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Accurate chemical measurements and standards: from the mole to Carbon Emission monitoring, Food safety, and SARS-CoV-2 testing

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The International Bureau of Weights and Measures (BIPM) is the international organization established by the Metre Convention, through which Member States act together on matters related to measurement science and measurement standards. With its offices and laboratories based in Sèvres, France, and over 100 states as Members or Associates, it is home to the International System of Units (SI). It brings together the world's experts in metrology across many disciplines of measurement science, working together in technical committees. The CCQM, active in the field of metrology in chemistry and biology, works to compare and establish equivalence of reference materials and reference methods globally, supporting measurements services provided by National Metrology Institutes worldwide.

The presentation will focus on progress in the development of reference measurement systems for chemical and biological measurement in the number of important sectors. Starting with fundamentals and the definition of units, and in particular the mole, the talk will describe how calibration hierarchies for chemical measurements based on reference methods and reference materials have been successfully established. Examples covered will include: accurate measurements of greenhouse gases, particularly carbon dioxide and its isotopes in support of global monitoring efforts; quantitative NMR for value assigning organic calibrants and in particular for the measurement of mycotoxins for food safety; high resolution mass spectrometry for characterization calibrators for biomarkers in the diagnosis of diabetes; and isotope dilution techniques for the quantification of SARS-CoV-2 monoclonal antibodies.