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Metrological aspects related to stable isotope reference materials: the traceability concept and uncertainty evaluation scheme supporting every day practice.

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The worldwide metrological comparability of stable isotope measurement results is presently achieved by linking them to the conventional delta scales. Delta scales are realized by scale defining reference materials, most of them being supplied by the IAEA (examples are VSMOW2 & SLAP2). In fact, these reference materials are artefacts, characterized by a network of laboratories using the current best measurement practice.
In reality any measurement result is linked to the scale via reference materials (RMs) in use. Any RMs is traceable to the highest-level RMs which define the scale; this is valid not only for international RMs (mostly secondary RMs like IAEA-CH-7, NBS22) but for any lab standard calibrated by users. This is a basic of measurement traceability. The traceability scheme allows addressing both the comparability and long-term compatibility of measurement results. Correspondingly, the uncertainty of any measurement result has to be propagated up to the scale level. The uncertainty evaluation should include (i) the uncertainty of the RMs in use; (ii) the analytical uncertainty of the materials used in calibration runs performed at the user laboratory; (iii) the reproducibility on results obtained on sample material; (iv) the uncertainty of corrections applied (memory, drift, etc). Besides these, there may be other uncertainty components of to be considered.
The presentation will illustrate the metrological concepts involved (comparability, traceability etc) and give a generic scheme for the uncertainty evaluation.