



CHALLENGES WITH THE PROVISION OF REFERENCE VALUES FOR PFAS ANALYTES

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INTRODUCTION: Per- and polyfluoro alkyl substances (PFAS) are of increasing concern due to their widespread occurrence in the environment, their bio-accumulative properties, slow biodegradation, and possible health effects. Accuracy based proficiency testing (PT) programs using reference values with metrological traceability are a valuable tool to demonstrate that analytical laboratories can deliver high quality and reliable results. The National Measurement Institute Australia (NMIA) conducted a PT program for PFAS (AQA 19-11) using a reference value for perfluorooctanoic acid (PFOA) in drinking water to assess the performance of participants.¹

REFERENCE METHOD

Exact matching isotope dilution mass spectrometry approach using solid phase extraction and two liquid chromatography mass spectrometry methods (Figure 1).

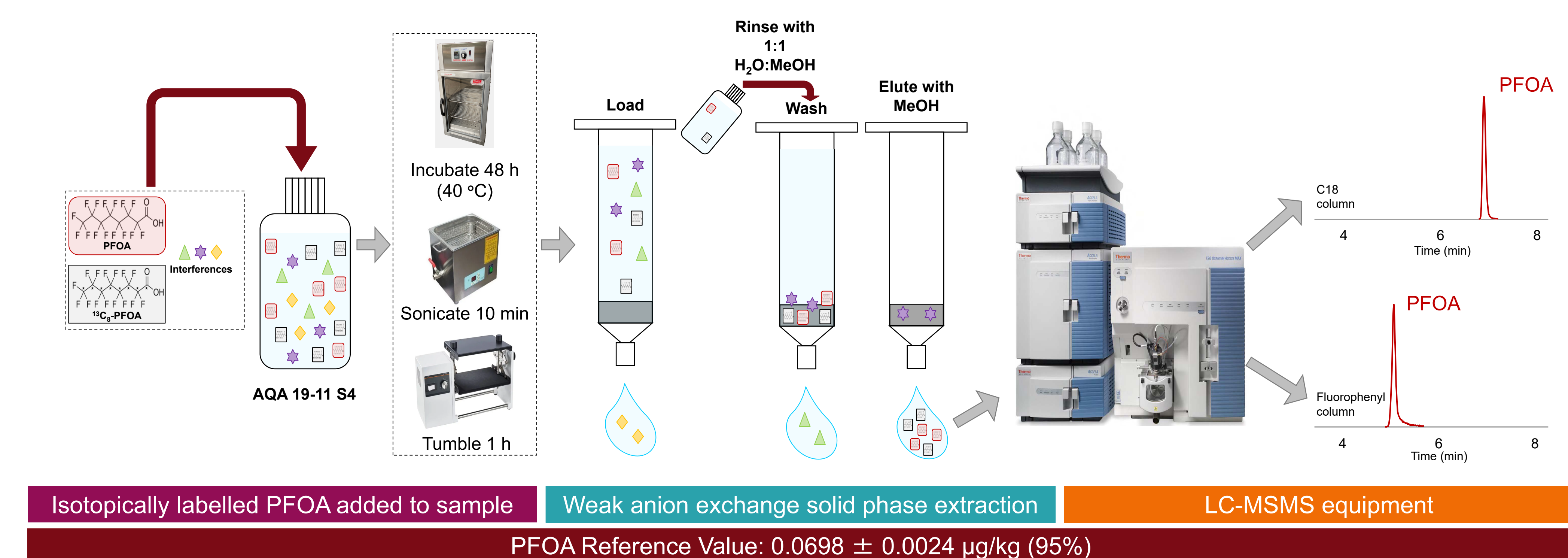
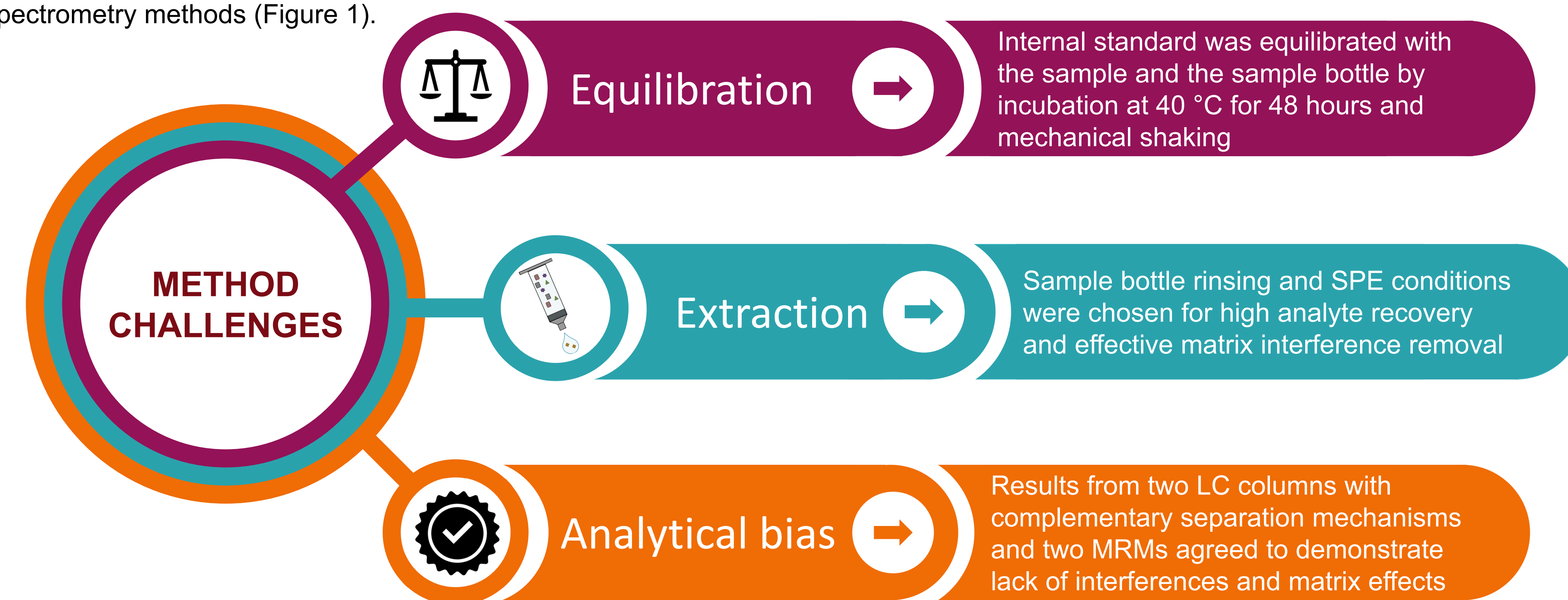
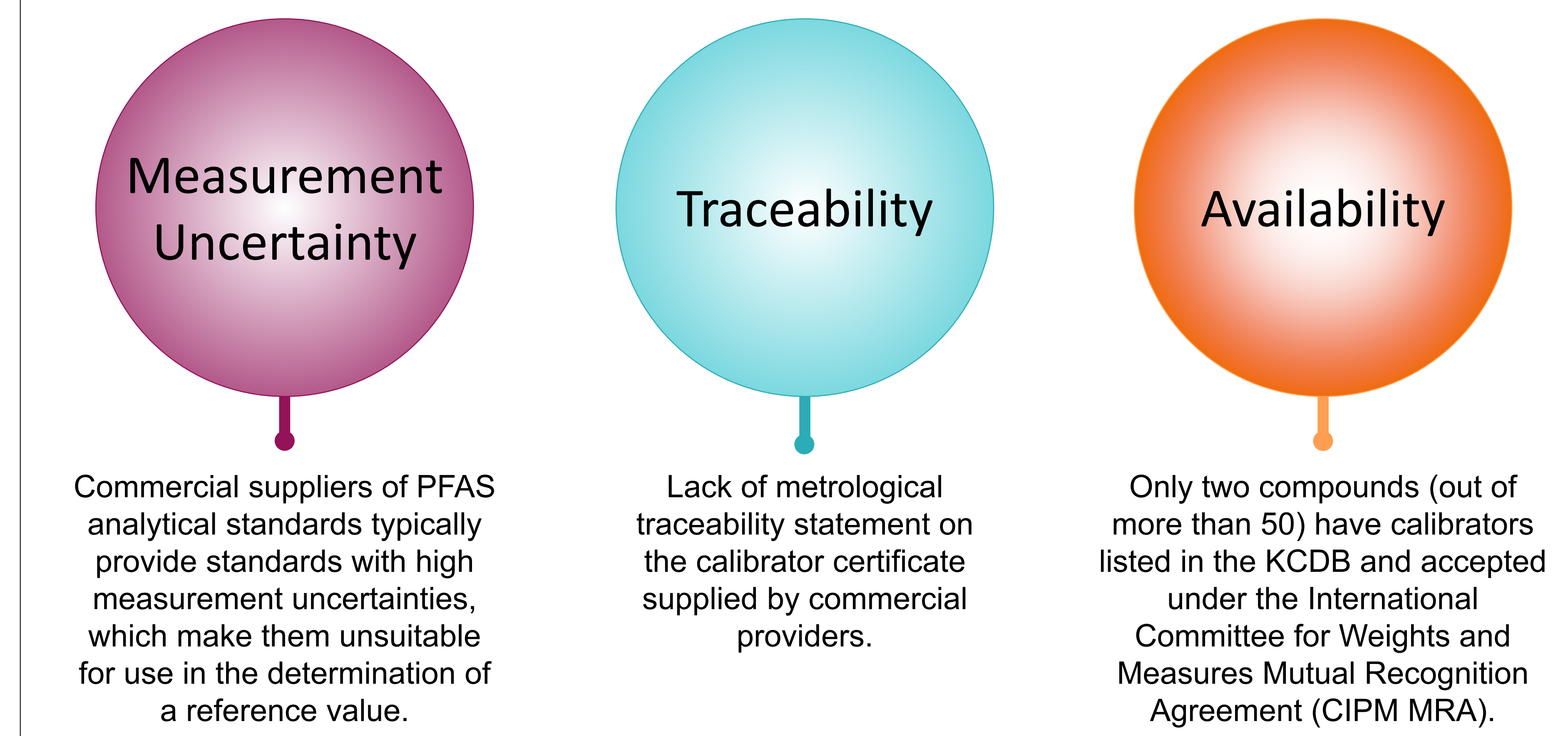


Figure 1 – Reference method schematic



CALIBRATOR CHALLENGES



APPLICATION IN PROFICIENCY TESTING

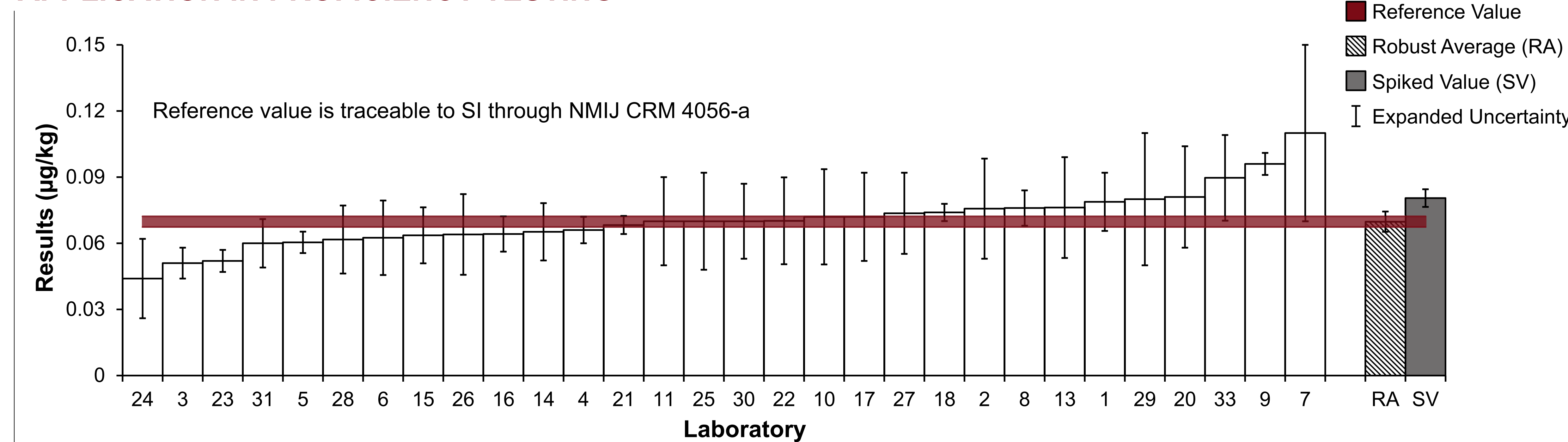


Figure 2 – Results for PFOA in AQA 19-11 PT

The reference value is important because it can be used directly to assess participants accuracy. The robust average of participant results is biased low from the spiked value. The reference value confirms that this is only an apparent bias and that the participant methods are generally accurate for PFOA in this sample.

CONCLUSION: A reference value for PFOA was determined in support of participant evaluation in the AQA 19-11 PT study. Reference methodology was required to address the challenges of internal standard equilibration, representative extraction, and unbiased analysis. Demand for PFAS analysis continues to grow with an ever increasing list of analytes and matrices. The provision of useful reference values and reference materials for other PFAS analytes remains a challenge due to the lack of availability of high order calibrators with metrological traceability. National Metrology Institutes and the International Bureau of Weights and Measures (BIPM) should consider developing materials and capabilities which would support laboratories world-wide and ensure quality of PFAS testing in food and water.

References: 1. NMIA, PT Report AQA 19-11 PFAS in Soil and Water, <https://www.industry.gov.au/sites/default/files/2020-10/aqa-19-11-pfas-in-soil-and-water.pdf> (January 2020).

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