

18.8 Reference materials

Terms and meanings are given in this section, which are recommended to use in connection with reference materials, with particular attention to terms that are used in reference material certificates and certification reports.

18.8.1 Terms related to materials

Reference material (RM)

Material or substance one of whose property values are sufficiently homogeneous and well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

Certified reference material (CRM)

Reference material, accompanied by a certificate, one or more of whose property values are certified by a procedure which establishes its traceability to an accurate realisation of the unit in which the property values are expressed, and for which each certified value is accompanied by an uncertainty at a stated level of confidence.

Notes:

- (1) The definition of a reference material certificate is given later.
- (2) CRMs are generally prepared in batches for which the property values are determined within stated uncertainty limits by measurements on samples representative of the whole batch.
- (3) The certified properties of reference materials are sometimes conveniently and reliably realized when the material is incorporated into a specially fabricated device, e.g. a substance of known triple-point into a cell; a glass of known optical density into a transmission filter; spheres of uniform particle size mounted on a microscope slide. Such devices may also be considered as CRMs.
- (4) Some RMs and CRMs have properties which, because they cannot be correlated with an established chemical structure or for other reasons, cannot be determined by exactly defined physical and chemical measurement methods. Such materials include certain biological materials such as vaccines to which an International unit has been assigned by the World Health Organization.

Primary standard

Standard that is designated or widely acknowledged as having the highest qualities and whose value is accepted without reference to other standards of the same quantity, within a specified context.

Note: The concept of primary standard is equally valid for base units and derived units.

Secondary standard

Standard whose value is assigned by comparison with a primary standard of the same quantity.

Note: Most CRMs fall into this category since the certification of property values is usually carried out by a procedure traceable to primary standards. The position of a CRM in the measurement hierarchy is no indication of its suitability for a particular purpose. Thus, e.g., for the determination of trace metals in environmental matrices, CRMs which are secondary standards, but which contain the metals in a similar state of chemical combination and in a similar matrix to the test sample, are greatly to be preferred over primary standards of pure metals.

Characterization

For a reference material, determination of one or more physical, chemical, biological, or technological property values that are relevant to its intended end use.

Homogeneity

Condition of being of uniform structure or composition with respect to one or more specified properties. A reference material is said to be homogeneous with respect to a specified property if the property value, as determined by tests on samples of specified size, if found to lie within the specified uncertainty limits, the samples being taken either from different supply units (bottles, packages, etc.) or from a single supply unit.

Stability

Ability of a reference material, when stored under specified conditions, to maintain a stated property value within specified limits for a specified period of time.

Sample

Representative quantity of material removed from a batch of reference material.

Note: The selection of the sample should be representative of the batch with respect to the property or properties being investigated.