



Standard Terminology Relating to Petroleum, Petroleum Products, and Lubricants¹

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

1. Scope*

1.1 This terminology standard covers the compilation of terminology developed by Committee D02 on Petroleum Products 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, and lubricants. 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] D 6812

abrasion, n —wear by displacement of material caused by hard particles or hard protuberances. [D02.B0] D 4998

abrasive wear—wear due to hard particles or hard protuberances forced against and moving along a solid surface. [D02.L0] D 5182

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] D 4174

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.

DISCUSSION—Absorbance expresses the excess absorption over that

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

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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] D 2008

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

$$a = A/fbc$$

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] D 2008

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]

D 3244

accepted reference value, n —a 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. [D02.01] D 2699, D 2700, D 6890,

D 7170, [D02.94] D 6299, D 6792, [E11] E 456, E 177

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] D 2699, D 2700

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] D 7170

accuracy, n —the closeness of agreement between a test result

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

and an accepted reference value. [D02.94] D 6792

accuracy, *n*—the closeness of agreement between an observed value and an accepted reference value. [D02.94] D 6299

acid number, *n*—the quantity of base, expressed as milligrams of potassium hydroxide per gram of sample, required to titrate a sample in a specified solvent to a specified end point.

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.

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*.

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] D 664

acid number, *n*—the quantity of base, expressed in milligrams of potassium hydroxide per gram of sample that is required to titrate a sample to a specified end point. [D02.06] D 974, D 3339, D 5770

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] D 974

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] D 3339

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] D 5770

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] D 1093

across (or against) grain, *n*—the 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] C 709

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] D 6139

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] D 6046

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] D 6384

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] D 6384

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] D 6081

additive, *n*—a material added to another, usually in small amounts, to impart or enhance desirable properties or to suppress undesirable properties. [D02.B0] D 5862, [D02.95] D 4175

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] D 5182

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] D 2892

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] D 6469

aerobic, *adj*—(1) taking place in the presence of oxygen; (2) living or active in the presence of oxygen. [D02.N0] D 6006, D 6046

agglomerate, *n*—*in manufactured carbon and graphite product technology*, a composite particle containing a number of grains. [D02.F0] C 709

aggressiveness index (A.I.), *n*—the value computed from the sum of the pH + log alkalinity + log hardness of water sample where both alkalinity and hardness are reported as CaCO₃L.

DISCUSSION—As A.I. decreases, water becomes more corrosive. At A.I. ≥ 12, water is noncorrosive. At 10 ≤ A.I. < 12, water is moderately corrosive. At A.I. < 10, water is strongly corrosive. [D02.14] D 6469

air-fuel ratio, *n*—*in internal combustion engines*, the mass ratio of air-to-fuel in the mixture being induced into the combustion chambers. [D02.B0] D 6593, D 6709, D 6837

DISCUSSION—In this test method, air-fuel ratio (AFR), is controlled by the EEC IV engine control module. [D02.B0] D 6593

amine number of reference fuels above 100, AN—determined in terms of the weight percent of 3-methylphenylamine in reference grade *isooctane* (2,2,4-trimethylpentane). For example, 5 % of 3-methylphenylamine in reference grade *isooctane* has an amine number of 105 (AN 105). No attempt has been made to correlate performance number of leaded reference fuels to the amine number of unleaded reference fuels, and none is implied. [D02.J0] **D 6812**

ampule, n—a glass vessel for the storage of liquid materials, possessing a long narrow neck for the purpose of providing a flame-sealed closure. [D02.04] **D 6596**

AN, n—amine number [D02.J0] **D 6812**

anaerobe, n—an organism that cannot grow or proliferate in the presence of oxygen.

DISCUSSION—Anaerobes use molecules other than oxygen in their primary energy-generating metabolic pathways, such as sulfate, nitrate, ketones, and other high-energy organic molecules. Although anaerobes may survive in the presence of oxygen, anaerobic growth typically occurs only in an oxygen depleted environment. [D02.14] **D 6469**

anaerobic, adj—(1) taking place in the absence of oxygen; (2) living or active in the absence of oxygen. [D02.N0] **D 6006, D 6046**

analysis cycle time, n—the period of time required to properly obtain and analyze a representative sample of the process stream material. [D02.25] **D 6624**

analysis sample—the reduced and divided representative portion of the bulk sample, prepared for use in the laboratory. [D02.05] **D 4930, D 6969**

analysis of variance (ANOVA), n—a procedure for dividing the total variation of a set of data into two or more parts, one of which estimates the error due to selecting and testing specimens and the other part(s) possible sources of added variation. [D02.94] **D 6300, [D13] D 123**

analytical column, n—a CP-Lowox² wall coated open tubular (WCOT) column containing an oxygenates-selective gas chromatographic liquid phase, used to further separate methanol and 1-propanol for quantification. [D02.04] **D 7059**

analyzer lag, n—Deprecated term. Use the preferred term **instrument response time**.

aniline point, n—the minimum equilibrium solution temperature for equal volumes of aniline (aminobenzene) and sample.

aniline point, n—the minimum equilibrium solution temperature for equal volumes of aniline and sample. [D02.04] **D 611**

anisotropic nuclear graphite, n—graphite in which the isotropy ratio based on the value of the coefficient of thermal expansion (25–500°C) is greater than 1.15. [D02.F0] **C 709**

ANOVA, n—*in statistics*, acronym for analysis of variance.

anoxic, adj—oxygen free. [D02.14] **D 6469**

anti-knock index, n—the arithmetic average of the Research octane number (RON) and Motor octane number (MON).

antiknock index, n—the arithmetic average of the Research octane number (RON) and Motor octane number (MON), that is, (RON + MON)/2. [D02.04] **D 4814**

antimicrobial, n—see **biocide**. [D02.14] **D 6469**

API—abbreviation for American Petroleum Institute.

API gravity, n—a special function of relative density (specific gravity) 60/60°F (15.56/15.56°C), represented by:
API gravity, deg = (141.5/sp gr 60/60°F) – 131.5

DISCUSSION—No statement of reference temperature is required, since 60°F is included in the definition. [D02.04] **D 287**

apparent viscosity, n—of a lubricating grease, the ratio of shear stress to shear rate calculated from Poiseuille's equation, and is measured in poises (see 10.1). [D02.G0] **D 1092**

apparent viscosity, n—the determined viscosity obtained by use of this test method. [D02.07] **D 3829, D 4741, D 4684**

area slice, n—area under a chromatogram within a specified retention time interval. [D02.04] **D 7096**

aseptic, adj—sterile, free from viable microbiological contamination. [D02.14] **D 6974**

ash, n—*in carbon and graphite technology*, the residue remaining after oxidation of a carbon or graphite. [D02.F0] **C 709**

asphalt, n—a dark brown-to-black cementitious material in which the predominating constituents are bitumens.

DISCUSSION—Asphalt can be a natural product or a material obtained from petroleum processing. [D02.G0] **D 128**

asphaltene, n—*in petroleum technology*, a molecule of high molecular mass, high carbon/hydrogen ratio, and containing heteroatoms.

DISCUSSION—Asphaltenes are found largely in crude oils and in heavy fuel oils containing residual fractions. They are insoluble in alkanes such as *n*-heptane and cetane, but soluble in aromatic solvents such as benzene, toluene, and 1-methylnaphthalene. [D02.14] **D 7060, D 7061**

asphaltenes, n—wax-free organic material insoluble in heptane, but soluble in hot toluene (benzene).

DISCUSSION—Benzene is included in this definition solely on the basis of its classical references in the definition of asphaltenes. The precision of this test method when using toluene has been found to be the same as when using benzene. [D02.14] **D 6560**

assignable cause, n—a factor that contributes to variation and that is feasible to detect and identify. [D02.94] **D 6299, [E11] E 456**

assigned test value (ATV), n—the average of all results obtained in the several laboratories which are considered acceptable based on the reproducibility of the test method. [D02.94] **D 3244**

ASTM color, n—the name of an empirical scale of expressing of the color of a petroleum liquid darker than Saybolt color based on a scale of 0.5 (lightest) to 8.0 Dil (darkest) and determined by Test Method D 1500. [D02.05] **D 6045**

² The sole source of supply of the apparatus known to the committee at this time is Varian-Chrompack, Netherlands. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

ASTM supercharge octane number of a fuel below 100, *n*—the whole number nearest the percentage by volume of *isooctane* (equals 100) in a blend with *n*-heptane (equals 0) that matches the knock characteristics of the fuel when compared by this test method. [D02.01] D 909

ASTM supercharge rating of a fuel above 100, *n*—the amount of tetraethyllead (TEL) in *isooctane*, expressed in millilitres per U.S. gallon. [D02.01] D 909

ATV—*in statistics*, abbreviation for assigned test value.

audit, *n*—a systematic examination of a laboratory's quality system procedure and related activities by an internal or external team to determine whether these procedures or activities are implemented according to the documented system. [D02.94] D 6792

autoignition, *n*—the ignition of a material caused by the application of pressure, heat, or radiation, rather than by an external ignition source, such as a spark, flame, or incandescent surface.

autoignition temperature, *n*—the minimum temperature at which autoignition occurs.

automotive, *adj*—descriptive of equipment associated with self-propelled machinery, usually vehicles driven by internal combustion engines. [D02.B0] D 4485, D 6709, D 6837

automotive wheel bearing grease, *n*—a lubricating grease specifically formulated to lubricate automotive wheel bearings at relatively high grease temperatures and bearing speeds. [D02.G0] D 4693

aviation gasoline, *n*—gasoline possessing specific properties suitable for fueling aircraft powered by reciprocating spark ignition engines.

DISCUSSION—Principal properties include volatility limits, stability, detonation-free performance in the engine for which it is intended and suitability for low temperature performance. [D02.J0] D 910

bacterium (pl. bacteria), *n*—a single cell microorganism characterized by the absence of defined intracellular membranes that define all higher life forms.

DISCUSSION—All bacteria are members of the biological diverse kingdoms *Prokaryota* and *Archaeobacteriota*. Individual taxa within these kingdoms are able to thrive in environments ranging from sub-zero temperatures, such as in frozen foods and polar ice, to superheated waters in deep-sea thermal vents, and over the pH range < 2.0 to > 13.0. Potential food sources range from single carbon molecules (carbon dioxide and methane) to complex polymers, including plastics. Oxygen requirements range from obligate anaerobes, which die on contact with oxygen, to obligate aerobes, which die if oxygen pressure falls below a species specific threshold. [D02.14] D 6469

base number, *n*—the quantity of an acid, expressed in terms of the equivalent number of milligrams of potassium hydroxide per gram of sample, that is required to titrate a sample dissolved in the specified solvent to a specified end point (for example, Test Method D 4739).

DISCUSSION—This method uses fixed amounts of *isooctane* and alcoholic hydrochloric acid as the sample solvent and the end point is defined as the amount of titrant required to reach a yellow end-point with a methyl red indicator solution. [D02.06] D 5984

base number, *n*—the quantity of acid, expressed in milligrams of potassium hydroxide per gram of sample that is required to titrate a sample to a specified end point.

DISCUSSION—In this test method, the indicator is *p*-naphtholbenzein titrated to an orange end point in a toluene-water-isopropanol solvent. [D02.06] D 974

base numbers, *n*—the quantity of acid, expressed in milligrams of potassium hydroxide per gram of sample that is required to titrate a sample, dissolved in a specified solvent to a specified end point.

DISCUSSION—In this test method, the sample is titrated to a meter reading corresponding to a freshly prepared nonaqueous acidic buffer solution. [D02.06] D 4739

base oil, *n*—a base stock or a blend of two or more base stocks used to produce finished lubricants, usually in combination with additives. [D02.B0] D 6074

base stock, *n*—a hydrocarbon lubricant component, other than an additive, that is produced by a single manufacturer to the same specifications (independent of feed source or manufacturer's location), and that is identified by a unique formula number or product identification number, or both. [D02.B0] D 6074

basicity, *n*—the quality, state or degree of being basic.

DISCUSSION—In this test method, the criterion for basicity is a pink or red color when phenolphthalein indicator is used. [D02.06] D 1093

basis weight of paper, *n*—basis weight is expressed in grams per square metre. In countries where the metric system is not universal, basis weight is also expressed in pounds per ream.

DISCUSSION—For factors to convert basis weight in grams per square metre to other commercial terms, see Test Method D 646. [D02.10] D 2423

BDC, *n*—bottom dead center [D02.B0] D 6750

bias, *n*—the difference between the population mean of the test results and an accepted reference value. [D02.94] D 6300, D 6792, [E11] E 456

bias, *n*—a systematic error that contributes to the difference between a population mean of the measurements or test results and an accepted reference or true value. [D02.94] D 6299, [E11] E 177, E 456

bias, relative, *n*—the difference between the population mean of the test results and an accepted reference value, which is the agreed upon value obtained using an accepted reference method for measuring the same property. [D02.94] D 6300

binder, *n*—a substance, usually an organic material such as coal tar pitch or petroleum pitch, used to bond the coke or other filler material prior to baking. [D02.F0] C 709

bioaccumulation, *n*—the net accumulation of a substance by an organism as a result of uptake from all environmental sources. [D02.N0] D 7044

bioburden, *n*—the level of microbial contamination (*biomass*) in a system.

DISCUSSION—Typically, bioburden is defined in terms of either biomass or numbers of cells per unit volume or mass or surface area material tested (g biomass / mL; g biomass / g; cells / mL sample, and

so forth). The specific parameter used to define bioburden depends on critical properties of the system evaluated and the investigator's preferences. [D02.14] D 6469

biocide, *n*—a poisonous substance that can kill living organisms.

DISCUSSION—Biocides are further classified as bactericides (kill bacteria), fungicides (kill fungi), and microbiocides (kill both bacteria and fungi). They are also referred to as *antimicrobials*. [D02.14] D 6469

biodegradable, *n*—any substance containing < 10 % wt. O₂ content which undergoes ≥60 % biodegradation as theoretical CO₂ in 28 days and ≥67 % biodegradation as theoretical O₂ uptake in 28 days, or any hydraulic fluid containing ≥10 % wt. O₂ content which undergoes ≥ 60 % biodegradation as theoretical CO₂ or as theoretical O₂ uptake in 28 days. [D02.N0] D 7044

biodegradation, *n*—the process of chemical breakdown or transformation of a material caused by organisms or their enzymes.

DISCUSSION—Biodegradation is only one mechanism by which materials are removed from the environment. [D02.N0] D 6046

biodegradation, *n*—the process of chemical breakdown or transformation of a substance caused by organisms or their enzymes. [D02.12] D 5864, D 6006

DISCUSSION—Biodegradation is only one mechanism by which materials are transformed in the environment. [D02.12] D 6006

biodeterioration, *n*—the loss of commercial value or performance characteristics, or both, of a product (fuel) or material (fuel system) through biological processes. [D02.14] D 6469

biodiesel, *n*—fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B 100.

DISCUSSION—Biodiesel is typically produced by a reaction of vegetable oil or animal fat with an alcohol such as methanol or ethanol in the presence of a catalyst to yield mono-esters and glycerin. The fuel typically may contain up to 14 different types of fatty acids that are chemically transformed into fatty acid methyl esters (FAME). [D02.07] D 5771

biodiesel (B-100), *n*—fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats. [D02.04] D 6584

biodiesel blend, *n*—a blend of biodiesel fuel with petroleum-based diesel fuel designated BXX, where XX is the volume % of biodiesel. [D02.07] D 5771

biofilm, *n*—a film or layer of microorganisms, biopolymers, water, and entrained organic and inorganic debris that forms as a result of microbial growth and proliferation at phase interfaces (liquid-liquid, liquid-solid, liquid-gas, and so forth). (Synonym—*skinnogen*.) [D02.14] D 6469

biomass, *n*—any material, excluding fossil fuels, which is or was a living organism or component of a living organism. [D02.12] D 5864

biomass, *n*—density of biological material per unit sample volume, area, or mass (g biomass / g (or / mL or / cm²))

sample). [D02.14] D 6469

biosurfactant, *n*—a biologically produced molecule that acts as a soap or detergent. [D02.14] D 6469

bituminous material, *n*—*in petroleum technology*, a black or dark-colored very viscous liquid or semi-solid composed principally of high molecular weight condensed aromatic, or naphthenic compounds, or both. [D02.02] D 95

black oil, *n*—lubricant containing asphaltic materials. Black oils are used in heavy-duty equipment applications, such as mining and quarrying, where extra adhesiveness is desired. [D02.07] D 97

blank, *n*—*in biodegradability testing*, a test system containing all system components with the exception of the test substance. [D02.N0] D 6006

blank, *n*—a flask containing the test medium and the inoculum with no additional carbon source added. [D02.12] D 5864

bleed (bleeding), *n*—*of lubricating greases*, the separation of a liquid lubricant from a lubricating grease for any cause. [D02.G0] D 6185

blind reference oil, *n*—a reference oil, the identity of which is unknown by the test facility.

DISCUSSION—This is a coded reference oil which is submitted by a source independent from the test facility. [D02.B0] D 6483, D 6709, D 6750, D 7156

blowby, *n*—*in internal combustion engines*, the combustion products and unburned air-and-fuel mixture that enter the crankcase. [D02.B0] D 5966, D 5967, D 6593, D 6709, D 6837, D 6891, D 6984, D 7156, D 7320

blowby, *n*—*in internal combustion engines*, that portion of the combustion products and unburned air/fuel mixture which leaks past piston rings into the engine crankcase during operation.

boilup rate, *n*—*in column distillation*, the quantity of vapor entering the column per unit of time.

boilup rate, *n*—the quantity of vapor entering the column per unit of time.

DISCUSSION—It is expressed in millilitres of liquid per hour for a given column or in millilitres per hour per square centimetre of cross-sectional area for comparative purposes. In the latter case, it refers to the test mixture of *n*-heptane and methylcyclohexane in the efficiency evaluation (see Annex A1) and is measured at the bottom of the column. The maximum boilup of the *n*-heptane-methylcyclohexane test mixture is that which the column can handle under stable conditions without flooding. In routine adiabatic operation, the boilup rate can be estimated roughly from the takeoff rate multiplied by the reflux ratio plus one. [D02.08] D 2892

bond, *v*—to connect two parts of a system electrically by means of a conductive wire to eliminate voltage differences. [D02.14] D 6217, [D02.J0] D 5452

bonded glycerin, *n*—is the glycerin portion of the mono-, di-, and triglyceride molecules. [D02.04] D 6584

borderline pumping temperature, *n*—the lowest temperature at which the critical yield stress or critical viscosity that allows a fluid to be pumped occurs.

Bourdon spring gauge, *n*—pressure measuring device that employs a Bourdon tube connected to an indicator. [D02.08] D 323, D 4953

Bourdon tube, *n*—flattened metal tube bent to a curve that

straightens under internal pressure. [D02.08] D 323, D 4953

break-in, *n*—*in tribology*, an initial transition process occurring in newly established wearing contacts, often accompanied by transients in coefficient of friction or wear rate, or both, that are uncharacteristic of the given tribological system's long term behavior. (Synonym—*run-in*, *wear-in*.) [D02.L0] D 6425, [G02] G 40

break-in, *n*—*in tribology*, an initial transition process occurring in newly established wearing contacts, often accompanied by transients in coefficient of friction or wear rate, or both, which are uncharacteristic of the given tribological system's long-term behavior. [D02.G0] D 5706, D 5707, [G02] G 40

bromine index, *n*—the number of milligrams of bromine that will react with 100 g of sample under the conditions of the test. [D02.04] D 2710

bromine number, *n*—the number of grams of bromine that will react with 100 g of the sample under the conditions of the test.

BSOC, *n*—break specific oil consumption [D02.B0] D 6750

BTDC, *adj*—abbreviation for Before Top Dead Center; used with the degree symbol to indicate the angular position of the crankshaft relative to its position at the point of uppermost travel of the piston in the cylinder. [D02.B0] D 5966, D 6837

BTDC (before top dead center), *adj*—the angular position of the crankshaft relative to its position at the point of uppermost travel of the piston in the cylinder, used with the degree symbol (°). [D02.B0] D 6984

BTDC (before top dead center), *adj*—the angular position of the crankshaft relative to its position at the point of uppermost travel of the piston in the cylinder, used with the degree symbol (°). [D02.B0] D 7320

bulk sample, *n*—a large sample, either from one place or made up of several incremental samples of the same material. [D02.05] D 4296

bulk sample—the reduced and divided representative portion of the gross sample as prepared for shipment to and received by a laboratory to be prepared for analysis. [D02.05] D 4930

Bunsen coefficient, *n*—the solubility of a gas expressed as the volume, reduced to 273 K (32°F) and 101.3 kPa (1 atm), dissolved by one volume of liquid at the specified temperature and 101.3 kPa. [D02.11] D 2779

Bunsen coefficient, *n*—the solubility of a gas, expressed as the gas volume reduced to 273 K (32°F) and 0.10 MPa (1 atm), dissolved by one volume of liquid at the specified temperature and 0.10 MPa. [D02.11] D 3827

burn, *vt*—*in emission spectroscopy*, to vaporize and excite a specimen with sufficient energy to generate spectral radiation. [D02.03] D 6595, D 6728

burner fuel oil, *n*—any petroleum liquid suitable for the generation of heat by combustion in a furnace or firebox as a vapor or a spray, or a combination of both.

DISCUSSION—Different grades are characterized primarily by viscosity ranges. [D02.P0] D 6448, D 6823

calcined coke, *n*—petroleum coke that has been thermally treated to drive off the volatile matter and to develop crystalline structure. [D02.05] D 5003

calcined petroleum coke, *n*—petroleum coke that has been thermally treated to drive off the volatile matter and to develop crystalline structure. [D02.05] D 2638, D 6791

calcined petroleum coke, *n*—raw petroleum coke that has been thermally treated to drive off the volatile matter and to develop crystalline structure. [D02.05] D 6376

calibrate, *v*—to determine the indication or output of a measuring device with respect to that of a standard. [D02.B0] D 5862, D 5966, D 5967, D 6794, D 6795, D 6984, D 7156, D 7320

calibrate, *v*—to determine the indication or output of a measuring device or a given engine with respect to a standard. [D02.B0] D 6557, D 6837, D 6894

calibrated test stand, *n*—a test stand on which the testing of reference material(s), conducted as specified in the standard, provided acceptable test results.

DISCUSSION—In several automotive lubricant standard test methods, the ASTM Test Monitoring Center provides testing guidance and determines acceptability. [D02.B0] D 6681, D 6750

calibration, *n*—the act of determining the indication or output of a measuring device or a given engine with respect to a standard. [D02.B0] D 6202

calibration, *n*—the determination of the values of the significant parameters by comparison with values indicated by a set of reference standards. [D02.03] D 6595, D 6728

calibration curve, *n*—the graphical or mathematical representation of a relationship between the assigned (known) values of standards and the measured responses from the measurement system. [D02.03] D 6595, D 6728

calibration oil, *n*—an oil that is used to determine the indication or output of a measuring device or a given engine with respect to a standard. [D02.B0] D 6202, D 6837

calibration standard, *n*—a standard having an accepted value (reference value) for use in calibrating a measurement instrument or system. [D02.03] D 6595, D 6728

calibration standard, *n*—a material with a certified value for a relevant property, issued by or traceable to a national organization such as NIST, and whose properties are known with sufficient accuracy to permit its use to evaluate the same property of another sample. [D02.94] D 6792

calibration standard, *n*—a standard having an assigned (known) value (reference value) for use in calibrating a measurement instrument or system. This standard is not used to determine the accuracy of the measurement instrument or system (see *check standard*). [D02.03] D 7171

calibration test, *n*—an engine test conducted on a reference oil under carefully prescribed conditions, the results of which are used to determine the suitability of the engine stand/laboratory for such tests on non-reference oils.

DISCUSSION—A calibration test also includes tests conducted on parts to ensure their suitability for use in reference and non-reference tests. [D02.B0] D 6750

calibration test, *n*—a test, using a coded oil, conducted as specified in the test method.

DISCUSSION—The test result is used to determine the suitability of the testing facility/laboratory to conduct such tests on non-reference oils.

[D02.B0] **D 6794**

calibration test stand, *n*—a test stand on which the testing of reference material(s), conducted as specified in the standard, provided acceptable results.

DISCUSSION—In several automotive lubricant standard test methods, the ASTM Test Monitoring Center provides testing guidance and determines acceptability.

[D02.B0] **D 6891**

candidate oil, *n*—an oil that is intended to have the performance characteristics necessary to satisfy a specification and is to be tested against that specification. [D02.B0] **D 5862, D 6618, D 6681, D 6750, D 6794, D 6795, D 7156**

DISCUSSION—These oils are mainly submitted for testing as *candidates* to satisfy a specified performance; hence the designation of the term.

[D02.B0] **D 6681**

candle pitch, *n*—a dark brown-to-black, tarry or solid, by-product residue from soap and candle stock manufacture, refining of vegetable oils, refining of wool grease, or refining of refuse animal fats.

[D02.G0] **D 128**

carbon, *n*—an element, number 6 of the periodic table of elements, electronic ground state $1s^2 2s^2 2p^2$.

[D02.F0]

C 709

carbon, *n*—*in carbon and graphite technology*, an artifact consisting predominantly of the element carbon and possessing limited long range order.

DISCUSSION—The presence of limited long range order is usually associated with low electrical and thermal conductivity and difficult machinability when compared with graphite.

[D02.F0] **C 709**

carbon, *n*—*in manual transmissions and final drive axles*, a hard, dry, generally black or gray deposit that can be removed by solvents but not by wiping with a cloth.

[D02.B0] **D 5704**

carbon foam, *n*—*in carbon and graphite technology*, a porous carbon product containing regularly shaped, predominantly concave, homogeneously dispersed cells which interact to form a three-dimensional array throughout a continuum material of carbon, predominantly in the non-graphitic state. The final result is either an open or closed cell product.

DISCUSSION—In most foam, the cell wall thickness is less than half the average cell size.

[D02.F0] **C 709**

carbon residue, *n*—*in petroleum products*, the part remaining after a sample has been subjected to thermal decomposition.

DISCUSSION—The amount of residue is dependent on the test conditions of evaporation and pyrolysis. The term may be misleading here in that the residue may contain other than carbon decomposition products. However, the term is retained due to its wide common usage.

[D02.06] **D 4530**

carbon residue, *n*—the residue formed by evaporation and thermal degradation of a carbon containing material.

DISCUSSION—The residue is not composed entirely of carbon but is a coke that can be further changed by carbon pyrolysis. The term carbon residue is retained in deference to its wide common usage.

[D02.06] **D 189, D 524**

category, *n*—*in engine oils*, a designation such as SH, SJ, SL, SM, CF-4, CF, CF-2, CG-4, CH-4, CI-4, Energy Conserving, and so forth, for a given level of performance in specified engine and bench tests.

[D02.B0] **D 4485**

CCCFP, *n*—continually closed cup flash point

[D02.E0]

D 6985

cell (bubble), *n*—*in carbon and graphite technology*, a single small cavity formed by gaseous displacement in a precursor material in its plastic state, and surrounded completely by its walls when formed. Cells can be open or closed.

DISCUSSION—After processing at high temperatures, the basic structure of the cell will remain even as the material converts from a plastic state to a rigid carbonaceous structure. Hence, the term cell will apply to a carbon product.

[D02.F0] **C 709**

cell count, *n*—*in carbon and graphite technology*, in closed-cell foams, the number of cells aligned in one plane in one linear inch, as determined by stereoscopic image analysis.

[D02.F0] **C 709**

cell size, *n*—*in carbon and graphite technology*, the average diameter of the cells in the final foam product.

[D02.F0]

C 709

certified reference material, CRM, *n*—a reference material one or more of whose property values are certified by a technically valid procedure, accompanied by a traceable certificate or other documentation which is issued by a certifying body.

[D02.94] **D 6792**

cetane index, *n*—an approximation of the cetane number (the ignition performance) of distillate diesel fuel, which does not contain a cetane improver additive, calculated from the density and the mid-boiling point temperature (see also **diesel index**).

cetane number, *n*—a measure of the ignition performance of a diesel fuel oil obtained by comparing it to reference fuels in a standardized engine test.

[D02.01] **D 613, D 6890,**

D 7170

DISCUSSION—In the context of this method, ignition performance is understood to mean the ignition delay of the fuel as determined in a standard test engine under controlled conditions of fuel flow rate, injection timing and compression ratio.

[D02.01] **D 613**

DISCUSSION—In the context of this test method, cetane number is that defined by Test Method D 613/IP 41.

[D02.01] **D 6890, D 7170**

cetane number, cn *n*—a measure of the ignition performance of a diesel fuel obtained by comparing it to reference fuels in a standardized engine test.

CFU, *n*—colony forming unit

[D02.14] **D 6974**

charge volume, *n*—the volume of the specimen, 100 mL, charged to the distillation flask at the temperature specified in Table 1.

[D02.08] **D 86**

Check Fuel, *n*—*for quality control testing*, a spark-ignition engine fuel of selected characteristics having an octane number accepted reference value ($O.N._{ARV}$) determined by round-robin testing under reproducibility conditions.

[D02.01] **D 2699, D 2700**

check standard, *n*—a material having an assigned (known) value (reference value) used to determine the accuracy of the measurement instrument or system. This standard is not used to calibrate the measurement instrument or system (see

calibration standard).

[D02.03] D 7171

check standard, *n*—in *QC testing*, material having an accepted reference value used to determine the accuracy of a measurement system.

DISCUSSION—In the context of this test method, check standard refers to heptane.

[D02.01] D 6890, D 7170

chronic 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 period of time which constitutes a major portion of their life span.

[D02.12] D 6384

chronic toxicity test, *n*—a comparative toxicity test in which a representative subpopulation of organisms are exposed to different treat rates of a test material and is observed for a period of time which constitutes a major portion of their life span.

[D02.12] D 6081

CHT, *n*—cylinder head temperature

[D02.J0] D 6812

CIE, *n*—the abbreviation for the French title of the International Commission on Illumination, or Commission Internationale de l’Eclairage.

[D02.05] D 6045, [E12] E 284

CIE Standard Illuminant C, *n*—Colorimetric illuminant, representing daylight with a correlated color temperature of 6774 K, defined by the CIE in terms of a relative spectral power distribution.

[D02.05] D 6045, [E12] E 284

CIE 1931 standard observer, *n*—ideal colorimetric observer with color matching functions $x(\lambda)$, $y(\lambda)$, $z(\lambda)$ corresponding to a field of view subtending a 2° angle on the retina; commonly called the “ 2° Standard Observer.”

[D02.05]

D 6045, [E12] E 284

C.L.A., *n*—in measuring surface finish, the arithmetic average of the absolute distances of all profile points from the mean line for a given distance.

[D02.L0] D 6425

classification, *n*—in *engine oils*, the systematic arrangement into categories in accordance with different levels of performance in specified engine and bench tests.

[D02.B0]

D 4485

clogging, *n*—the restriction of a flow path due to the accumulation of material along the flow path boundaries.

[D02.B0] D 6618, D 6984, D 7320

closed cell, *n*—in *carbon and graphite technology*, a cell totally enclosed by its walls and hence not interconnected with other cells. A closed cell foam is a foam consisting predominantly of closed cells.

[D02.F0] C 709

closeness sum of squares (CSS), *n*—a statistic used to quantify the degree of agreement between the results from two test methods after bias-correction using the methodology of this practice.

[D02.94] D 6708

cloud point, *n*—in *petroleum products and biodiesel fuels*, the temperature of a liquid specimen when the smallest observable cluster of hydrocarbon crystals first occurs upon cooling under prescribed conditions.

DISCUSSION—The cloud point occurs when the temperature of the specimen is low enough to cause hydrocarbon crystals to precipitate. In a homogeneous liquid, the cloud is always noted first at the location in the specimen where the specimen temperature is the lowest. The cloud point is the temperature at which the crystals first occur, regardless of their location in the specimen, and not after extensive crystallization has taken place. The hydrocarbon crystals that precipitate at lower

temperatures are typically, but not excluded to, straight chain hydrocarbons commonly called “wax crystals.”

DISCUSSION—The purpose of the cloud point method is to detect the presence of the wax crystals in the specimen; however, trace amounts of water and inorganic compounds may be present. The intent of the cloud point method is to capture the temperature at which the liquids in the specimen begin to change from a single liquid phase to a two-phase system containing solid and liquid. It is not the intent of this test method to monitor the phase transition of the trace components, such as water.

[D02.07] D 5771, D 5772, D 5773

coagulate, *v*—to cause to become viscous or thickened into a coherent mass.

[D02.06] D 893, D 7317

coagulated pentane insolubles, *n*—in *used oil analysis*, separated matter that results when a coagulant is added to a solution of used oil in pentane.

DISCUSSION—The addition of a coagulant will aid in separating finely divided materials that may have been held in suspension because of the dispersant characteristics of the oil.

[D02.06] D 893, D 7317

coagulated toluene insolubles, *n*—in *used oil analysis*, coagulated and separated matter not soluble in pentane or toluene.

[D02.06] D 893

coefficient of friction, (μ)—the ratio of the tangential force that is needed to start or to maintain uniform relative motion between two contacting surfaces to the perpendicular force holding them in contact.

[D02.L0] D 5183

coefficient of friction, μ or f , *n*—in *tribology*, the dimensionless ratio of the friction force (F) between two bodies to the normal force (N) pressing these two bodies together.

$$\mu \text{ or } f = (F/N)$$

DISCUSSION—A distinction is often made between *static coefficient of friction* and *kinetic coefficient of friction*.

[D02.L0] D 2714,

D 3704

coefficient of friction μ or f , *n*—in *tribology*, the dimensionless ratio of the friction force (F_f) between two bodies to the normal force (F_n) pressing these bodies together.

$$\mu = (F_f/F_n)$$

[D02.L0] D 6425, [G02] G 40

coke, *n*—a carbonaceous solid produced from coal, petroleum, or other materials by thermal decomposition with passage through a plastic state.

[D02.F0] C 709

cold sticking, *n*—of *piston rings*, a condition in which the ring is free in its groove while the engine is running but stuck when the piston is cold, normally indicated by the absence of varnish or other deposits on the outer face of the ring and of signs of blowby on the piston skirt.

[D02.B0] D 4857

cold-stuck piston ring, *n*—in *internal combustion engines*, a piston ring that is stuck when the piston and ring are at room temperature, but inspection shows that it was free during engine operation.

[D02.B0] D 6593, D 6984, D 7320

DISCUSSION—A cold-stuck piston ring cannot be moved with moderate finger pressure. It is characterized by a polished face over its entire circumference, indicating essentially no blowby passed over the ring-face during engine operation.

[D02.B0] D 6593, D 7320

combustion chamber, *n*—in *reciprocating internal combustion engines*, the volume bounded by the piston crown and any portion of the cylinder walls extending above the piston

crown when in the top dead center position, and the inner surface of the cylinder head including any spark plugs and other inserted components. [D02.B0] **D 4857, D 4858**

commercial butane—a hydrocarbon product for use where low volatility is required. [D02.H0] **D 1835**

commercial PB mixtures—mixtures of propane and butane for use where intermediate volatility is required. [D02.H0] **D 1835**

commercial propane—a hydrocarbon product for use where high volatility is required. Commercial propane is suitable for certain low severity internal combustion engine applications. [D02.H0] **D 1835**

compatibility, *n*—of crude oils or of heavy fuel oils, the ability of two or more crude oils or fuel oils to blend together within certain concentration ranges without evidence of separation, such as the formation of multiple phases.

DISCUSSION—Incompatible heavy fuel oils or crude oils, when mixed or blended, result in the flocculation or precipitation of asphaltenes. Some oils may be compatible within certain concentration ranges in specific mixtures, but incompatible outside those ranges. [D02.14] **D 7060, D 7061**

compensation line, *n*—a line of plot on log-log paper where the coordinates are scar diameter in millimetres and applied load in kilograms-force (or newtons) obtained under dynamic conditions.

DISCUSSION—Shown in Fig. 1 as line ABE. [D02.G0] **D 2596**

compensation scar diameter, *n*—the average diameter, in millimetres, of the wear scar on the stationary balls caused by the rotating ball under an applied load in the presence of a lubricant, but without causing either seizure or welding. [D02.G0] **D 2596, [D02.L0] D 2783**

composite sample—a thoroughly mixed gross sample. [D02.O5] **D 4296**

composite sample—a sample, representative of an entire consignment of calcined petroleum coke, generated by mixing portions of gross samples from different lots together in mass fractions proportioned to the consignment. [D02.O5] **D 6969**

compression ratio, *n*—the ratio of the volume of the combustion chamber including the precombustion chamber with the piston at bottom dead center to the comparable volume with the piston at top dead center. [D02.O1] **D 613**

compressive strength, *n*—a property of solid material that indicates its ability to withstand a uniaxial compressive load. [D02.F0] **C 709**

congealing point, *n*—that temperature at which molten petroleum wax ceases to flow, when allowed to cool under prescribed conditions.

congealing point, *n*—of petroleum wax, that temperature at which molten petroleum wax, when allowed to cool under prescribed conditions, ceases to flow. [D02.10] **D 938**

consistency, *n*—of lubricating grease, the degree of resistance to movement under stress.

DISCUSSION—The term consistency is used somewhat synonymously with penetration. Generally, consistency refers to worked penetration of a grease. [D02.G0] **D 217, D 7342**

consortium (pl. consortia), *n*—microbial community comprised of more than one, species that exhibits properties not shown by individual community members.

DISCUSSION—Consortia often mediate biodeterioration processes that individual taxa cannot. [D02.14] **D 6469**

continuous analyzer unit cycle time—the time interval required to replace the volume of the analyzer measurement cell. [D02.25] **D 7278**

control limits, *n*—limits on a control chart that are used as criteria for signaling the need for action or for judging whether a set of data does or does not indicate a state of statistical control. [D02.25] **D 6122, [D02.94] D 6299, [E11] E 456**

cool-on-column injector, *n*—an injection port that allows controlled injection of the sample at a temperature close to or lower than the boiling point of the solvent into the gas chromatographic column or a liner within the injection port connected to the column.

DISCUSSION—After the injection, the injection port is heated at a fixed rate to a temperature sufficiently high enough to allow the transfer of sample components of interest from the injection port to the part of the column located in the gas chromatograph (GC) oven. [D02.04] **D 7059**

corrected load, *n*—the load in kilograms-force (or newtons) for each run obtained by multiplying the applied load by the ratio of the Hertz scar diameter to the measured scar diameter at that load. [D02.L0] **D 2783**

corrected load, *n*—the load in kilograms-force (or newtons) obtained by multiplying the applied load by the ratio of the Hertz scar diameter to the measured scar diameter at that load.

DISCUSSION—In this test method, the corrected load is calculated for each run. [D02.G0] **D 2596**

correction factor, *n*—a mathematical adjustment to a test result to compensate for industry-wide shifts in severity. [D02.B0] **D 6984, D 7320**

corrosion, *n*—the chemical or electrochemical reaction between a material, usually a metal surface, and its environment that can produce a deterioration of the material and its properties. [D02.B0] **D 5862, D 6557, D 6594, D 7320**

corrosion, *n*—the chemical or electrochemical oxidation of the surface of metal, which can result in loss of material or accumulation of deposits. [D02.B0] **D 6984**

cracked gases, *n*—hydrocarbon gases that contain unsaturates. [D02.04] **D 2650**

critical parts, *n*—those components used in the test that are known to affect test severity. [D02.B0] **D 6709**

cross-method reproducibility (R_{XY}), *n*—a quantitative expression of the random error associated with the difference between two results obtained by different operators using different apparatus and applying the two methods *X* and *Y*, respectively, each obtaining a single result on an identical test sample, when the methods have been assessed and an appropriate bias-correction has been applied in accordance with this practice; it is defined as the 95 % confidence limit for the difference between two such single and independent

results.

[D02.25] D 6122, [D02.94] D 6708

DISCUSSION—A statement of cross-method reproducibility must include a description of any bias correction used in accordance with this practice.

DISCUSSION—Cross-method reproducibility is a meaningful concept only if there are no statistically observable sample-specific relative biases between the two methods, or if such biases vary from one sample to another in such a way that they may be considered random effects. (see 6.7.)

[D02.94] D 6708

crude oil, *n*—a naturally occurring hydrocarbon mixture, generally in a liquid state, which may also include compounds of sulfur, nitrogen, oxygen, metals, and other elements. (Synonym—*crude petroleum*, *crude*.)

cup grease, *n*—any lubricating grease having physical properties, such as consistency and texture, suitable for its use in spring-loaded or screw-type lubricating cups.

DISCUSSION—Cup greases are predominantly NLGI No. 3 or 4 calcium greases, but grease types other than calcium are also used.

[D02.G0] D 128

cylinder height, *n*—for the CFR engine, the relative vertical position of the engine cylinder with respect to the piston at top dead center (tdc) or the top machined surface of the crankcase.

[D02.01] D 2699, D 2700

cylinder stock, *n*—lubricant for independently lubricated engine cylinders, such as those of steam engines and air compressors. Cylinder stock are also used for lubrication of valves and other elements in the cylinder area.

[D02.07]

D 97

debris, *n*—in internal combustion engines, solid contaminant materials unintentionally introduced into the engine or resulting from wear.

[D02.B0] D 5862, D 6593, D 6750, D 6984, D 7320

DISCUSSION—Examples include such things as gasket material, silicone sealer, towel threads, and metal particles.

[D02.B0] D 6593

debutanization, *n*—of crude petroleum, the removal of the light hydrocarbons up to and including *n*-butane, and retention of the heavier hydrocarbons.

DISCUSSION—In practice, a crude petroleum is regarded as debutanized if the light hydrocarbon cut collected in the cold trap contains more than 95 % of the C₂ to C₄ hydrocarbons and less than 5 % of the C₅ hydrocarbons initially present in the sample.

[D02.08] D 2892

decomposition, *n*—of a hydrocarbon, the pyrolysis or cracking of a molecule yielding smaller molecules with lower boiling points than the original molecule.

DISCUSSION—Characteristic indications of thermal decomposition are evolution of fumes and erratic temperature readings that usually decrease after any attempt is made to adjust the heat.

[D02.08]

D 86

decomposition point, *n*—the corrected thermometer reading that coincides with the first indications of thermal decomposition of the liquid in the flask.

DISCUSSION—The decomposition point, as determined under the conditions of this test method, does not necessarily correspond to the decomposition temperature in other applications.

[D02.08] D 86

defect, *n*—of a manufactured carbon or graphite product, any irregularity in the chemistry, microstructure, or macrostructure.

[D02.F0] C 709

defective, *adj*—having flaws or dimensional deviations greater than acceptable for the intended use.

[D02.F0] C 709

degras (wool fat, wool grease, wool wax), *n*—a fat-like material comprised primarily of sterols, other higher alcohols, and fatty acids, obtained from the solvent extraction of sheep's wool.

[D02.G0] D 128

degree of thickening (DT), *n*—the ratio of an oil's viscosity with an additive to that oil's viscosity without the additive. A measure of the amount by which an additive increases the base fluid viscosity.

[D02.07] D 6022

degrees of freedom, *n*—the divisor used in the calculation of variance.

DISCUSSION—This definition applies strictly only in the simplest cases. Complete definitions are beyond the scope of this practice.

[D02.94] D 6300, [ISO/TC 28] ISO 4259

demulsibility, *n*—in petroleum products, the ability of a mixture of liquids (usually hydrocarbons and water) to separate into its components after the mixture has been vigorously agitated.

denaturants, *n*—natural gasoline, gasoline components, unleaded gasoline, or toxic or noxious materials added to fuel ethanol to make it unsuitable for beverage use but not unsuitable for automotive fuel use.

[D02.A0] D 6423

denatured fuel ethanol, *n*—fuel ethanol made unfit for beverage use by the addition of denaturants.

[D02.A0]

D 6423

density, *n*—mass per unit volume at a specified temperature.

[D02.04] D 4052

density—the weight in vacuo, (that is, the mass) of a unit volume of the material at any given temperature.

[D02.04]

D 1217

density, *n*—the mass per unit volume. In the SI, the unit of density is the kg/m³, but for practical use, a submultiple is more convenient. The g/cm³ is 10⁻³ kg/m³ and is customarily used.

[D02.07] D 4741, D 6616

density, *n*—the mass of liquid per unit volume at 15°C and its saturation pressure with the standard unit of measurement being kilograms per cubic metre.

DISCUSSION—Other reference temperatures, such as 20°C may be used for some products or in some locations. Less preferred units of measurement; for example, kg/L or g/mL, are still in use.

[D02.02]

D 1657

depacifying, *adj*—the process of removing hydrogen ions (protons) from the cathodic surface of an electrolytic cell, thereby promoting continued electrolytic corrosion.

[D02.14] D 6469

deplasticize, *v*—the process of breaking down polymers in plastics and similar materials, resulting in loss of the material's structural integrity.

[D02.14] D 6469

detection limit, *n*—a stated limiting value that designates the lowest concentration that can be determined with confidence and that is specific to the analytical procedure used.

[D02.03] D 7111

detection limit, *n*—the smallest concentration of an element

that can be measured for specific analysis conditions and data collection periods. [D02.03] **D 6728**

determinability, *n*—a quantitative measure of the variability associated with the same operator in a given laboratory obtaining successive determined values using the same apparatus for a series of operations leading to a single result; it is defined as that difference between two such single determined values as would be exceeded in the long run in only one case in 20 in the normal and correct operation of the test method.

DISCUSSION—This definition implies that two determined values, obtained under determinability conditions, which differ by more than the determinability value should be considered suspect. If an operator obtains more than two determinations, then it would usually be satisfactory to check the most discordant determination against the mean of the remainder, using determinability as the critical difference. [D02.94] **D 6300**

determination, *n*—the process of carrying out the series of operations specified in the test method whereby a single value is obtained. [D02.94] **D 3244**

detonation meter, *n*—for *knock testing*, the signal conditioning instrumentation that accepts the electrical signal from the detonation pickup and provides an output signal for display. [D02.01] **D 2699, D 2700**

detonation pickup, *n*—for *knock testing*, a magnetostrictive-type transducer that threads into the engine cylinder and is exposed to combustion chamber pressure to provide an electrical signal that is proportional to the rate-of-change of cylinder pressure. [D02.01] **D 2699, D 2700**

developer, *n*—of an *ASTM test method*, the assigned ASTM group, working under the supervision of its governing subcommittee and main committee, that formats the test method in accordance with the Form and Style for ASTM Standards, and continually refines the test method. [D02.B0] **D 6594**

developer, *n*—of a *test procedure*, an individual or organization that selects the test apparatus and operating conditions. [D02.B0] **D 6594**

dial indicator reading, *n*—for the *CFR engine*, a numerical indication of cylinder height, in thousandths of an inch, indexed to a basic setting at a prescribed compression pressure when the engine is motored. [D02.01] **D 2699, D 2700**

diesel fuel oil, *n*—any petroleum liquid suitable for the generation of power by combustion in compression ignition (diesel) engines.

DISCUSSION—Different grades are characterized primarily by viscosity ranges and by minimum cetane numbers.

diesel index, *n*—an approximation of the cetane number (the ignition performance) of diesel fuel, calculated from the density and the aniline point. (No longer widely used for distillate fuels but applicable to some blended distillate residual fuels (see also **cetane index**.)

diffuser, *n*—for *gas*, a device for dispersing gas into a fluid.

DISCUSSION—In this test method the diffuser may be made of either metallic or non-metallic materials. [D02.06] **D 892**

diffuser, *n*—for *gas*, a device for dispersing gas into a liquid.

(Test Method D 892).

DISCUSSION—Although diffusers can be made of either metallic or non-metallic materials, in this test method the diffuser is sintered stainless steel. [D02.06] **D 6082**

digital counter reading, *n*—for the *CFR engine*, a numerical indication of cylinder height, indexed to a basic setting at a prescribed compression pressure when the engine is motored. [D02.01] **D 2699, D 2700**

dilution factor, *f*, *n*—the proportion of solvent increase made to reduce the concentration and thus the absorbance of a solute, expressed by the ratio of the volume of the diluted solution to the volume of original solution containing the same quantity of solute as the diluted solution. [D02.04] **D 2008**

DIN—abbreviation for Deutsches Institut für Normung (the German Standards Body).

dispersant, *n*—in *engine oil*, an additive that reduces deposits on oil-wetted engine surfaces primarily through suspension of particles.

dispute, *n*—when there is a question as to product quality because a test value obtained falls outside the acceptance limit. [D02.94] **D 3244**

dissolved and free water—water may be present in the fuel as dissolved water or as “free” (undissolved) water, or both. The free water may be fresh or saline. Fresh water may enter the fuel from steam coils in storage tanks, from condensation out of moisture-laden air, or from leaking cooling coils. Saline water can enter the fuel during transportation in barges or tankers. [D02.E0] **D 4418**

distillate, *n*—in the *petroleum industry*, an overhead or side stream liquid from a distillation process. (Synonym—**petroleum distillate**.)

DISCUSSION—Distillates can be produced either directly from crude oil (called straight-run distillates) or from distillation after processing crude oil by cracking, coking, hydrocracking, or other conversion processes. The term is often given a modifier, such as cracked distillate.

DISCUSSION—The term distillate is sometimes used to mean middle distillate. This practice is discouraged.

distillation pressure, *n*—the pressure measured as close as possible to the point where the vapor temperature is taken, normally at the top of the condenser. [D02.08] **D 2892**

distillation residue, *n*—that portion of the sample remaining after distillation using specified procedures. [D02.06] **D 1093**

distillation temperature, *n*—in *column distillation*, the temperature of the saturated vapor measured just above the top of the fractionating column. (Synonym—*head temperature*, *vapor temperature*.)

double-blind reference oil, *n*—a reference oil, the identity of which is unknown by either the submitting source or the test facility and is not known to be a reference oil by the test facility.

DISCUSSION—This is a coded reference oil that is supplied by an independent source to a second party, who applies their own coded designation to the oil (and if necessary, repackages it to preserve its anonymity), and submits it to a third party for testing. [D02.B0] **D 6750**

double-blind test, *n*—a standard test performed on a double-blind reference oil. [D02.B0] D 6750

drain and dry mode, *n*—the effect from being sprayed, dipped, or brushed with a fluid lubricant and the excess material draining from the surface leaving behind a thin film that remains wet and must act as a lubricant on its own, without benefit of recirculation or continuous supply. [D02.L0] D 5620

drop melting point of petroleum wax, *n*—the temperature at which material becomes sufficiently fluid to drop from the thermometer used in making the determination under definite prescribed conditions. [D02.10] D 127

dropping point, *n*—a numerical value assigned to a grease composition representing the corrected temperature at which the first drop of material falls from the test cup and reaches the bottom of the test tube.

DISCUSSION—In the normal and proper operation of this test method, the observed dropping point is corrected by adding to it a value representing one third of the difference between the oven block temperature and the observed dropping point temperature. This corrected value is recorded as the dropping point of the grease.

[D02.G0] D 2265

dry method, *n*—in vapor pressure methods, a specific empirical test method (D 4953) for measuring the vapor pressure of gasoline and other volatile products in which contact of the test specimen with water is not allowed. [D02.08] D 4953

dry point, *n*—in batch distillation, the temperature observed at the instant the last drop of liquid evaporates from the lowest point in the flask.

dry point, *n*—the corrected thermometer reading that is observed at the instant the last drop of liquid (exclusive of any drops or film of liquid on the side of the flask or on the temperature sensor), evaporates from the lowest point in the distillation flask.

DISCUSSION—The end point (final boiling point), rather than the dry point, is intended for general use. The dry point can be reported in connection with special purpose naphthas, such as those used in the paint industry. Also, it is substituted for the end point (final boiling point) whenever the sample is of such a nature that the precision of the end point (final boiling point) cannot consistently meet the requirements given in the precision section.

[D02.08] D 86

dry solid film lubricants, *n*—dry coatings consisting of lubricating powders in a solid matrix bonded to one or both surfaces to be lubricated. [D02.L0] D 2510

dry vapor pressure equivalent (DVPE), *n*—value calculated by a defined correlation equation, that is expected to be comparable to the vapor pressure value obtained by Test Method D 4953, Procedure A. [D02.08] D 4953

DT—in viscometry, abbreviation for degree of thickening.

dynamic, *adj*—in petroleum products—in petroleum product flash point test methods—the condition where the vapor above the test specimen and the test specimen are not in temperature equilibrium at the time that the ignition source is applied.

DISCUSSION—This is primarily caused by the heating of the test specimen at the constant prescribed rate with the vapor temperature

lagging behind the test specimen temperature. [D02.08] D 92, D 93

dynamic fuel level, *n*—for knock testing, test procedure in which the fuel-air ratio for maximum knock intensity for sample and reference fuels is determined using the falling level technique that changes carburetor fuel level from a high or rich mixture condition to a low or lean mixture condition, at a constant rate, causing knock intensity to rise to a maximum and then decrease, thus permitting observation of the maximum knockmeter reading. [D02.01] D 2699, D 2700

dynamic hold-up, *n*—in column distillation, the quantity of liquid held up in the column under normal operating conditions.

dynamic hold-up, *n*—the quantity of liquid held up in the column under normal operating conditions.

DISCUSSION—It is expressed as a percentage of the packed volume for packed columns so that the data can be compared. For real plate columns, it is expressed in millilitres per plate. The data can only be compared with others of the same diameter because of different tray spacing. Data for packed columns cannot be compared with those of real plate columns except in absolute units of millilitres per theoretical plate (see Table 1). Dynamic hold-up increases with increasing distillation rate up to the flood point and varies from one kind of fractionator to another. [D02.08] D 2892

dynamic holdup, *n*—the amount of material present in the neck of the flask, in the sidearm of the flask, and in the condenser tube during the distillation. [D02.08] D 86

dynamic viscosity (η), *n*—the ratio between the applied shear stress and rate of shear of a liquid.

DISCUSSION—It is sometimes called the coefficient of dynamic viscosity or, simply, viscosity. Thus, dynamic viscosity is a measure of the resistance to flow or to deformation of a liquid under external shear forces.

DISCUSSION—The term dynamic viscosity can also be used in a different context to denote a frequency-dependent quantity in which shear stress and shear rate have a sinusoidal time dependence.

[D02.07] D 7042

ecotoxicity, *n*—the propensity of a material to produce adverse behavioral, biochemical, or physiological effects in non-human organisms or populations. [D02.N0] D 6046

effect load XX (ELXX), *n*—a statistically or graphically estimated loading rate of test material that is expected to cause one or more specified effects in XX % of a group of organisms under specified conditions for a specified time.

DISCUSSION—This terminology should be used for hydraulic fluids instead of the standard effect concentration (ECXX) when the hydraulic fluid is not completely soluble under test conditions.

[D02.N0] D 6046

effect load XX (ELXX), *n*—a statistically or graphically estimated loading rate of test material that is expected to cause one or more specified effects in XX % of a representative subpopulation of organisms under specified conditions.

DISCUSSION—This terminology should be used instead of the standard ECXX when the test material is not completely soluble at the test treat rates. [D02.12] D 6081