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Standard Terminology Relating to Analytical Chemistry for Metals, Ores, and Related Materials[1]

This standard is issued under the fixed designation E 135; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This is a compilation of terms commonly used in analytical chemistry for metals, ores, and related materials. Terms that are generally understood or defined adequately in other readily available sources are either not included or their sources are identified.

1.2 A definition is a single sentence with additional information included in a discussion.

1.3 Definitions identical to those published by another standards organization or ASTM committee are identified with the name of the organization or the identifying document and ASTM committee.

1.4 Definitions specific to a particular field (such as *emission spectrometry*) are identified with an italicized introductory phrase.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E 1914 Practice for Use of Terms Relating to the Development and Evaluation of Methods for Chemical Analysis

E 2437 Practice for Designing and Validating Performance-Based Test Methods for the Analysis of Metals, Ores, and Related Materials

E 2438 Practice for Implementing Standard Performance Based Test Methods for the Analysis of Metals, Ores, and Related Materials

2.2 *ISO Standard:*[3]

ISO Guide 30 Terms and Definitions Used in Connection with Reference Materials

3. Significance and Use

3.1 Definitions given in Section 4 are intended for use in all standards on analytical chemistry for metals, ores, and related materials. The definitions should be used uniformly and consistently. The purpose of this terminology is to promote clear understanding and interpretation of the standards in which definitions are used.

4. Terminology Definitions

aim interlaboratory uncertainty, *n*— the maximum deviation (95 % confidence) to be allowed in the design of the total interlaboratory uncertainty of a test method, beginning with the preparation of a homogeneous sample and ending with a final report value to the client. **E 2437**

aim total intralaboratory uncertainty, *n*—the maximum deviation (95 % confidence) to be allowed in the design of the total intralaboratory uncertainty of a test method, beginning with the preparation of a homogeneous sample and ending with a final report value to the client. **E 2438**

aim uncertainty budget, *n*—during the development of a standard performance-based test method, the target allocation of interlaboratory measurement uncertainty among specific components of a measurement process that contribute significantly to the overall deviation. The target allocation is made by the task group and serves as guidance for interlaboratory test participants during method testing. **E 2437**

analytical curve— see **calibration curve.**

analyte, *n*—*in methods of chemical analysis*, the constituent determined by a method. **E 1914**

analytical gap, *n*— *in atomic emission spectrometry*, the region between two electrodes in which the specimen is excited and from which radiant energy is used for analysis.

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[1] This terminology is under the jurisdiction of ASTM Committee E01 on Analytical Chemistry for Metals, Ores, and Related Materials and is the direct responsibility of Subcommittee E01.23 on Terminology and Editorial.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

analytical line, *n— in atomic spectrometry,* the particular wavelength of electromagnetic radiation used in determining the presence or concentration of an element.

arc, condensed— see **discharge, triggered capacitor.**

*continuous dc arc, n—*a self-maintaining dc discharge.

noncapacitive ac arc, n—in atomic emission spectrometry, a series of separate electrical discharges, individually self-initiating or initiated separately by another means, in which each current pulse has a polarity that is reversed from the previous one.

arc line—not recommended, see **atom line.**

atom line, *n—in atomic emission spectrometry*, a spectral line resulting from radiation emitted during electron transition as an excited atom returns to a lower energy level.

atomic emission spectrometry (AES), *n—* pertaining to emission spectrometry in the ultraviolet, visible, or infrared wavelength regions of the electromagnetic spectrum.

between-laboratory standard deviation, s_R, *n*—the standard deviation of results obtained on the same material in different laboratories. **E 1914**

buffer, *n—in spectrometric analysis*, a substance that tends to minimize the effects of one or more elements on the emission of other elements.

burn, *n—in atomic emission spectrometry*, that portion of a solid specimen from which atoms were volatilized or sputtered.

burn, *vt—in atomic emission spectrometry*, to vaporize, or sputter, and excite a specimen with sufficient energy to generate spectral radiation.

calibrant, *n*—a reference material used for a calibration.

calibrate, *vt*—(*1*) to establish the relationship between the response of an instrument and the concentration or mass of the analyte; (*2*) to establish a table of corrections to improve the accuracy of equipment used to measure physical properties such as mass, volume, temperature, and so forth.

calibration, *n*—the act, process, or result of establishing: (*1*) the relationship between the response of an instrument and the concentration or mass of the substance determined; (*2*) a table of corrections to improve the accuracy of equipment used to measure physical properties such as mass, volume, temperature, and so forth.

calibration curve, *n*—the graphical or mathematical representation of the relationship between the response of an instrument and the concentration or mass of the analyte.

condensed arc— see under **discharge, triggered capacitor.**

continuous dc arc— see under **arc.**

certified reference material (CRM), *n—* a reference material, accompanied by a certificate, one or more of whose property values are certified by a procedure which establishes traceability to an accurate realization 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.

DISCUSSION—See also **standard reference material (SRM).**

counter electrode, *n— in atomic emission spectrometry*, the electrode in an analytical pair that does not contain the specimen being analyzed.

detection limit, *n—for an analytical instrument*, the minimum quantity of analyte expected to yield a response greater than zero. **E 1914**

discharge, triggered capacitor, *n—* a series of electrical discharges from capacitors initiated by a separate means and extinguished when the voltage across the analytical gap falls to a value that no longer is sufficient to maintain it.

division, *n—in sample preparation,* a process which divides a sample into two or more subsamples without changing the composition.

doré bead, *n*—a gold and silver alloy bead which results from cupellation.

drift correction, *n— in spectrometric analysis,* the process of adjusting for a translational shift or a rotational shift, or both, in an instrument calibration.

electrode, *n—in atomic emission spectrometry*, either of two terminals between which an electrical discharge occurs.

electrode gap— not recommended, see **analytical gap.**

error, *n—of a result,* the difference between a result obtained on a material and its accepted reference value. **E 1914**

fatigue, *n—in atomic emission spectrometry,* the decrease in response of a photoelectric radiant energy detector caused by the accumulated exposure of the detector to radiant energy.

filter, *n—in atomic spectrometry,* a substance that attenuates the radiant power in a definite manner with respect to spectral distribution.

neutral filter, n—in atomic spectrometry, a filter that attenuates the radiant power reaching the detector by the same factor at all wavelengths within a prescribed wavelength region.

nonselective filter—not recommended, see under **filter.**

gross sample —see under **sample.**

homologous lines, *n— in atomic emission spectrometry*, spectral lines that exhibit minimal change in their intensity ratios with variations in excitation conditions.

increment, *n—in sampling*, a portion of material removed from a lot by a single operation.

inquartation, *vt—in fire assay* , the addition of silver to facilitate parting.

interlaboratory study (ILS), *n*—a study undertaken to demonstrate the precision and accuracy of a test method. **E 1914**

interlaboratory uncertainty, *n— in a performance based standard test method*, the precision (95 % confidence) that participating laboratories achieved during interlaboratory studies, beginning with the preparation of a homogeneous sample and ending with a final report value to the client. **E 2437**

internal standard, *n— in spectrometry*, a material present in or added to test samples that serves as an intensity reference for spectral measurements.

internal standard line, *n— in atomic spectrometry*, a spectral line of an internal standard, to which the radiant energy of an analytical line is compared.

intralaboratory uncertainty, *n— in a performance based standard test method*, the precision (95 % confidence) that a laboratory achieves when the method is used by more than one operator. In test methods that establish maximum allowable intralaboratory uncertainties, users must be able to demonstrate compliance with those uncertainties in order to report that a given test result was produced using the named method. **E 2437**

ion line, *n—in atomic emission spectrometry*, a spectral line resulting from radiation emitted during electron transition as an ionized atom decays to a lower, but still ionized, energy level; see **atom line.**

laboratory sample—see under **sample.**

linear dispersion, *n*—the derivative d*x*/dλ where *x* is the distance along the spectrum and λ is the wavelength.

line pair, *n—in atomic emission spectrometry,* an analytical line and the internal standard line with which it is compared.

lot, *n—in sampling* , a collection of material regarded as a unit.

matrix, *n—in methods of chemical analysis*, all components of a material except the analyte. **E 1914**

method, *n*—instructions used to produce a numerical result, which are detailed in a document referred to as "the method." **E 1914**

minimum standard deviation, s_M, *n*—the standard deviation of results on a test material obtained under conditions of minimum variability **E 1914**

nebulizer, *n*—a device for converting a sample solution into a gas-liquid aerosol for atomic absorption, emission, fluorescence, or mass analysis.

neutral filter— see under **filter.**

noncapacitive ac arc—see under **arc.**

nonselective filter—see under **filter.**

normalization, *n— in spectrometric analysis,* (*1*) the process of adjusting instrument output to conform to an established condition using one or more homogeneous specimens or reference materials; (*2*) the adjustment of the analysis total to 100 %, or some other total.

parting, *vt—in fire assay*, separating silver from gold by selectively dissolving the silver in acid.

performance based method, *n*—a test method that defines: *(1)* the general approaches for sampling, sample preparation, and making measurements on a specified type of material; and *(2)* defines maximum allowable uncertainties for each measured constituent over its validated concentration range.

polychromator, *n*—a device for simultaneously isolating several rays of monochromatic radiation from a beam of polychromatic radiation.

preburn period, *n— in atomic emission spectrometry*, the time interval after the initiation of a discharge during which the emitted radiation energy is not recorded for analytical purposes.

precision—*of methods of chemical analysis*, a characteristic manifested by agreement among individual results at a given analyte content. **E 1914**

premix burner, *n— in flame atomic absorption and atomic emission spectrometry*, a burner in which the fuel gas is mixed with the oxidizing gas before reaching the combustion zone.

prepared sample—see under **sample.**

primary X rays, *n— in spectrometry*, the emergent beam from the X-ray source.

profile, *vt—in atomic emission spectrometry*, to scan and set the deflection of the grating, or actual or apparent position of the entrance slit, or actual or apparent location of the exit slits, to produce optimum measurement of intensity.

proof, *n—in fire assay*, a synthetic verifier having a precious metal content similar to that expected in the test sample.

proof correction, *n— in fire assay*, the adjustment to the final assay obtained by analyzing the proof concurrently with the test sample.

radiant power, *P*, *n*—the rate at which energy is transported in a beam of radiant energy, preferably expressed in ergs per second or watts.

reciprocal linear dispersion, *n*—the derivative dλ/d*x* where λ is the wavelength and *x* is the distance along the spectrum.

reference material (RM), *n*—material or substance one or more 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. **ISO Guide 30**