Designation: D 4790 – 99

Standard Terminology of Aromatic Hydrocarbons and Related Chemicals[1]

This standard is issued under the fixed designation D 4790; 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.

absorbance—the logarithm to the base 10 of the reciprocal of the relative transmittance, *T*, expressed as:

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

D 1840, D 2269, D 4053; D-2

accuracy—the agreement between the mean of a series of repeated measurements of a property and the accepted reference value of the property. **D 3980; D-1**

acidity—the number of milligrams of sodium hydroxide consumed when 100 mL of the sample are titrated under the conditions prescribed in this method. **D 847; D-16**

acid reaction—a characteristic of materials producing the acid-color of the indicator used under the conditions prescribed in this method. **D 847; D-16**

acid wash color—the color developed in the separated acid when a sample is agitated with sulfuric acid under the condition prescribed in this method. **D 848; D 2279; D-16**

aldehydes—a broad class of organic compounds having a generic formula RCHO, and characterized by a carbonyl group.

alkaline or basic reaction—a characteristic of the materials producing the alkalicolor of the indicator used under the conditions prescribed in this method. **D 847; D-16**

alpha-methylstyrene—2-phenylpropene (C_9H_{10}) mol weight 119.16; colorless liquid; subject to polymerization by heat or catalysts; freezing point, −23.21°C; boiling point, 165.38°C.

apparent density—the density calculated when the pycnometer is calibrated with water, weighed in air, and when the sample is weighed in air and no air buoyancy correction is used for either weighing, even though the density in vacuum of water is used in calculating the apparent volume of the pycnometer.

apparent density at 60°F—the weight in air of a unit volume of sample at 60°F; in this method, the weight is in pounds and the volume in U.S. liquid gallons. Average air in this method is assumed to have a density of 0.0012 g/cm^3.

DISCUSSION—This definition is not in conflict with that given in the current version of Definitions E 12. **D 2935; D-16**

at-line analysis—analytical procedure performed in a process environment using manually entered samples.

benzene—cyclohexatriene, benzol (obsolete) (C_6H_6) mol weight 78.11; clear, colorless, highly flammable liquid; characteristic odor; solidification point +5.5°C; boiling point 80.1°C.

benzene, carbon disulfide-free—benzene treated with alcoholic sodium hydroxide and used as a spectrophotometric reference standard.

benzene-535, refined—benzene with impurities limited to trace amounts by a solidification point of 5.35°C and having a total distillation range of no more than 1.0°C. Refer to Specification D 2359 for complete specifications.

benzene-545, refined—benzene with impurities limited to trace amounts by a solidification point of 5.45°C and having a total distillation range of no more than 1°C. Refer to Specification D 4734.

benzene-485, refined (nitration grade)—benzene with impurities limited by a solidification point of 4.85°C and having a total distillation range of no more than 1.0°C. Refer to Specification D 835 for complete specifications.

benzene, thiophene-free—benzene refined by special treatment and used as a reagent in ASTM standards.

bias—a persistent positive or negative deviation of a test method average value from the assumed or accepted true value. **D 1129; D 2777; D-19**

bromine index—the number of milligrams of bromine consumed by 100 g of sample under given conditions. **D 1492; D-16**

carbon disulfide (CS_2)—mol weight 76.14; clear, colorless, flammable, volatile liquid; boiling point, 45.6°C; freezing point, 111.6°C.

clear—free of turbidity.

cloud point of phenol—the temperature at which a separate phase forms when a homogeneous solution of phenol in water is allowed to cool at a prescribed rate from a temperature above that at which phase separation occurs. It may precisely be defined as follows: when a homogeneous solution of phenol and water is allowed to cool at a prescribed rate with stirring, the solution will show a slight cloudiness or turbidity as the cloud point is approached. On

[1] This terminology is under the jurisdiction of ASTM Committee D16 on Aromatic Hydrocarbons and Related Chemicals and is the direct responsibility of Subcommittee D16.05 on Editorial and Nomenclature.

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The boldface designations refer to the original source of the definition and the ASTM Technical Committee having jurisdiction.

further cooling, the cloudiness will increase rapidly and the thermometer bulb, which is centrally located in the test tube, will suddenly become invisible. The temperature at which the thermometer bulb becomes invisible is taken as the cloud point. **D 2147; D-16**

cloudy—qualitative expression of turbidity.

confidence limits—the limits on either side of the mean value of a group of observations which will, in a stated fraction or percent of the cases include the expected value. Thus the 95 % confidence limits are the values between which the population mean will be situated in 95 out of 100 cases. **D 3980; D-1**

copper corrosion—a qualitative indication of reactive impurities in aromatic hydrocarbons. An iridescent, gray, or black discoloration of polished copper strip is considered cause for rejection.

corrosive substance—*in Committee D-16 Standards*, material in industrial aromatic hydrocarbons that discolors or tarnishes polished copper.

cresol(s)—methyl phenol, hydroxymethyl benzene (C_7H_8O) mol weight 108.13; colorless, yellowish, brownish, yellow, or pinkish liquid; phenolic odor. Three isomeric cresols exist.

cresylic acids—commercial mixtures of phenolic materials which may include phenol, cresols, xylenols, and other alkylated phenols.

cumene—(C_9H_{12}) mol weight 120.19; clear, flammable liquid; melting point, −96.0°C; boiling point, 152.4°C.

cyclohexane-995—cyclohexane with a purity of 99.5 weight % minimum determined by analysis by gas chromatography. Refer to proposed specifications for complete requirements.

degrees of freedom—the number of observations minus the number of constraints imposed upon the system. In general, only one constraint (for example, the mean value) is imposed and the total degrees of freedom are one less than the number of observations. **D 3980; D-1**

density in air—the weight per unit volume in vacuum minus the weight of a volume of air equal to the difference between the volume of the sample and the volume of brass weights equivalent to weight in vacuum of the sample.

dry point temperature—the temperature observed immediately after the liquid just disappears from the bottom of the flask during a distillation test.

ethylbenzene (C_8H_{10})—mol weight 106.16; clear, colorless, flammable liquid; freezing point, −94.97°C; boiling point, 136°C.

evaporation residue—the nonvolatile impurities remaining after vaporizing a substance.

freezing point—the temperature at which the liquid and solid states of a substance are in equilibrium at a given pressure (usually atmospheric). For pure substances it is identical with the melting point of the solid form.**Lange, 10th Ed.**[2]

homologues of phenol—compounds of the phenol series whose structure differs regularly by some radical (for example, -CH_3) from that of its adjacent neighbor in the series. Also *cresols* and *xylenols.*

hydrogen sulfide (H_2S)—mol weight 34.08; flammable, poisonous gas with characteristic odor of rotten eggs.

industrial grade—a quality of aromatic hydrocarbons suitable for many industrial applications that have a tolerance for nonreactive impurities.

DISCUSSION—The classification covers intermediate levels of purity that may vary over a wide range for different materials.

inhibitor—a substance added to a material to retard or prevent deterioration.

initial boiling point—the temperature observed immediately after the first drop of distillate falls into the receiving cylinder during a distillation test.

isopropylbenzene—see **cumene**.

internal standard—a compound of known behavior added to a sample to facilitate the analysis. **D 2908; D-19**

ketones—a class of organic compounds possessing a carbonyl group attached to two hydrocarbon groups. Acetone is the first member of this series.

meta-xylene—1,3-dimethylbenzene (C_8H_{10}) mol weight 106.16; clear, colorless, flammable liquid; freezing point, −47.87°C; boiling point, 139.3°C.

moisture, atmospheric—ambient humidity that may be absorbed by hygroscopic material during sampling and testing and may lead to erroneous results.

molten state—the liquid phase of a solid substance existing above its melting point temperature.

naphtha, aromatic solvent—a concentrate of aromatic hydrocarbons including C_8, C_9 and C_{10} homologs.

DISCUSSION—Distillation end point of individual grades varies between 155 and 220°C to provide a range of volatility and solvency characteristics. Color of solvents is water-white to dark red depending on refining treatment.

naphthalene ($C_{10}H_6$)—mol weight 128.16; monoclinic prismatic plates; commercially available as white scales, powder, balls, or cakes; odor of moth balls; solidification point, 80.1°C; sublimes above melting point.

nonaromatic hydrocarbons—one or more types of hydrocarbons identified as paraffins, cycloparaffins (naphthenes), and olefins. Generally, the saturated types, paraffins and cycloparaffins, constitute the impurities in the commercial grades of aromatic hydrocarbons.

nonvolatile matter—the oily, gummy, or resinous residue remaining after evaporating volatile hydrocarbon materials.

on-line analysis—analytical procedure performed in a process environment using automatic or continuous sampling.

ortho-xylene—1,2-dimethylbenzene (C_8H_{10}) mol weight 106.16; clear, colorless, flammable liquid; freezing point, −25.18°C; boiling point, 144°C.

para-xylene—1,4-dimethylbenzene (C_8H_{10}) mol weight 106.16; clear, colorless, flammable liquid; freezing point, 13.26°C; boiling point, 137 to 138°C.

[2] Lange, N. A., *Handbook of Chemistry,* 10th Ed., McGraw Hill Book Co. Inc., New York, NY.