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An American National Standard

Standard Terminology Relating to the Examination of Explosives[1]

This standard is issued under the fixed designation E3196; 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.

1. Scope

1.1 This is a compilation of terms and corresponding definitions related to the analysis of explosives. Legal or scientific terms that are generally understood or defined adequately in other readily available sources may not be included.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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 *NFPA Document:*[2]

NFPA 921 Guide for Fire & Explosion Investigations, 2017 edition

3. Significance and Use

3.1 These terms have particular application to explosives analysis. In addition, several sources of definitions were used in the development of this terminology: *Hawley's Condensed Chemical Dictionary, Sixteenth Edition* (1);[3] *Practical Bomb Scene Investigation, Third Edition* (2); *Forensic Investigation of Explosions* (3); *Chemistry of Pyrotechnics, Third Edition* (4); *Explosives, Seventh Completely Revised and Updated Edition* (5); *Dictionary of Explosions & Explosives* (6); PICATINNY *Encyclopedia of Explosives and Related Items* (7, 8); *Merriam-Webster.com Dictionary* (9); and *DOD Dictionary of Military and Associated Terms* (10). A suitable definition was developed after all of the sources were found wanting.

4. Terminology

activation energy, *n*—the amount of energy needed to take the starting materials from their reasonably stable form at 25°C and convert them to a reactive, higher-energy excited state.

Conkling and Mocella (4), p. 40

alloy, *n*—a solid or liquid mixture of two or more metals, or of one or more metals with certain non-metallic elements, as in carbon steels.

Hawley's Condensed Chemical Dictionary (1), p. 48

ANFO, *n*—a mixture that consists of ammonium nitrate and fuel oil.

anion, *n*—an ion having a negative charge.

Hawley's Condensed Chemical Dictionary (1), p. 95

DISCUSSION—Examples of anions are NO_{3^-} in KNO_3 or ClO_{4^-} in NH_4ClO_4.

base charge, *n*—the main high explosive charge.

binary explosive, *n*—a high explosive consisting of a separate oxidizer and fuel that can be acquired, stored, or shipped individually, but when combined form an explosive mixture.

black powder, *n*—a low explosive composed of potassium nitrate, sulfur, and charcoal; commercial products are generally glazed and produced in specific granulation size ranges.

Beveridge (3), p. 129

DISCUSSION—Sodium nitrate can be found in place of potassium nitrate.

black powder substitute, *n*—a commercially produced low explosive powder which is designed to replace traditional black powder in muzzle loading weapons; formulations can include potassium perchlorate in addition to potassium nitrate, or can use other fuels such as ascorbic acid.

DISCUSSION—Many black powder substitutes are sulfur-free.

blasting agent, *n*—a non-detonator sensitive explosive that must be initiated by a booster, or that requires a primer to detonate.

Dictionary of Explosions & Explosives (6), p. 24

DISCUSSION—Many ammonium nitrate-based explosives fall into this category.

[1] This terminology is under the jurisdiction of ASTM Committee E30 on Forensic Sciences and is the direct responsibility of Subcommittee E30.01 on Criminalistics.

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[2] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, http://www.nfpa.org.

[3] The boldface numbers in parentheses refer to the list of references at the end of this standard.

blasting cap, *n*—a cylindrical shell, usually of metal, containing both a primary high explosive and a secondary high explosive, which is used to initiate other explosives; also known as a detonator or cap.

bomb, *n*—an explosive device, usually some kind of container filled with explosive, incendiary material, gas, or other destructive substance, designed to cause damage by way of thermal, blast, or fragmentation effects on impact or when detonated by a time mechanism, switch, remote control device, electric match, or lit fuse.

booby trap, *n*—a device with a hidden or concealed triggering mechanism designed to be initiated by the victim; also known as a victim-activated device.

booster, *n*—a detonator-sensitive high explosive charge used to initiate a main-charge explosive that is usually detonator insensitive.

brisance, *n*—the ability of an explosive to shatter an object when fired in direct contact or in its vicinity.

Encyclopedia of Explosives and Related Items (7), p. B265

cap-sensitive, *adj*—reliably initiated with a detonator; also known as detonator-sensitive.

Thurman (2), p. 13

catalyst, *n*—any substance of which a small proportion notably affects the rate of a chemical reaction without itself being consumed or undergoing a chemical change.

Hawley's Condensed Chemical Dictionary (1), p. 273

cation, *n*—an ion having a positive charge.

Hawley's Condensed Chemical Dictionary (1), p. 275

DISCUSSION—Examples of cations are K^+ in KNO_3 or NH_4^+ in NH_4ClO_4.

chain reaction, *n*—a self-sustaining chemical or nuclear reaction yielding energy or products that cause further reactions of the same kind.

Encyclopedia of Explosives and Related Items (8), p. C146

charcoal, *n*—a highly porous form of amorphous carbon.

Hawley's Condensed Chemical Dictionary (1), p. 294

chemical reaction bomb (CRB), *n*—a device designed to cause a mechanical explosion by overpressure of the container due to a chemical reaction, generally produced by the mixing of commonly available chemicals or products.

DISCUSSION—Examples include the mixing of hydrochloric acid and aluminum foil, and mixing sodium hydroxide, water and aluminum foil.

combustion, *n*—a usually rapid chemical process (such as oxidation) that produces heat and usually light.

Merriam-Webster.com Dictionary[4]

[4] Merriam-Webster.com Dictionary (9), 2021, s.v. "combustion."

deflagration, *n*—propagation of a combustion zone at a velocity that is less than the speed of sound in the unreacted medium. **NFPA 921 3.3.43**

detection agent, *n*—a chemical marker added to plastic explosives to aid in detection by either instrumental or canine screening; also known as detection taggant.

DISCUSSION—Detection agents include DMDNB, o-mononitrotoluene, p-mononitrotoluene, and EGDN.

detonation, *n*—propagation of a reaction zone at a velocity that is greater than the speed of sound in the unreacted medium.

detonating cord, *n*—a flexible cord containing a central core of high explosives used to initiate high explosives along the cord's length; also known as detcord/primacord.

Thurman (2), p. 508

dynamite, *n*—a general term given to a class of explosives in which the principal organic energetic material is usually NG and/or EGDN, or other explosive oils.

DISCUSSION—*(1)* Usually inorganic oxidizers such as nitrate salts and plant material are also included. *(2)* It should be noted that this does not describe "military" type dynamites.

electric match, *n*—a device, designed and used for the electrical ignition of fireworks and pyrotechnic articles, that contains a small amount of pyrotechnic material, which ignites when a specified electric current flows through the leads.

Dictionary of Explosions and Explosives (6), p. 104

DISCUSSION—An electric current is passed through the bridgewire, using a wire circuit, and a temperature rise occurs in the bridgewire that ignites a small dab of match composition. A burst of flame is produced that ignites a section of fuse or a charge of pyrotechnic composition.

Conkling and Mocella (4), p. 198

electric squib, *n*—a small tube or block containing a small quantity of ignition composition in contact with a wire bridge.

emulsion explosive, *n*—a class of high explosive consisting of liquid solutions of an oxidizer, fuel, and water blended with a sensitizer and an emulsifier.

emulsion, n—a stable mixture of two or more immiscible liquids held in suspension by small percentages of substances called emulsifiers.

Hawley's Condensed Chemical Dictionary (1), p. 554

energetic material, *n*—any mixture or single material able to rapidly release energy upon initiation.

explosion, *n*—the sudden conversion of potential energy (chemical or mechanical) into kinetic energy with the production and release of gases under pressure, or the release of gas under pressure; these high-pressure gases then do mechanical work such as moving, changing, or shattering nearby materials. **NFPA 921 3.3.56**

explosive, *n*—a single substance, or a mixture of substances, that is capable of producing an explosion upon initiation (see **high explosives** and **low explosives**).

explosive compound, n—a single chemical compound that can produce an explosion.

explosive mixture, n—a mixture of separate fuel and oxidizer components that together can produce an explosion.

explosive ordnance disposal (EOD), *n*—the detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded explosive ordnance; it may also include explosive ordnance which has become hazardous by damage or deterioration.

DOD Dictionary of Military and Associated Terms (10), p. 78

DISCUSSION—*(1)* This term is also sometimes colloquially applied to the same actions applied to improvised explosive devices (IEDs). *(2)* The term "render safe" involves procedures utilized by EOD technicians or bomb technicians to make an explosive device safe.

explosive train, *n*—an arrangement of explosive components by which the initial force from the primer is transmitted and intensified until it reaches and detonates the main explosive composition.

flash powder, *n*—a mixture of strong inorganic oxidizer, such as perchlorate or chlorate salts, and finely divided metal fuel, such as aluminum or magnesium powders; also known as photoflash powder.

DISCUSSION—Sulfur powder, often used as a fuel/tinder, and carbonaceous filler materials can also be present in flash powder.

fragmentation, *n*—high-speed missiles that are the result of an explosion and may be part of the explosive casing, container, earth, building material, target area, or other items affected by the explosion.

Thurman (2), p. 510

fuel, *n*—any substance capable of reacting with oxygen and oxygen carriers (oxidizers) with the evolution of heat.

Explosives (5), p. 146

fuel-rich, *adj*—indicating a ratio of oxygen-to-fuel that provides less oxygen than needed for optimum combustion of the fuel.

fuse, *n*—a train of pyrotechnic composition (usually black powder), often covering, or covered with, inexpensive materials such as twine, thread, or twisted paper, as well as a waterproofing material.

Conkling and Mocella (4), p. 198

DISCUSSION—Sub-types of fuse include cannon/hobby/pyrotechnic fuse and safety fuse.

fusee, *n*—a device composed of a pyrotechnic mixture in a tube, usually equipped to be ignited by a mechanical initiation mechanism.

DISCUSSION—The common red 'fusee,' or road flare, normally contains strontium nitrate, potassium perchlorate, sulfur, and some organic binders. Other constituents can include sawdust, potassium nitrate, aluminum or magnesium.

fuze, *n*—a device with explosive or nonexplosive components designed to initiate a train of fire or detonation in ordnance by an action such as hydrostatic pressure, electrical energy, chemical, impact, mechanical, time, acceleration or deceleration, and piezoelectric action, or a combination of these.

Thurman (2), p. 510

gunpowder, *n*—a generic term used for propellant powders used in firearms.

high explosives, *n*—energetic materials that support a supersonic detonation wave, irrespective of the ambient condition of confinement; sometimes abbreviated HE.

high order, *adj*—descriptive of an explosive that undergoes complete reaction (or detonation) of the material as designed.

hoax device, *n*—a 'dummy' device designed to appear as a bomb, but missing explosive or other components such that the device would not function as a bomb.

homemade explosives, *n*—often abbreviated as HME, any explosive not commercially manufactured; also known as improvised explosives.

hypergolic, *adj*—spontaneously self-igniting upon mixing of components or when one component contacts another component; examples include the reaction of potassium permanganate with glycerin, and the reaction of calcium hypochlorite with polyethylene glycol.

improvised explosive device (IED), *n*—any combination of items or components that are neither originally designed nor produced to be used in conjunction with each other and, when placed together, constitute a mechanism that has the capability of exploding and causing personal injuries and property damage.

Thurman (2), p. 510

initiator, *n*—the device which initiates an explosive train, starting an explosion.

low explosives, *n*—energetic materials that function by deflagration.

Thurman (2), p. 511

low order, *adj*—descriptive of an explosive that undergoes incomplete reaction (or detonation) of the material as designed.

main explosive charge, *n*—the final explosive in an explosive train.

munitions, *n*—any and all military explosives; also known as ordnance.

Munroe Effect, *n*—the partial focusing and concentration of blast energy caused by incorporating a conical or hemispherical hollow into the end of an explosive cartridge (see **shaped charge**).

oxidizer, *n*—a material that releases oxygen, or that reacts readily with fuels, and enables the initiation or increased intensity of a fire or explosion.

plastic explosive, *n*—a high explosive in a pliable plastic matrix; examples include Composition C-4 (a white plastic