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Uniform Terminology for Agricultural Waste and By-Product Management

Proposed by the ASAE Rural Waste Disposal Committee; reviewed by the ASAE Structures and Environment Division Technical Committee, ASAE Water Treatment and Use Committee, and the USDA North Central Region Committee on Farm Waste Disposal; approved by the Structures and Environment Division Technical Committee; adopted by ASAE as a Recommendation December 1965; reconfirmed December 1970, December 1971; revised March 1973; revised and reclassified as a Standard December 1977; reconfirmed December 1982; revised June 1983, March 1987; reconfirmed December 1992; revised October 1994; reaffirmed for two years December 1999; reaffirmed December 2001, February 2004, February 2009; November 2013; revised September 2019.

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1 Purpose and Scope

1.1 The terminology reported herein is intended to establish uniformity in terms used in the field of organic waste and by-product management and to serve as a guideline for developing current, new terminology and definitions. Terms and definitions were adopted from related fields where applicable.

1.2 Standard procedures for the determination of values for many of the terms defined herein may be found in Standard Methods for the Examination of Water and Wastewater, American Public Health Association, Washington, D.C.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies unless noted. For undated references, the latest approved edition of the referenced document (including any amendments) applies.

APHA, Standard Methods for the Examination of Water and Wastewater.

3 Definitions

3.1 activated sludge process: A biological wastewater treatment process in which a mixture of wastewater and biological solids is agitated and aerated. The resulting biological solids are subsequently separated from the wastewater by settling and wasted or returned to the process as needed. The mixture is called mixed liquor, and the mass of settled solids is the active sludge.

3.2 absorption: The taking or soaking up of one substance into the body of another.

3.3 adsorption: The adherence of gas, liquid, or dissolved materials to the surface of solids through physical or electrochemical attachment.

3.4 aerobic bacteria: Bacteria that require free molecular oxygen for their growth needs.

3.5 aerobic decomposition: Reduction of the net energy level of organic matter by microorganisms (aerobic microorganisms) in the presence of dissolved oxygen.

3.6 aerobic lagoon: (See lagoon and oxidation pond).

3.7 aeration: A process forcing intimate contact between air (or oxygen) and a liquid or solid organic material by one or more of the following methods:

- Spraying the liquid in the air;
- Bubbling air through the liquid;
- Mixing the liquid to promote absorption of oxygen through the air liquid interface;
- Mechanical stirring or turning solid materials to promote movement of air or oxygen through the bulk of the materials;
- Forcing air through a pile of solid materials using mechanical devices, such as fans/blowers.

3.8 aerator: A mechanical device used to supply oxygen or air to water, wastewater, sludge, or manure in a tank or lagoon.

3.9 aerosol: A system of colloidal particles dispersed into air or gas, e.g., smoke or fog.

3.10 agitation: The turbulent mixing of liquids and slurries.

3.11 agricultural wastes: Wastes associated with the production and processing of food and fiber on farms, feedlots, ranches, ranges, and forests. Examples include animal manure, crop residues, animal mortalities, runoff from feedlots, process wastewater, and agricultural chemicals and their packaging/containers.

3.12 agricultural residue: A remaining part from the production and processing of food and fiber on farms, feedlots, ranches, ranges, and forests which may include animal manure and crop residue materials (see agricultural wastes).

3.13 algae: A group of diverse organisms ranging from microscopic cyanobacteria to giant kelp, capable of converting sunlight into energy using photosynthesis, like plants.

3.14 alkalinity: The capacity of water to neutralize acids; a property imparted by the water's content of carbonates, bicarbonates, hydroxides, and occasionally borates, silicates, and phosphates. It is expressed in milligrams per liter of equivalent calcium carbonate.

3.15 ammonification: The biochemical process whereby organic nitrogen is converted to ammoniacal nitrogen.

3.16 anaerobic bacteria: Bacteria that do not require free molecular or dissolved oxygen to grow. This group of bacteria includes facultative anaerobes that can be active in the presence of dissolved oxygen, but do not require it; and obligate anaerobes that do not require any form of oxygen to grow.

3.17 anaerobic decomposition: Reduction of the net energy level of organic matter by anaerobic microorganisms in the absence of free molecular oxygen.

3.18 anaerobic digestion: Conversion of organic matter by microorganisms in the absence of oxygen under controlled conditions to soluble organic acids, hydrogen, and alcohols, and subsequently to gases, such as methane and carbon dioxide.

3.19 bacteria: A group of universally distributed, rigid, essentially unicellular prokaryotic microorganisms. Bacteria usually appear as spheroid, rod-like or curved entities, but occasionally appear as sheets, chains, or branched filaments.

3.20 biochemical oxygen demand, BOD: The quantity of oxygen used by bacteria while stabilizing decomposable organic matter under aerobic conditions.

- 3.21 biogas:** Gaseous product of anaerobic digestion that consists of methane, carbon dioxide, nitrogen, water vapor, and small amounts of other gases.
- 3.22 biological oxidation:** The process whereby living organisms aerobically convert organic matter into a less complex or mineral form.
- 3.23 biological wastewater treatment:** Forms of wastewater treatment in which bacterial or biochemical action is managed to stabilize or oxidize the unstable organic matter present. Oxidation ditches, aerobic lagoons, anaerobic lagoons, anaerobic digesters, and aerobic digesters are examples.
- 3.24 biomass:** Living or dead organic matter grown either by photosynthetic conversion of solar energy into plants, algae, etc., or degradation of such biomass during waste treatment, i.e., the microbial biomass produced during the degradation of organic matter.
- 3.25 bioremediation:** Use of living organisms to degrade organic materials, spills or remove other pollutants from soil, water or wastewater.
- 3.26 biosolids:** Solids organic matter recovered from wastewater or water treatment that can be beneficially used especially as a fertilizer. Biosolids are solids that have been stabilized within the treatment process, whereas sludge has not.
- 3.27 black water: Wastewater containing** liquid (urine) and solid (feces) human waste and the associated water generated by toilet use.
- 3.28 bulk density:** The ratio of the mass of material to its bulk volume, usually expressed in kilograms per cubic meter or pounds per cubic foot.
- 3.29 carbon-nitrogen ratio, C/N:** The weight ratio of carbon to nitrogen in organic matter.
- 3.30 cesspool:** A designed underground pit (partially lined or unlined) into which raw animal and/or household wastewater is discharged and from which liquid seeps into the surrounding soil. The purpose is to infiltrate the wastewater into the surrounding soil. No longer considered as environmentally adequate in most instances.
- 3.31 chemical oxidation:** Oxidation of organic substances without action of living organisms.
- 3.32 chemical oxygen demand, COD:** A measure of the oxygen-consuming capacity of inorganic and organic matter present in water or wastewater. It is expressed as the amount of oxygen consumed by a chemical oxidant in a specified test. It does not differentiate between stable and unstable organic matter and thus does not necessarily correlate with biochemical oxygen demand.
- 3.33 chlorination:** The application of chlorine to water, sewage, or industrial wastes, generally as a disinfectant.
- 3.34 coagulation:** In water and wastewater treatment, the aggregation of colloidal, finely divided suspended matter and/or bacterial cells by the addition of a floc-forming chemical or by biological processes (also see flocculation).
- 3.35 coliform-group bacteria:** A group of long-living bacteria predominantly inhabiting the intestines of warm-blooded animals that are also found in soil. It includes all aerobic and facultative anaerobic, gram-negative, non-spore-forming bacilli that ferment lactose with production of gas. This group of “total” coliforms include *Escherichia coli*, which is considered the typical form of fecal origin. The fecal coliforms are often used as an indicator of the potential presence of pathogenic organisms.
- 3.36 colloidal matter:** Fine suspended solids in solution that will not settle but may be removed by coagulation, biochemical action, or membrane filtration.
- 3.37 composting:** Biological degradation of organic solids under predominately aerobic conditions to a relatively stable humus-like material called compost.

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