THESAURUS ON RESOURCE RECOVERY TERMINOLOGY

Sponsored by
ASTM Committee E-38 on
Resource Recovery

ASTM SPECIAL TECHNICAL
PUBLICATION 832
Herbert I. Hollander
Sanders and Thomas, Inc.
editor

ASTM Publication Code Number (PCN)
04-832000-16

STM 1916 Race Street. Philadelphia. Pa 19103

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EDITOR'S PREFACE

This Thesaurus is a compendium of terms identified as useful to those involved or interested in recovering the resources in the solid wastes discarded by communities, institutions, commercial enterprises, and industry. The terms included were selected to readily permit communication and understanding between producers of commodities recovered from waste materials and the users of these commodities. To provide the greatest utility, this compilation of terms also recognizes the need of those individuals or associations who have yet to become involved in resource recovery, particularly non-technical managers in industry and government and the public at large.

This screened compilation is the result of the many contributions generously provided by an impressive group of dedicated educators, engineers, scientists, and managers representing industry, government, academia, and the public, all deeply interested and committed to the idea that practical recovery of material and energy resources from wastes can be a commercial reality. This publication is the result of the vigorous activity of ASTM Committee E-38 on Resource Recovery.

The following individuals provided major contributions to the activity of Subcommittee E-38.93 on Terminology in developing this thesaurus:

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The time and effort generously provided by all members of E-38 which resulted in this publication is acknowledged.

Herbert I. Hollander
Sanders & Thomas, Inc., Chairman,
ASTM Subcommittee E-38.93 on
Terminology.

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Carlton C. Wiles, Project Officer

THESAURUS FORMAT

The thesaurus is structured into three sections to provide greater flexibility in its use:

Thesaurus—Composite
Thesaurus—Sector
Thesaurus—Generic

Thesaurus—Composite has all compiled terms arranged alphabetically. Preceding the definition of each term there is one or more "letter" designations in a parenthesis ( ). These letters denote the "use sector" of the term.

Sector Legend
CM—Construction Materials
E —Energy
F —Ferrous
G —Glass
H —Health and Safety
NF —Nonferrous
O —Oil
P —Paper
S —Sludge
U —Unit Processes
X —Generic

An asterisk appears before a term to denote that the definition was drawn from the published compilation of ASTM Standard Definitions. When a term is defined in a standard developed by ASTM E-38, the number of that particular adopted standard is displayed in parenthesis.

Thesaurus—Sector is an alphabetical assembly of terms by Sector. Included for each Sector are those generic terms, denoted by (x) which were considered to be of particular interest to that Sector.

Thesaurus—Generic is an alphabetical assembly of terms considered to be generally applicable or of interest to all Sectors.

RELATED ASTM PUBLICATIONS

Standardization of Technical Terminology: Principles and Practices, STP 806 (1983), 04-806000-42

Hazardous and Solid Waste Testing: Second Symposium, STP 805 (1983), 04-805000-16

Hazardous Solid Waste Testing: First Conference, STP 760 (1982), 04-760000-16

Resourse Recovery and Utilization, STP 592 (1975), 04-592000-41

Compilation of ASTM Standard Definitions—1982 Edition, 03-001082-42

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THESAURUS — COMPOSITE OF ALL TERMS

SECTOR LEGEND

CM - CONSTRUCTION MATERIALS
E - ENERGY
F - FERROUS
G - GLASS
H - HEALTH AND SAFETY
NF - NONFERROUS
O - OIL
P - PAPER
S - SLUDGE
U - UNIT PROCESSES
X - GENERIC TERMS

(*) Denotes definitions originating from compilation of ASTM standard definitions.

#1 MIXED PAPER (P) consists of a baled mixture of various qualities of paper containing less than 25% of groundwood stock, coated or uncoated.

#1 NEWS (P) consists of baled newspapers containing less than 5% of other papers.

#1 USED BROWN KRAFT BAGS (P) consists of baled brown kraft bags free of objectionable liners or contents.

#2 BUNDLES (F) old block and galvanized sheet metal scrap, hydraulically compressed and weighing not less than 75 pounds per cubic foot. May not include tin or lead coated material or vitreous enameled material.

ABANDONED VEHICLES (X) automobiles, buses, trucks and trailers that are no longer useful as such and have been left on city streets and other public places.

ABRASION (E,U) the removal of surface material from any solid through the frictional action of another solid, a liquid, or a gas or combination thereof. See Corrison, Erosion.

ABSORBENCY (P) property of a paper to imbibe liquids.

ACCURACY (E) the agreement between an experimentally determined value and the accepted reference value. See ASTM E180.

ACCURACY (X) the agreement between a determined value and the accepted reference value, e.g. Freedom from bias. See Bias, Precision.

ACTINOMYCETES (E) a large group of moldlike microorganisms that give off an odor characteristic of rich earth. These are the significant organisms involved in the stabilization of solid wastes by composting.

AERATION (E) the process of exposing a bulk material such as compost to air, or of charging a liquid with a gas or a mixture of gases.

AEROBIC DIGESTION (S) the breakdown of organic components by microbal action in the presence of oxygen. See Anerobic Digestion.

AEROBIC RESPIRATION (S) oxidation of organic compounds by oxygen.

AEROSOL (H) an airborne suspension of fine solid or liquid particles; includes dusts, fumes, smokes, mists and fogs.

AFTER-BURNER (E) a device used to burn or oxidize the combustible constituents remaining in effluent gases to destroy smoke and odors. see secondary combustion chamber.

AGGREGATE (CM,E,F,G) a granular material of mineral composition such as sand, gravel, shell, slag, or crushed stone used with a cementing medium to form mortars or concrete, or alone as in base courses, railroad ballasts, etc.

AGRICULTURAL WASTES (X) See Solid Wastes.

AIR CLASSIFICATION (NF,U) process utilizing an air stream to separate materials by differences in density and aerodynamic properties. See Elutriation, Gravity Seperation.

AIR CLASSIFIER (E,F,NF,U) a mechanical device using air currents to separate solid components into "light-fraction" or "heavy-fraction". See Air Knife, Elutriation, Gravity Separation.

AIR DEFICIENCY (E) a lack of air, in an air-fuel mixture to supply the quantity of oxygen required to completely oxidize the fuel.

AIR DENSITY SEPARATOR (ADS) (NF) See Air Classifier.

AIR DRY (P) Paper or paperboard is air dry when its moisture content is in equilibrium with atmospheric conditions to which it is exposed. According to trade custom, air dry pulps are assumed to contain 10 percent moisture, and are sold on this basis.

AIR EMISSIONS (E,F) airborne solid particulates (such as unburned carbon), gaseous pollutants (such as oxides of nitrogen or sulfur) or odors emanating from any of a broad variety of sources.

AIR HEATER (E) a heat exchanger through which air passes and is heated by a medium of a higher temperature, such as hot combustion gases or steam.

AIR JETS (E) streams of high-velocity air that issue from nozzles in a furnace enclosure to provide turbulence, combustion air, or a cooling effect.

AIR KNIFE (F,NF,U) jargon for a blower device intended to separate steel cans from more massive pieces of iron and steel. Experimentation is required to discover the best design and location for application.

AIR PERMEABILITY (P) property that allows passage of air through a mass.

AIR POLLUTION (E,H) the presence of unwanted material in the air, which includes any material present in sufficient concentrations for a sufficient time, and under circumstances to interfere significantly with the comfort, health or welfare of persons, or with the full use and enjoyment of property.

AIR PREHEATER (E) See Air Heater.

AIR QUALITY STANDARDS (E) regulatory levels above which specific substances must be kept from discharge into the atmosphere.

ALCOVE (G) a narrow channel through which molten glass is conveyed.

ALKALI (G) the oxide of sodium or potassium; less frequently of lithium.

ALUMINUM BRONZE (NF) copper aluminum alloys, 4 to 11% aluminum. High tensile strength, cast or cold worked, resists corrosion.

ALUMINUM SCRAP, MUNICIPAL (NF) See Municipal Aluminum Scrap.

ALUMINUM TURNINGS (NF) oily aluminum chips produced by machining operations.

ALUMINUM, BRASS (NF) brass to which aluminum has been added to improve resistance to corrosion.

AMBIENT AIR (X) the surrounding air.

AMPOULE (G) a glass container designed to be sealed by fusion of the glass neck.

ANAEROBIC (E) able to live and grow in the absence of free oxygen.

ANAEROBIC DIGESTION (S) the breakdown of organic components by microbial components in the absence of oxygen. See Aerobic Digestion.

ANAEROBIC RESPIRATION (X) a type of respiration among some bacteria in which an inorganic oxidant (NO3,SO4) other than oxygen is used.

ANALYSIS (X) the ascertainment of the identity and/or concentration, or both, of the constituents or components of a sample.

ANALYTICAL PARAMETERS:-FUELS (E)

AS-DETERMINED BASIS - data representing the numerical values obtained for a particular moisture and/or ash content, in the sample at the time of measurement.

AS-RECEIVED BASIS - analytical data calculated to the moisture condition of the sample is as it arrived at the laboratory and before any processing or conditioning.

ASH - inorganic residue remaining after ignition of combustible substances. The analyses of ash for commonly determined major elements by prescribed methods for the oxides of silicon, aluminum, iron, titanium, phosphorus, calcium, sodium and potassium. Other elements such as the heavy metals may be included in these analyses. See inherent ash, extraneous ash.

ASH FLUID TEMPERATURE (FT) - the temperature at which the fused mass has spread out in a nearly flat layer with a maximum height of 1/16 inch (1.6mm). (EDS-23)

ASH HEMISPHERICAL TEMPERATURE (HT) - the temperature at which the cone has fused down to a hemispherical lump at which condition the height is one half the width of the base.

ASH INITIAL DEFORMATION TEMPERATURE (IT) - the temperature at which the first rounding of the apex of the triangular pyramid (cone) occurs. (the cone is prepared from the ash of a sample.)

ASH SOFTENING TEMPERATURE (ST) - the temperature at which the cone of ash has fused down to a spherical lump in which the height is equal to the width at the base.

DECIMAL PERCENT - percentage expressed in decimal form, ie: 8.12% = 0.0812 decimal percent.
DRY BASIS - analytical data calculated to a theoretical base of no moisture associated with the sample. The numerical value (residual moisture value) is used for converting the as-determined data to a dry basis.
DRY, ASH-FREE BASIS - analytical data calculated to a theoretical base of no moisture or ash associated with the sample. Numerical values (air-dry loss, residual moisture, and ash content) are used for converting the as-determined data to a moistureand ash-free basis.
HIGHER HEATING VALUE (HHV) - the heat produced by combustion of a unit quantity at constant volume, in an oxygen bomb calorimeter under specified conditions. Also known as gross calorific value.
PROXIMATE ANALYSIS - the determination by prescribed methods of moisture, volatile matter, fixed carbon (by difference), ash and usually heating value.
ULTIMATE ANALYSIS OF FUELS - the elemental chemical analysis of a solid, liquid, or gaseous fuel. In the cases of coal, coke, or solid waste, the percentages in a dry sample of carbon. Hydrogen, sulfur, nitrogen, ash and chlorine are usually determined. Oxygen is obtained by subtracting the total of the other elements from 100.
VOLATILE MATTER - those products, exclusive of moisture, given off by a material as gas or vapor, determined by definite prescribed methods which may vary according to the nature of the material (EDS-24).

ANALYTICAL PARAMETERS:-LABORATORY (CM,E,F,G,NF,O,P,S)
AIR DRY LOSS - that moisture gain or loss from a sample that has been partially dried to bring its moisture content close to equilibrium with the atmosphere in the room in which further reduction and division of the sample is to take place.
AIR DRYING - a process of partial drying of the sample to bring its moisture content near to equilibrium with atmosphere in the room in which further reduction, division and characterization of the sample are to take place.
ANALYSIS SAMPLE - final subsample prepared from the air dried laboratory sample but reduced by passing through a mill with a 0.5 mm (0.02 in.) size or smaller final screen.
BIAS - a systematic error that is consistently negative or consistently positive. The mean of errors resulting from a series of observations that does not tend toward zero.
GROSS SAMPLE - a sample representing one lot and composed of a number of increments on which neither reduction nor division has been performed.
LABORATORY SAMPLE - a representative portion of the gross sample recieved by the laboratory for further analysis.
PRECISION - the capability of a person, an instrument or a method to obtain reproducible results; specifically, a measure of the random error as expressed by the variance, the standard error or a multiple of the standard error.
REPRESENTATIVE SAMPLE - a sample collected in such a manner that it has characteristics equivalent to the lot sample.
RESIDUAL MOISTURE - that moisture remaining in the sample after determining air-dry loss.

RESIDUAL MOISTURE - the moisture content remaining in the sample after it has been milled down to an analysis sample. Prior to milling, the sample should have been subjected to either a total moisture determination (single stage) or an air drying procedure (E790-81).
SAMPLE DIVISION - the process of extracting a smaller sample from a sample so that the representative properties of the larger sample are retained. During this process it is assumed that no change in particle size or other characteristics occurs.
SAMPLE PREPARATION - the process of that includes drying, size reduction, division, and mixing of a laboratory sample for ths purpose of obtaining an unbiased analysis sample.
SAMPLE REDUCTION - the process whereby sample particle size is reduced without change in sample weight.
SIGNIFICANT LOSS - any loss that introduces a bias in final results that is of appreciable importance to concerned parties (E790-81).
SIZE CONSIST - the particle size distribution of a product (to be consistent with standard method of sieve analysis (E828-81).
TOTAL MOISTURE - that moisture determined as the loss in weight in an air atmosphere under rigidly controlled conditions of temperature, time and air flow. Total moisture is calculated from the air dry loss and the residual moisture (EDS-6).
TOTAL MOISTURE - the weight loss resulting from drying a sample to constant weight in an oven usually maintained between 103 and 107 deg C.

ANGLE OF REPOSE (F,G,CM,NF,S,P) the maximum acute angle that the inclined surface of a pile of loosely divided material naturally makes with the horizontal.

ANIMAL SIZE (P) gelatinous size from animal hides used in papermaking.

ANNEAL (G) to prevent or remove objectionable stresses in glassware by controlled cooling from a suitable temperature.

ANNEALING POINT (G) the temperature corresponding to a rate of elongation of 0.0136 cm/min when measured by the method of test for annealing point and strain point of glass (ASTM C 336).

ANNEALING RANGE. (G) the range of glass temperature in which stresses in glass articles can be relieved at a commercially desirable rate. For purposes of comparing glasses, the annealing range is assumed to correspond with the temperatures between the annealing point and the strain point.

* AQUIFER (X) a water-bearing formation that provides a ground water reservoir.

ARCH (E,F,G,NF,S)
DROP - a form of construction that supports a vertical refractory furnace wall and serves to deflect gases downward.
FURNACE - a nearly horizontal structure that extends into a furnace and serves to deflect gases.
IGNITION - a refractory furnace arch or surface located over a fuel bed to radiate heat and to accelerate ignition.

AS-DETERMINED BASIS (E) See Analytical Parameters - Fuels.

AS-RECEIVED BASIS (E) See Analytical Parameters: - Fuels.

ASH (E) See Analytical Parameters - Fuels.

ASH (X) see solid waste.

* ASH (E,X) (E830-81) inorganic residue remaining after ignition of combustible substances. Quantity determined by definite prescribed methods. Ash may not be identical, in composition or quantity, with the inorganic substances present in the material before ignition. Also see inherent ash, extraneous ash.

ASH FLUID TEMPERATURE (FT) (E) See Analytical Parameters - Fuels.

ASH HEMISPHERICAL TEMPERATURE (HT) (E) See Analytical Parameters - Fuels.

ASH INITIAL DEFORMATION TEMPERATURE (IT) (E) See Analytical Parameters - Fue

ASH PIT (E) a pit or hopper located below a furnace where the residue from combustion is accumulated and from which it is removed.

ASH SLUICE (E) a trench or channel in which water flushes residue from an ash pit to a storage or disposal point.

ASH SOFTENING TEMPERATURE (ST) (E) See Analytical Parameters - Fuels.

ASH-BOUND (INHERENT) (E,X) See Inherent Ash

ASH-EXTRANEOUS (E,x) See Extraneous Ash. Also see Inherent Ash.

ASH-FREE BASIS (E) (E791-81) the method whereby the weight of ash in a fuel sample is subtracted from total fuel weight and the adjusted weight is used to calculate the percent of other constituents present in the sample. Example, the percent of fixed carbon (FC) on an ash-free basis is computed as follows:

$$\frac{\text{FC (Weight) X 100}}{\text{FUEL SAMPLE (Weight) - ASH (Weight)}} = \text{ASH-FREE FC}$$

AUXILIARY EQUIPMENT (X) accessory equipment necessary for the operation of a process train.

AUXILIARY FUEL FIRING EQUIPMENT (E) equipment to supply additional heat, by the combustion of a supplementary fuel, for the purpose of attaining temperatures sufficiently high to (1) dry and ignite the waste materials, (2) maintain ignition thereof (3) maintain equilibrium of combustion process in response to system demand. (4) promote complete combustion of combustible solids, vapors and grease.

AVENTURINE (G) glass containing colored, opaque spangles of nonglassy material.

AVERAGE DEMAND (X) See Demand, average.

B.O.D. (BOD) (X) biochemical oxygen demand of sewage, industrial waste, leachate or polluted water. It is the amount of molecular oxygen required to stabilize the decomposable matter present by aerobic biochemical action.

B.T.U. (X) See British Thermal Unit.

BACK-END MATERIALS RECOVERY (F,NF) an engineered system that provides for collection of discrete reusable materials from mixed wastes which have been burned or treated.

BACK-END-SYSTEM (X) a combination of system components that changes the chemical properties of the waste and/or converts its components into energy or compost. See Front-end System.

BACKFILL (X) the material used to refill a ditch or other excavation, or the process of doing so.

BACKHOE TAMPING (X) a processing step, often used in direct-dump transfer systems, in which a conventional backhoe is used to compact waste contained in an open-top transfer trailer.

BACTERIA (X) single-cell, microscopic organisms. They may be aerobic, anaerobic or faculative.

* BAFFLE (F,E,G) a construction used to close or deflect the deliver/ of a moving substance.

BAFFLE CHAMBER (E) a chamber following the combustion chamber, in which baffles change the direction of and/or reduce the velocity of the combustion gases in order to promote the settling of fly ash or coarse particulate matter.

BAFFLE MARK (G) mark or seam on bottle resulting from a mold joint between blank mold and baffle.

BAGASSE (E) the fibrous residue that remains after juice is extracted from sugar cane or sugar beets.

BAIT (G) the tool dipped into molten glass to start any drawing operation.

BALE (paper) (P) standard size bale of reusable paper, 72" by 32" by 28", weighing 900 to 1000 pounds.

BALER (E,F,U) a machine used to compress and bind materials together.

BALLED (F,U) describes municipal ferrous scrap which has been processed by a machine so that individual particles have been formed into tight, high density "balls" or "nuggets".

BARIDEX (CM) a quantitative method for determining the amount of Ba CO3 required to combine the water soluable sulfates in clays of shales.

BASE LOAD (E) the minimum load over a given period of time.

BASE LOAD STATION (E) an electric generating plant which is normally operated to take all or part of the base load of a system and, consequently operates at a constant output.

BATCH (G) the raw materials properly proportioned and mixed, for delivery to the furnace.

BATCH HOUSE (G) the place where batch materials are received, handled, weighed, and mixed, for delivery to melting units.

BEAD (G) (1) an enlarged, rounded edge of a tumbler or other glass article, or any raised section extending around the article. (2) a small piece of glass tubing used around a lead wire.

BEARING CAPACITY (E) the maximum load that a material can support before failing.

BEDDING, ANIMAL (X) material, usually organic, that is placed on the floor of livestock quarters for animal comfort and to absorb excreta.

BENDING STRENGTH (P) ability of a sheet to bend but not crease.

BENT GLASS (G) flat glass that has been shaped while hot into cylindrical or other curved shapes.

BIAS (E) a constant or systematic error as opposed to a random error. See Analytical Parameters: Laboratory. See ASTM E180.

BIOCHEMICAL OXYGEN DEMAND (BOD) (P) a measure of the amount of oxygen used by micro-organisms to break down organic waste materials in water.

BIODEGRADABLE (X) denotes a physical and/or chemical structure of a material capable of being incorporated into the environmental processes through the action of microorganisms.

BIOGASIFICATION (X) a resource recovery process for the extraction of methane resulting from anaerobic decomposition of organic material.

BIOMASS (E,P,U) the living material in a botanical ecosystem. Organic residue from the processing of agricultural and forestry products, and consumer discards.