Designation: ~~D4175 – 14~~ D4175 – 15

Standard Terminology Relating to Petroleum, Petroleum Products, and Lubricants[1]

This standard is issued under the fixed designation D4175; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This terminology standard covers the compilation of terminology developed by Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants, except that it does not include terms/definitions specific only to the standards in which they appear.

1.1.1 The terminology, mostly definitions, is unique to petroleum, petroleum products, lubricants, and certain products from biomass and chemical synthesis. Meanings of the same terms outside of applications to petroleum, petroleum products, and lubricants can be found in other compilations and in dictionaries of general usage.

1.1.2 The terms/definitions exist in two places: *(1)* in the standards in which they appear and *(2)* in this compilation.

2. Terminology

2.1 Alphabetical listing of terms with definitions for each term showing attributions as to source and subcommittee jurisdiction is in bold print following the definition. Those showing no attributes are under the jurisdiction of Subcommittee CS 95. Some abbreviations, acronyms, and symbols are included in the list.

3-MPA, *n*—3-methylphenylamine **[D02.J0] D6812**

AAS, *n*—atomic absorption spectrometry, an analytical technique for measuring metal content of solutions, based on a combination of flame source, hollow cathode lamp, photomultiplier, and a readout device. **[D02.03] D7876**

abrasion, *n*—wear due to hard particles or hard protuberances forced against and moving along a solid surface. **[D02.B0] D4998**

abrasive wear—wear due to hard particles or hard protuberances forced against and moving along a solid surface. **[D02.L0] D5182**

absolute filtration rating, *n*—the diameter of the largest hard spherical particle that will pass through a filter under specified test conditions. This is an indication of the largest opening in the filter element. **[D02.N0] D4174**

absorbance, *n*—logarithm to the base 10 of the ratio of the reciprocal of the transmittance. **[D02.03] D7740**

absorbance, *A*,*n*—the molecular property of a substance that determines its ability to take up radiant power, expressed by:

$$A = \log_{10}\,(1/T) = -\log_{10} T$$

where T is the transmittance.

[1] This terminology is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.95 on Terminology.

Current edition approved ~~Oct. 1, 2014~~Feb. 1, 2015. Published ~~October 2014~~February 2015. Originally approved in 1983. Last previous edition approved in ~~2009~~2014 as ~~D4175 – 09~~D4175 – 14.~~ε5~~. DOI: ~~10.1520/D4175-14.~~10.1520/D4175-15.

DISCUSSION—

Absorbance expresses the excess absorption over that of a specified reference or standard. It is implied that compensation has been affected for reflectance losses, solvent absorption losses, and refractive effects, if present, and that attenuation by scattering is small compared with attenuation by absorption. **[D02.04] D2008**

absorptivity, *a*,*n*—the specific property of a substance to absorb radiant power per unit sample concentration and path length, expressed by:

***A Summary of Changes section appears at the end of this standard**

$a = Af/bc$

where:

A = the absorbance,
f = the dilution factor,
b = sample cell path length, and
c = the quantity of absorbing substance contained in a volume of solvent.

[D02.04] D2008

acceptance limit (*AL*), *n*—a numerical value that defines the point between acceptable and unacceptable quality.

DISCUSSION—

The *AL* is not necessarily the specification limit. It is the value that takes into account the specification value, the test method precision, and the confidence level desired for defining minimum acceptable quality relative to the specification value.

[D02.94] D3244

accepted reference value (ARV), *n*—value that serves as an agreed-upon reference for comparison and that is derived as (*1*) a theoretical or established value, based on scientific principles, (*2*) an assigned value, based on experimental work of some national or international organization, such as the U.S. National Institute of Standards and Technology (NIST), or (*3*) a consensus value, based on collaborative experimental work under the auspices of a scientific or engineering group.

DISCUSSION—

In the context of this test method, accepted reference value is understood to apply to the ignition delay of specific reference materials determined under reproducibility conditions by collaborative experimental work. **[D02.01] D6890, [D02.94] D6299, D6792**

DISCUSSION—

In the context of this test method, accepted reference value is understood to apply to the Research octane number of specific reference materials determined empirically under reproducibility conditions by the National Exchange Group or another recognized exchange testing organization. **[D02.01] D2699, D2700**

DISCUSSION—

In the context of this method, accepted reference value is understood to apply to the ignition delay of specific reference materials determined under reproducibility conditions by collaborative experimental work. **[D02.01] D7170**

DISCUSSION—

In the context of this test method, accepted reference value is understood to apply to the Supercharge and octane number ratings of specific reference materials determined empirically under reproducibility conditions by the National Exchange Group or another recognized exchange testing organization. **[D02.01] D909**

accepted reference value (ARV), *n*— a value that serves as an agreed-upon reference for comparison, and which is derived as: *(1)* a theoretical or established value, based on scientific principles, *(2)* an assigned or certified value, based on experimental work of some national or international organization, or *(3)* a consensus or certified value, based on collaborative experimental work under the auspices of a scientific or engineering group. **[D02.25] D3764**

accuracy, *n*—the closeness of agreement between a test result and an accepted reference value. **[D02.94] D6792**

accuracy, *n*—the closeness of agreement between an observed value and an accepted reference value. **[D02.94] D6299, D7372**

acid number, *n*—the quantity of a specified base, expressed in milligrams of potassium hydroxide per gram of sample, required to titrate a sample in a specified solvent to a specified endpoint using a specified detection system.

DISCUSSION—

In this test method, acids or salts with dissociation constants greater than 10−9, are titrated to a green end point with p-naphtholbenzein indicator. **[D02.06] D3339**

DISCUSSION—

In this test method, the acid number is calculated from the number of drops required to produce a change in solution color from blue-green to orange, compared to the number of drops required to produce an identical color change using a reference standard. Because this is a direct comparison method, the acid number value can be reported in milligrams of potassium hydroxide per gram of sample. **[D02.06] D5770**

DISCUSSION—

In this test method, the indicator is p-naphtholbenzein titrated to a green/green-brown end point in a toluene-water-isopropanol solvent. **[D02.06] D974**

DISCUSSION—

This test method expresses the quantity of base as milligrams of potassium hydroxide per gram of sample, that is required to titrate a sample in a mixture of toluene and propan-2-ol to which a small amount of water has been added from its initial meter reading in millivolts to a meter reading in millivolts corresponding to an aqueous basic buffer solution or a well-defined inflection point as specified in the test method. **[D02.06] D664**

DISCUSSION—

This test method provides additional information. The quantity of base, expressed as milligrams of potassium hydroxide per gram of sample, required to titrate a sample in the solvent from its initial meter reading in millivolts to a meter reading in millivolts corresponding to a freshly prepared aqueous acidic buffer solution or a well-defined inflection point as specified in the test method shall be reported as the *strong acid number*. **[D02.06] D664**

DISCUSSION—

The causes and effects of the so-called strong acids and the causes and effects of the other acids can be very significantly different. Therefore, the user of this test method shall differentiate and report the two, when they are found. **[D02.06] D664**

acidity, *n*—the quality, state or degree of being acid.

DISCUSSION—

In this test method, the criterion for acidity is a pink or red color when methyl orange indicator is used. **[D02.06] D1093**

across (or against) grain, *n*—direction in a body with preferred orientation due to forming stresses that has the maximum *c*-axis alignment as measured in an X-ray diffraction test. **[D02.F0] C709**

activated sludge, *n*—the precipitated solid matter, consisting mainly of bacteria and other aquatic microorganisms, that is produced in a domestic wastewater treatment plant; activated sludge is used primarily in secondary sewage treatment to microbially oxidized dissolved organic matter in the effluent. **[D02.12] D6139**

activation energy (E_a)—measure of temperature effects on the rate of oxidation in the kinetic, or chemical control, regime. Activation energy is calculated from the Arrhenius equation:

$$OR = Z\exp(-E_a/RT)$$

where:

OR = oxidation rate,
R = 8.314 J $mole^{-1}$ K^{-1} is the universal gas constant,
T = absolute temperature (in Kelvin), and
Z = pre-exponential factor.

The activation energy and pre-exponential factor are calculated from linearized form of Arrhenius equation, that is, from the slope and intercept of the linear plot of the logarithm of oxidation rate versus the inverse of absolute temperature (1/T):

$$\log_{10}(OR) = \log_{10} Z - E_a/(2.303\,RT)$$

Activation energy is expressed in units of kJ/mol. Pre-exponential factor is expressed in the same units as the oxidation rates, namely g h^{-1} m^{-2} (for Z_a calculated from area-normalized oxidation rates, OR_a) or g g^{-1} h^{-1} (for Z_w calculated from weight-normalized oxidation rates, OR_w). **[D02.F0] D7542**

active grease-sampling device, *n*—device designed to take an active sample of a lubricating grease from a bearing, gear, or drive shaft located in a grease-lubricated component. **[D02.G0] D7718**

active sampling, *v*—to use a sampling device to actively gather an in-service lubricating grease sample from a grease-lubricated component. **[D02.G0] D7718**

actuate, *v*—to hold the interior cylinder of the active grease-sampling device while pushing the exterior cylinder forward toward the grease-lubricated component that is being sampled allowing lubricating grease to fill the sampling device. **[D02.G0] D7718**

acute ecotoxicity, *n*—the propensity of a material to produce adverse behavioral, biochemical, or physiological effects in non-human organisms or populations in a short period of time, usually not constituting a substantial portion of the life span of the organism. **[D02.N0] D6046**

acute ecotoxicity, *n*—the propensity of a test material to produce adverse behavioral, biochemical or physiological effects in non-human organisms or populations in a short period, usually not constituting a substantial portion of the life span. **[D02.12] D6384**

acute ecotoxicity test, *n*—a comparative ecotoxicity test in which a representative subpopulation of organisms is exposed to different treat rates of a test material and is observed for a short period, usually not constituting a substantial portion of their life span. **[D02.12] D6384**

acute toxicity test, *n*—a comparative toxicity test in which a representative subpopulation of organisms is exposed to different treat rates of a test material and is observed for a short period usually not constituting a substantial portion of their life span. **[D02.12] D6081**

additive, *n*—a material added to another, usually in small amounts, to impart or enhance desirable properties or to suppress undesirable properties. **[D02.B0] D5862**

additive, *n*—substance added to a base aviation gasoline in relatively small amounts that either enables that base aviation gasoline to meet the applicable specification properties or does not alter the applicable specification properties of that base aviation gasoline beyond allowable limits. **[D02.J0] D7826**

adenosine monophosphate, *n*—molecule formed by the removal of two (2) molecules of phosphate (one pyrophosphate molecule) from ATP. **[D02.14] D7463**

adenosine triphosphate, *n*—molecule comprised of a purine and three phosphate groups, that serves as the primary energy transport molecule in all biological cells. **[D02.14] D7463**

adherent insolubles (formerly adherent gum), *n*—material that is produced in the course of stressing distillate fuel under the conditions of this test and which adheres to the glassware after fuel has been flushed from the system. **[D02.14] D7462**

adhesive wear (scuffing), *n*—wear due to localized bonding between contacting solid surfaces leading to material transfer between the two surfaces or loss from either surface. **[D02.L0] D5182**

adiabaticity, *n*—the condition in which there is no significant gain or loss of heat throughout the length of the column.

DISCUSSION—

When distilling a mixture of compounds as is the case of crude petroleum, there will be a normal increase in reflux ratio down the column. In the case where heat losses occur in the column, the internal reflux is abnormally greater than the reflux in the head. The opposite is true when the column gains heat, as with an overheated mantle. **[D02.08] D2892**

adjustment, *n*—operation of bringing the portable digital density meter to a state of performance suitable for its use, by setting or adjusting the instrument constants. **[D02.04] D7777**

aerobe, *n*—an organism that requires oxygen to remain metabolically active.

DISCUSSION—

Aerobes use oxygen as their terminal electron acceptor in their primary energy-generating metabolic pathways. Aerobes require oxygen for survival, using *aerobic* metabolic processes to generate energy for growth and survival. **[D02.14] D6469**

aerobic, *adj*—(*1*) taking place in the presence of oxygen; (*2*) living or active in the presence of oxygen. **[D02.N0] D6006, D6046**

AET—abbreviation for atmospheric equivalent temperature.

agglomerate, *n*— *in manufactured carbon and graphite product technology*, composite particle containing a number of grains. **[D02.F0] C709**