



Designation: D6384 – 19

# Standard Terminology Relating to Biodegradability and Ecotoxicity of Lubricants<sup>1</sup>

This standard is issued under the fixed designation D6384; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This terminology covers definitions relating to biodegradability and ecotoxicity of lubricants.

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

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

**D5864** Test Method for Determining Aerobic Aquatic Biodegradation of Lubricants or Their Components

**D6139** Test Method for Determining the Aerobic Aquatic Biodegradation of Lubricants or Their Components Using the Gledhill Shake Flask

## 3. Terminology

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

**D6139**

**aerobic**, *adj*—(1) taking place in the presence of oxygen; (2) living or active in the presence of oxygen.

**D6139**

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

**D5864**

DISCUSSION—Biodegradation is only one mechanism by which materials are transformed in the environment.

<sup>1</sup> This terminology is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of D02.12 on Environmental Standards for Lubricants.

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

**biomass**, *n*—biological material including any material other than fossil fuels which is or was a living organism or component or product of a living organism.

DISCUSSION—In biology and environmental science, biomass is typically expressed as density of biological material per unit sample volume, area, or mass (g biomass / g (or / mL or / cm<sup>2</sup>) sample); when used for products derived from organisms biomass is typically expressed in terms of mass (kg, MT, etc.) or volume (L, m<sup>3</sup>, bbl, etc.).

DISCUSSION—Products of living organisms include those materials produced directly by living organisms as metabolites (for example, ethanol, various carbohydrates and fatty acids), materials manufactured by processing living organisms (for example, pellets manufactured by shredding and pelletizing plant material) and materials produced by processing living organisms, their components or metabolites (for example, transesterified oil; also called biodiesel).

**blank**, *n*—in biodegradability testing, a test system containing all system components with the exception of the test material.

**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.

**ecotoxicity**, *n*—the propensity of a test material to produce adverse behavioral, biochemical, or physiological effects in non-human organisms or populations.

**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.

**environmental compartment**, *n*—a subdivision of the environment based on physical or chemical properties, or both.

DISCUSSION—Examples of environmental compartments are aerobic fresh water, aerobic marine, aerobic soil, and anaerobic media. The results of test procedures may be applied to environmental compartments, but the test systems do not constitute an environmental compartment.

**fresh water environment**, *n*—in ecotoxicity testing, the aerobic, aqueous compartment, characteristically with a sodium chloride content of less than 5.0 g/kg (0.5 wt%).

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

**good laboratory practices (GLP)**, *n*—guidelines for the management of laboratory experiments which are published by regulatory agencies or other recognized groups, and are concerned with the organizational process and the conditions under which laboratory studies are planned, performed, monitored, recorded, and reported.

DISCUSSION—The major GLPs used are USEPA-TSCA, USFDA, OECD, and to some extent, the MITI version from Japan, for submissions in Japan.

**inhibition load XX (ILXX)**, *n*—a statistically or graphically estimated loading rate of test material that is expected to cause a XX % inhibition of a biological process (such as growth or reproduction) of a representative subpopulation of organisms under specified conditions and is expressed as an analog as opposed to digital measure.

DISCUSSION—An example of a digital measure would be alive/dead. This terminology (ILXX) should be used instead of the standard ICXX when the test material is not completely soluble at the test treat rates.

**inoculum**, *n*—living spores, bacteria, single celled organisms, or other live materials that are introduced into a test medium.

**lethal load XX (LLXX)**, *n*—a statistically or graphically estimated loading rate of test material that is expected to be lethal to XX % of a representative subpopulation of organisms under specified conditions.

DISCUSSION—This terminology should be used for lubricants instead of the standard LCXX to designate that the material is not completely soluble at the test treat rates.

**microbial degradation**, *n*—synonym for biodegradation.

**mixed liquor**, *n*— *in sewage treatment*, the contents of an aeration tank including the activated sludge mixed with primary effluent or the raw wastewater and return sludge.

**pre-adaptation**, *n*—the incubation of an inoculum in the presence of the test material which is done prior to the initiation of the test and under conditions similar to the test conditions.

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**salt water**, *n*—the aerobic, aqueous compartment, characteristically with a salinity equal to or greater than five parts per thousand.

**sonication**, *n*—the act of subjecting a material to the shearing forces of high-frequency sound waves.

DISCUSSION—Sonication of a two-phase liquid system may result in the dispersal of one phase as fine droplets in the other phase.

**supernatant**, *n*—the liquid above settled solids.

**terrestrial (or soil) environment**, *n*—the aerobic environmental compartment which is found in and on natural soils.

**theoretical CO<sub>2</sub> (carbon dioxide)**, *n*—the amount of carbon dioxide which could hypothetically be produced from the complete biological oxidation of all the carbon in a material.

DISCUSSION—The appropriate abbreviation is ThCO<sub>2</sub>.

**theoretical O<sub>2</sub> (oxygen)**, *n*—the amount of oxygen that would theoretically be required to completely oxidize a material.

DISCUSSION—The appropriate abbreviation is ThO<sub>2</sub>.

**toxicity**, *n*—the propensity of a test material to produce adverse behavioral, biochemical, or physiological effects in a living organism.

**ultimate biodegradation**, *n*—degradation achieved when the test material is totally utilized by microorganisms, resulting in the production of carbon dioxide (and possibly methane, in the case of anerobic biodegradation), water, inorganic compounds, and new microbial cellular constituents (biomass or secretions, or both).

**water accommodated fraction (WAF)**, *n*—the predominantly aqueous portion of a mixture of water and a material poorly soluble in water which separates in a specified period of time after the mixture has undergone a specified degree of mixing and which includes water, dissolved components, and dispersed droplets of the poorly water soluble material.

DISCUSSION—The composition of the WAF depends on the ratio of poorly soluble material to water in the original mixture as well as on the details of the mixing procedure.

**water soluble fraction (WSF)**, *n*—the filtrate or centrifugate of the water accommodated fraction which includes all parts of the WAF except the dispersed droplets of the poorly soluble material.

## SUMMARY OF CHANGES

Subcommittee D02.12 has identified the location of selected changes to this standard since the last issue (D6384 – 18) that may impact the use of this standard. (June 1, 2019.)

(1) Deleted definitions for ultimate biodegradation test and wppm.

Subcommittee D02.12 has identified the location of selected changes to this standard since the last issue (D6384 – 17) that may impact the use of this standard. (June 1, 2018.)

(1) Revised definitions for fresh water environment and theoretical O<sub>2</sub>.