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Standard Terminology Relating to Sampling and Analysis of Atmospheres¹

This standard is issued under the fixed designation D1356; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This terminology is a collective vocabulary relating to sampling and analysis of atmospheres. As a convenience to general interest, it contains most of the standard terms, definitions, and nomenclature under the jurisdiction of Committee D22.

1.2 Many of the entries in this terminology are copied (with attribution) from the standards of origin referenced in Section 2. The standards of origin are noted in bold type at the right margin of the applicable definition.

1.3 Certain terms in the common language that comprise multiple concepts are included herein with the definition specific to standards and practices of Committee D22.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- D1357 Practice for Planning the Sampling of the Ambient Atmosphere
- D3249 Practice for General Ambient Air Analyzer Procedures
- D3614 Guide for Laboratories Engaged in Sampling and Analysis of Atmospheres and Emissions
- D3631 Test Methods for Measuring Surface Atmospheric Pressure
- D3670 Guide for Determination of Precision and Bias of Methods of Committee D22
- D3686 Practice for Sampling Atmospheres to Collect Or-

- ganic Compound Vapors (Activated Charcoal Tube Adsorption Method)
- D3687 Test Method for Analysis of Organic Compound Vapors Collected by the Activated Charcoal Tube Adsorption Method
- D4023 Terminology Relating to Humidity Measurements (Withdrawn 2002)³
- D4096 Test Method for Determination of Total Suspended Particulate Matter in the Atmosphere (High-Volume Sampler Method)
- D4240 Test Method for Airborne Asbestos Concentration in Workplace Atmosphere (Withdrawn 1995)³
- D4298 Guide for Intercomparing Permeation Tubes to Establish Traceability
- D4597 Practice for Sampling Workplace Atmospheres to Collect Gases or Vapors with Solid Sorbent Diffusive Samplers
- D5011 Practices for Calibration of Ozone Monitors Using Transfer Standards
- D5015 Test Method for pH of Atmospheric Wet Deposition Samples by Electrometric Determination
- D5096 Test Method for Determining the Performance of a Cup Anemometer or Propeller Anemometer
- D5111 Guide for Choosing Locations and Sampling Methods to Monitor Atmospheric Deposition at Non-Urban Locations
- D5366 Test Method for Determining the Dynamic Performance of a Wind Vane
- D5438 Practice for Collection of Floor Dust for Chemical Analysis
- D5466 Test Method for Determination of Volatile Organic Compounds in Atmospheres (Canister Sampling Methodology)
- D5527 Practices for Measuring Surface Wind and Temperature by Acoustic Means
- D5755 Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Surface Loading
- D6061 Practice for Evaluating the Performance of Respirable Aerosol Samplers

¹ This terminology is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.01 on Quality Control. Current edition approved Sept. 1, 2020. Published September 2020. Originally approved in 1955. Last previous edition approved in 2020 as D1356 – 20. DOI: 10.1520/D1356-20A.

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 The last approved version of this historical standard is referenced on www.astm.org.

- D6177** Practice for Determining Emission Profiles of Volatile Organic Chemicals Emitted from Bedding Sets
- D6196** Practice for Choosing Sorbents, Sampling Parameters and Thermal Desorption Analytical Conditions for Monitoring Volatile Organic Chemicals in Air
- D6246** Practice for Evaluating the Performance of Diffusive Samplers
- D6552** Practice for Controlling and Characterizing Errors in Weighing Collected Aerosols
- D6785** Test Method for Determination of Lead in Workplace Air Using Flame or Graphite Furnace Atomic Absorption Spectrometry
- D7036** Practice for Competence of Air Emission Testing Bodies
- D7144** Practice for Collection of Surface Dust by Microvacuum Sampling for Subsequent Metals Determination
- D7338** Guide for Assessment Of Fungal Growth in Buildings
- D7391** Test Method for Categorization and Quantification of Airborne Fungal Structures in an Inertial Impaction Sample by Optical Microscopy
- D7439** Test Method for Determination of Elements in Airborne Particulate Matter by Inductively Coupled Plasma–Mass Spectrometry
- D7459** Practice for Collection of Integrated Samples for the Speciation of Biomass (Biogenic) and Fossil-Derived Carbon Dioxide Emitted from Stationary Emissions Sources
- D7659** Guide for Strategies for Surface Sampling of Metals and Metalloids for Worker Protection
- D7675** Test Method for Determination of Total Hydrocarbons in Hydrogen by FID-Based Total Hydrocarbon (THC) Analyzer
- E7** Terminology Relating to Metallography
- E104** Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions
- E631** Terminology of Building Constructions
- E833** Terminology of Building Economics
- E1613** Test Method for Determination of Lead by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometry (FAAS), or Graphite Furnace Atomic Absorption Spectrometry (GFAAS) Techniques
- E1728** Practice for Collection of Settled Dust Samples Using Wipe Sampling Methods for Subsequent Lead Determination
- 2.2 Other Documents:**
- ECC Directive 98/24/EC** Risks Related to Chemical Agents at Work⁴
- EN 1540:2011** Workplace Exposure – Terminology⁵
- EPA 540-R-04-004, 2004** Contract Laboratory Program National Functional Guidelines for Inorganic Data Review⁶

- ISO 3534-2** Statistics Vocabulary and Symbols – Part 2: Applied Statistics⁷
- ISO 7708** Air Quality – Particle Size Fraction Definitions for Health-Related Sampling⁷
- ISO 13137** Workplace Atmospheres — Pumps for Personal Sampling of Chemical and Biological Agents — Requirements and Test Methods⁷
- ISO 15202-2** Workplace Air — Determination of Metals and Metalloids in Airborne Particulate Matter by Inductively Coupled Plasma Atomic Emission Spectrometry — Part 2: Sample Preparation⁷
- ISO 15202-3** Workplace Air — Determination of Metals and Metalloids in Airborne Particulate Matter by Inductively Coupled Plasma Atomic Emission Spectrometry — Part 3: Analysis⁷

3. Terminology

absolute temperature—see **temperature**.

absolute filter—see **filter**.

absorbance, *n*—the logarithm to the base of 10 of the reciprocal of *transmittance*.

absorbate, *n*—material that has been retained by the process of absorption.

absorbent, *n*—material in which absorption occurs.

absorption, *n*—a process in which one material (the absorbent) takes up and retains another (the absorbate) with the formation of an homogeneous mixture having the attributes of a solution.

DISCUSSION—Chemical reaction may accompany or follow absorption.

acceptance angle ($\pm \alpha$, **deg**), *n*—the angular distance, centered on the array axis of symmetry, over which the following conditions are met: (*a*) wind components are unambiguously defined, and (*b*) flow across the transducers is unobstructed or remains within the angular range for which transducer shadow corrections are defined. **D5527**

accrediting authority, *n*—a body that evaluates the capability of a testing agency or an inspection agency, or both, in certain specific fields of activity. **D3614**

accretion, *n*—a phenomenon consisting of the increase in size of particles by the process of external additions.

accuracy, *n*—the degree of conformity of a value generated by a specific procedure to the assumed or accepted true value and includes both precision and bias. **D3670**

acoustic pathlength (*d*, **(m)**), *n*—the physical distance between transducer transmitter-receiver pairs. **D5527**

activated charcoal, *n*—activated charcoal refers to properly conditioned coconut-shell charcoal. **D3686**

adsorbate, *n*—material that has been retained by the process of adsorption.

⁴ Available from EUR-Lex, <http://eur-lex.europa.eu>.

⁵ Available from European Committee for Standardization (CEN), Avenue Marnix 17, B-1000 Brussels, Belgium, <http://www.cen.eu>.

⁶ Available from United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, <http://www.epa.gov>.

⁷ Available from International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, <http://www.iso.org>.

adsorbent, *n*—solid material on the surface of which adsorption takes place.

adsorption, *n*—a physical process in which molecules of gas, of dissolved substances, or of liquids, adhere in an extremely thin layer to the surfaces of solid bodies with which they are in contact.

aerosol, *n*—a dispersion of solid or liquid particles in a gaseous medium.

agency, *n*—an organization or part of an organization engaged in the activities of testing or inspection, or both. **D3614**

agglomeration, *n*—a process of contact and adhesion whereby the particles of a dispersion form clusters of increasing size.

air at normal conditions (standard air), *n*—air at 50 % relative humidity, 25°C and 101.3 kPa (77°F and 760 mm Hg). See also **atmosphere**.

air change rate, *n*—the volumetric flow rate (volume per unit time) of air entering a space or enclosure divided by the net volume of air in that space or enclosure (1/s, 1/h). **D6177**

DISCUSSION—The entering air may be outdoor air or conditioned air. The space may be an entire building, a room or a chamber used for material emissions and other testing. When using the term *air change rate*, it is important to specify whether the entering air is outdoor or conditioned, as well as the space being considered. The net volume of air in a space or enclosure may be different from the internal volume when the contents (for example, materials being tested for emissions) displace a significant amount of air within the space or enclosure. Requirements for accounting for the net volume of air in determining the air change rate, including clear identification of when the displacement is considered significant, are covered in the individual standards using the definition.

air emission testing body, *n*—a company or other entity that conducts Air Emission Testing. **D7036**

air pollution, *n*—the presence of unwanted material in the air.

DISCUSSION—The term *unwanted material* here refers to material in sufficient concentrations, present for a sufficient time, and under circumstances to interfere significantly with comfort, health, or welfare of persons, or with the full use and enjoyment of property.

aliquot, *n*—a representative portion of the whole that can be expressed as the inverse of an integer.

ambient, *adj*—surrounding on all sides.

analytical recovery, *n*—ratio of the mass of analyte measured to the known mass of analyte in the sample, typically expressed as a percentage. **D7439**

analyzer, *n*—the instrumental equipment necessary to perform automatic analysis of ambient air through the use of physical and chemical properties and giving either cyclic or continuous output signal. **D3249**

analyzer system, *n*—all sampling, analyzing, and readout instrumentation required to perform ambient air quality analysis automatically. **D3249**

full scale, *n*—the maximum measuring limit for a given range of an analyzer. **D3249**

lag time, *n*—the time interval from a step change in the input concentration at the analyzer inlet to the first corresponding change in the analyzer signal readout. **D3249**

linearity, *n*—the maximum deviation between an actual analyzer reading and the reading predicted by a straight line drawn between upper and lower calibration points.

DISCUSSION—This deviation is expressed as a percentage of full scale. **D3249**

minimum detection limit, *n*—the smallest input concentration that can be determined as the concentration approaches zero. **D3249**

noise, *n*—random deviations from a mean output not caused by sample concentration changes. **D3249**

open path analyzer, *n*—an analytical system that measures the average atmospheric or emission compound concentration along one or more monitoring paths open to the atmosphere. See **monitoring path**.

operating humidity range of analyzer, *n*—the range of ambient relative humidity of air surrounding the analyzer, over which the analyzer will meet all performance specifications. **D3249**

operating temperature range of analyzer, *n*—the range of ambient temperatures of air surrounding the analyzer, over which the monitor will meet all performance specifications. **D3249**

operational period, *n*—the period of time over which the analyzer can be expected to operate unattended within specifications. **D3249**

output, *n*—a signal that is related to the measurement, and intended for connection to a readout or data acquisition device.

DISCUSSION—Usually this is an electrical signal expressed as millivolts or milliamperes full scale at a given impedance. **D3249**

range, *n*—the concentration region between the minimum and maximum measurable limits. **D3249**

readout instrumentation, *n*—output meters, recorder, or data acquisition system for monitoring analytical results. **D3249**

response time, *n*—the time interval from a step change in the input concentration at the analyzer inlet to an output reading of 90 % of the ultimate reading. **D3249**

rise time, *n*—response time minus lag time. **D3249**

sample system, *n*—equipment necessary to provide the analyzer with a continuous representative sample. **D3249**

span drift, *n*—the change in analyzer output over a stated time period, usually 24 h of unadjusted continuous operation, when the input concentration is at a constant, stated upscale value.

DISCUSSION—Span drift is usually expressed as a percentage change of full scale over a 24-h operational period. **D3249**

zero drift, *n*—the change in analyzer output over a stated time period of unadjusted continuous operation when the input concentration is zero; usually expressed as a percentage change of full scale over a 24-h operational period.

See also **point analyzer**. **D3249**

analyzer system—see **analyzer**.