may influence the PT's consensus value. It provides an indispensable advantage for interlaboratory comparisons, enabling national and international comparability. Additionally, it offers a more reliable and unbiased benchmark for participants to scrutinise their results for accuracy.



Planned comparison

To further advance metrology in food safety testing, GLHK is committed to enhancing the analysis of pesticide residues in plant products and also plans to conduct a follow-up CCQM Key Comparison on arsenic speciation in seafood. Looking ahead, GLHK intends to launch a new matrix CRM focused on pesticide residues in botanical materials by 2025.

Workflow for the preparation of arsenic speciation in seafood



Conclusion

Since 2005, the Government laboratory has been the Designated Institute in the field of metrology in chemistry for Hong Kong, China, under the International Committee of Weights and Measures (CIPM) Mutual Recognition Arrangement (MRA). During Over the past 20 years, GLHK has been providing support and promoting metrology through hosting technical and metrology seminars, organising proficiency testing schemes and producing reference materials. GLHK has also actively participated in and organised key comparisons, achieving satisfactory results in these comparisons.

- Our achievements includes :
- Organisation of 22 and participation in over 100 key comparisons, supplementary comparisons or pilot studies
 - Acquisition of 120 CMC Claims
 - Provision of 85 PT Schemes
 - Production of 10 CRMs

Moving forward, GLHK will continue to actively participate in and organise international and regional comparison studies. We will also continue to provide proficiency testing schemes with the highest metrologically traceable assigned values, aiming to improve the accuracy and traceability of measurements. Additionally, GLHK will focus on producing CRMs to provide valuable testing support to food authorities across various jurisdictions. These initiatives will strengthen food safety practices and contribute to the overall goal of ensuring safer food and water for the public.

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