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EDITORIAL

# On 'trueness control materials', better known under the multi-purpose term of 'Certified Reference Materials' (CRMs)

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In a previous editorial [1], we elaborated on one function of a 'Certified Reference Material' (CRM) [2] in the process of measurement: that of being used as a 'calibrator' [3] in 'calibration' [4], the process which is essential in the establishment of the 'metrological traceability' [5] and its corresponding 'metrological traceability chain' [6] of the 'measurement result' [7].

There is another important function in which a CRM can be used by the analyst in the process of measurement, namely as a 'measurement trueness control material' [8]. Many cases do occur in chemical measurement where the 'measurand' [9] is embodied in (or carried by) a so-called "matrix" material:

- a simple water system being measured for the 'content' [10] of a specified potentially toxic component (such as a trace content of cadmium or arsenic limiting the fitness for the intended use of the water as drinking water),
- a somewhat complex material to be measured for the content of a specified property-determining component (such as the boron content determining the fitness for intended use of the material as semiconductor); and
- a complex material system to be measured for the content of a specified, monetary value reducing, component (such as the content of specified dioxins limiting the use of the soil for building purposes).

The preparation of such carriers (water, soil, crystals, etc.) measured for the actual measurement of a specified component may involve chemical operations such as extraction, dilution, chromatographic separation, fractional distillation, all of which may be subject to systematic effects such as partial loss of the specified substance under investigation. Thus the analyst, when measuring these because his/her customer is interested in them, may want to know about the size of the systematic effects the process of measurement is subjected to, in order to be able to compensate for such effects and come to a reasonable estimate of the measurand.

Somewhat unfortunate terms are frequently used in this context: "recovery" and "recovery factor" [11, 12] for which, however, a systematic terminology was developed recently [13]. The analyst wants to compensate for this 'systematic effect' [14], the measurement uncertainty of which he needs as a component of his/her 'uncertainty budget' [15]: it is an inherent part of his/her final measurement result. The operation of compensating for that (and any) systematic effect, is an important part of the 'verification' [16] or 'validation' [17] of a 'reference measurement procedure' [18]. The use of a CRM as a measurement trueness control material is a very convenient means to do that.

Calling such a CRM a "trueness control material" would point directly to its function in the process of measurement the analyst has selected. It is less ambiguous than CRM which is a family name for a very wide range of materials used for a variety of purposes.

Both the concepts and associated terms 'calibrator' and 'trueness control material' indicate rather precisely what we have in mind when we use them in the laboratory.

Keeping in mind that terminology which is ambiguous, generates ambiguity in thinking, the suggested change in terminology enables us to focus more unequivocally on the process we have in mind when working in the laboratory. One term covering different concepts, always reduces clarity in understanding and introduces more "fog",

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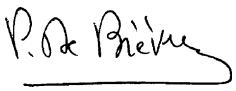
something to be avoided absolutely on the intercontinental scene.

A more precise perception of CRM as 'calibrator' or 'trueness control material' is simplifying and useful to our thinking about calibration and compensation for systematic effects.

As the introduction of basic metrological concepts always should be …



Paul De Bièvre
Editor-in-Chief

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16. Ibidem, entry 2.44
17. Ibidem, entry 2.45
18. Ibid. entry 2.7