Permitted and Restricted Fireworks Chemicals
Consumer Fireworks and Novelties
(2018 APA Standard 87-1A)

Chemical	Formula	Typical Use	Restrictions
Alloprene (Chlorinated Rubber)	Not Required	Color Intensifier	
Aluminum > 149 microns	Al	Fuel	The individual or combined use of metal powders greater than 149 microns, with benzoates, phthalates, salicylates and terephthalates, must not exceed 10 percent of the total burst charge formulation weight or the total propellant charge formulation weight
Aluminum > 53 to ≤ 149 microns	Al	Fuel	1) Metal powders less than 149 microns are limited to 130 milligrams in burst charge formulations 2) Metal powders less than 149 microns are not permitted in propellant charge formulations
Aluminum ≤ 53 microns	Al	Fuel	Permitted only in reports
Ammonium Dichromate	$(NH_4)_2Cr_2O_7$	Oxygen Donor / Colored Ash	1) Not to exceed 5 percent of formulation; 2) Prohibited if mixed with a chlorate.
Ammonium Perchlorate	NH_4ClO_4	Oxygen Donor	1) Prohibited if mixed with a chlorate; 2) In sparkler or dipped stick the total composition is limited to 5 grams.
Anthracene	$C_{14}H_{10}$	Fuel	
Antimony	Sb	Fuel	
Antimony Sulfide	Sb_2S_3	Fuel	Prohibited if mixed with a chlorate
Antimony Trioxide	Sb_2O_3	Oxygen Donor	
Barium Carbonate	$BaCO_3$	Color Agent	
Barium Chlorate	$Ba(ClO_3)_2$	Oxygen Donor / Color Agent	1) In smoke formulations an equal or greater weight of bicarbonates or carbonates is required; 2) In all other devices the total chemical composition cannot exceed 4 grams of which no more than 15 percent can be chlorate salts; 3) Permitted in firecrackers, party poppers and booby traps.
Barium Nitrate	$Ba(NO_3)_2$	Oxygen Donor / Color Agent	
Barium Oxalate	BaC_2O_4	Color Agent	
Barium Phthalate	$Ba(C_8H_5O_4)_2$	Whistle / Color Agent	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Barium Sulfate	$BaSO_4$	Oxygen Donor / Color Agent	
Benzoic Acid	C_6H_5COOH	Whistle	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Bismuth Trioxide (Bismuth Oxide)	Bi_2O_3	Oxygen Donor	
Boric Acid (Boracic Acid)	H_3BO_3	Neutralizer	
Calcium Carbonate	$CaCO_3$	Neutralizer	
Calcium Sulfate	$CaSO_4$	Oxygen Donor	
Calcium Sulfate (Gypsum)	$CaSO_4 \times 2H_2O$	Oxygen Donor	
Carbon Black or Lamp Black	C	Fuel	
Cationic Asphalt	Not Required	Fuel	
Charcoal (Carbon)	C	Fuel	
Chlorinated Rubber	Not Required	Color Intensifier	
Chlorinated Wax (Chlorinated Paraffin)	Not Required	Color Intensifier	
Chloro-rub	Not Required	Color Intensifier	
Copper Metal	Cu	Color Agent	Particle size is not required
Cork	Not Required	Fuel	
Cotton (Fiber / Powder) (Cellulose)	Not Required	Fuel	
Cryolite (Sodium Hexafluoroaluminate)	Na_3AlF_6	Color Agent	
Cupric Acetate, Anhydrous (Verdigris)	Cu(CH3COO)2	Color Agent	Prohibited if mixed with a chlorate
Cupric Acetate, Hydrated (Verdigris)	Cu(CH3COO)2 · (H2O)2	Color Agent	Prohibited if mixed with a chlorate

Cupric Benzoate (Copper Benzoate)	$Cu(C_6H_5CO_2)_2$	Whistle / Color Agent	1) Prohibited if mixed with a chlorate 2) The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Cupric Carbonate	CuCO3	Color Agent	Prohibited if mixed with a chlorate
Cupric Chloride	CuCl2	Color Agent	Prohibited if mixed with a chlorate
Cupric Oxide	CuO	Color Agent	Prohibited if mixed with a chlorate
Cupric OxyChloride (Copper OxyChloride)	$CuCl_2$ - $3Cu(OH)_2$	Color Agent	Prohibited if mixed with a chlorate
Cupric Sulfate	CuSO4	Color Agent	Prohibited if mixed with a chlorate
Cuprous Chloride (Copper Chloride)	Cu_2Cl_2	Color Agent	
Cuprous Oxide (Copper Oxide)	Cu_2O	Color Agent	
Dextrin or Dextrine	Not Required	Binder/Fuel	
Diatomaceous Earth; Silica; Kieselgur	$SiO_2 \cdot nH_2O$	Filler / Density Control	
Dicopper chloride trihydroxide	$Cu_2(OH)_3Cl$	Color Agent	Prohibited if mixed with a chlorate
Diphenylamine	$(C_6H_5)_2NH$	Stabilizer	
Epoxy (Thermosetting polymer)	Not Required	Binder	
Flour (Wheat, Corn or Rice)	Not Required	Binder	
Glucose	$C_6H_{12}O_5$	Binder	
Gum Arabic	Not Required	Binder	
Hexachlorophene (Nabac)	$C_{13}H_6Cl_6O_2$	Fuel	
Hexamethylenetetramine (Hexamine)	$C_6H_{12}N_4$	Fuel	
Iron Metal	Fe	Fuel / Sparks	Particle size is not required
Iron (II, III) Oxide (Black)	Fe_3O_4 or $FeO|Fe_2O_3$	Oxygen Donor	
Iron (III) Oxide (Red)	Fe_2O_3	Oxygen Donor	
Iron/Titanium Alloy (Ferro/Titanium)	Fe/Ti	Fuel / Sparks	Particle size is not required
Isophthalic Acid (*Meta* -Phthalic Acid)	$C_6H_4(COOH)_2$	Whistle	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Lactose	$C_{12}H_{22}O_{11}$	Binder/Fuel	
Lampblack	C	Fuel	
Linseed Oil	Not Required	Fuel	
Magnalium > 149 microns	Mg/Al	Fuel	The individual or combined use of metal powders greater than 149 microns, with benzoates, phthalates, salicylates and terephthalates, must not exceed 10 percent of the total burst charge formulation weight or the total propellant charge formulation weight
Magnalium > 53 to ≤ 149 microns	Mg/Al	Fuel	1) Metal powders less than 149 microns are limited to 130 milligrams in burst charge formulations 2) Metal powders less than 149 microns are not permitted in propellant charge formulations
Magnalium ≤ 53 microns	Mg/Al	Fuel	Permitted only in reports
Magnesium Carbonate	$MgCO_3$	Neutralizer	
Magnesium Stearate	Not Required	Binder	
Magnesium Sulfate	$MgSO_4$	Oxygen Donor	
Naphthol Pitch	Not Required	Fuel	Permitted only in snakes
Nitrated Asphalt	Not Required	Fuel	Permitted only in snakes
Nitrated Asphaltum	Not Required	Fuel	Permitted only in snakes
Nitrated Bitumen	Not Required	Fuel	Permitted only in snakes
Nitrated Pitch	Not Required	Fuel	Permitted only in snakes
Nitrated Tar	Not Required	Fuel	Permitted only in snakes
Nitrocellulose ≤ 12.6 percent nitrogen by mass	Not Required	Fuel	1) Single tube device is limited to 15 grams; 2) Multiple tube devices are limited to less than or equal to 10 grams per tube and less than or equal to 100 grams per device.
Nitrocellulose Lacquer ≤ 12.6 percent nitrogen by mass	Not Required	Binder	Limited to 5 percent of formulation
Par Oil (Chlorinated Wax)	Not Required	Color intensifier	
Parlon (Chlorinated rubber)	Not Required	Color intensifier	
Phosphorus - (Red)	P (Red)	Fuel	Permitted in party poppers and booby traps only
Phthalic Acid (*Ortho* -Phthalic Acid)	$C_6H_4(COOH)_2$	Whistle	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight

Polyvinyl Alcohol PVA)	$[CH_2CH(OH)]_n$	Binder	
Polyvinyl Butyral (PVB)	$(C_8H_{14}O_2)_n$	Binder	
Polyvinyl Chloride (PVC)	$(C_2H_3Cl)_n$	Color Intensifier	
Polyvinylidine chloride (Saran Resin)	$(C_2H_2Cl_2)_n$	Color Intensifier	
Potassium Benzoate	$KC_6H_5CO_2$	Whistle	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Potassium Chlorate	$KClO_3$	Oxygen Donor	1) Prohibited if mixed with a Cupric Salts (Copper II Salts) 2) In smoke formulations an equal or greater weight of bicarbonates or carbonates is required; 3) In all other devices the total chemical composition cannot exceed 4 grams of which no more than 15 percent can be chlorate salts; 4) Permitted in firecrackers, party poppers and booby traps.
Potassium Dichromate; (Potassium Bichromate)	$K_2Cr_2O_7$	Oxygen Donor	Not to exceed 5 percent of the formulation
Potassium Fluorosilicate	K_2SiF_6	Color Intensifier	
Potassium hexafluoroaluminate (Cryolite)	K_3AlF_6	Color Agent	
Potassium Hydrogen Phthalate (KHP)	$KC_8H_5O_4$	Whistle	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Potassium Nitrate	KNO_3	Oxygen Donor	
Potassium Oxalate	$K_2C_2O_4$	Color Agent	
Potassium Perchlorate	$KClO_4$	Oxygen Donor	In sparkler or dipped stick the total composition is limited to 5 grams
Potassium Silicofluoride	K_2SiF_6	Color Intensifier	
Potassium Sulfate	K_2SO_4	Oxygen Donor	
Red Gum (Accaroid Resin)	Not Required	Binder	
Resinox (Phenolic Resin)	Not Required	Binder	
Rice Flour (Rice Starch)	Not Required	Binder	
Rice Hull	Not Required	Density Control	
Rice Hull (Coated)	Not Required	Fuel	Specify chemical formulation of the coating
Salicylic Acid	$C_6H_4(OH)COOH$	Whistle	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Shellac	Not Required	Binder	
Silica	$SiO_2 \cdot nH_2O$	Moisture Absorber	
Silicon	Si	Fuel	
Silver	Ag	Fuel	Particle size is not required
Silver Fulminate	AgCNO	Explosive	Permitted in Snappers and Novelty Pull Apart devices only
Silver Oxide	Ag_2O	Oxygen Donor	
Smoke Dye (Blue): Lysine	$C_6H_{14}N_2O_2$	Smoke Dye	
Smoke Dye (Blue): Methylene Blue	$C_{16}H_{18}ClN_3S$	Smoke Dye	
Smoke Dye (Blue): Phthalocyanine (Blue)	$C_{32}H_{16}CuN_8$	Smoke Dye	
Smoke Dye (Blue): Ultramarine	Na_2S_2 □$3NaAlSiO_4$	Smoke Dye	
Smoke Dye (Green): Solvent Green 3; 1,4-di-p-toluidino-anthraquinone	$C_{26}H_{20}O_2(NH)_2\,(CH3)_2$	Smoke Dye	
Smoke Dye (Green): Lysine; 2, 6-diaminohexanoic acid	$C_6H_{14}N_2O_2$	Smoke Dye	
Smoke Dye (Orange): Orange 7; a-xylene-azo-b-naphthol	$C_{16}H_{11}N_2NaO_4S$	Smoke Dye	
Smoke Dye (Orange): Oil Orange Pigment	$C_{26}H_{28}N_2O_2$	Smoke Dye	
Smoke Dye (Red): Disperse Red 9; 1-methylamino-anthraquione	$C_{15}H_{11}NO_2$	Smoke Dye	
Smoke Dye (Red): Solvent Red 3; 1-Naphthalenol, 4-[(4-ethoxyphenyl)azo]	$C_{18}H_{16}N_2O_2$	Smoke Dye	
Smoke Dye (Red): Para Red; Pigment Red-1; p-nitroaniline red	$C_{16}H_{11}N_3O_3$	Smoke Dye	

Smoke Dye (Violet): 1,4-diamino-2,3-dihydroanthraquinone	$C_{14}H_{12}N_2O_2$	Smoke Dye	
Smoke Dye (Violet): Rhodamine B; (Basic Violet 10)	$C_{28}H_{31}ClN_2O_3$	Smoke Dye	
Smoke Dye (Yellow): Solvent Yellow 33; 2-(2-quinolyl)-1, 3-indandione; (Chinoline Yellow)	$C_{18}H_{11}O_2N$	Smoke Dye	
Smoke Dye (Yellow): Auramine; (Basic Yellow 2)	$C_{17}H_{22}ClN_3$	Smoke Dye	
Smoke Dye (Yellow): Vat Yellow 4; Dibenzo(a,h)pyrene-7,14-dione; (Dibenzochrysenedione); (Dibenzpyrenequinone); (Golden Yellow GK); (Tyrian Yellow I-GOK)	$C_{24}H_{12}O_2$	Smoke Dye	
Smoke Dye (Yellow): Dimethyl Yellow; Methyl Yellow (Butter Yellow); 4-Dimethylaminoazobenzene; N, N-Dimethyl-4-phenylazoaniline; Solvent Yellow 2; Oil Yellow	$C_{14}H_{15}N_3$	Smoke Dye	
Sodium Benzoate	$NaC_6H_5CO_2$	Whistle	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Sodium Bicarbonate (Sodium Hydrogen Carbonate)	$NaHCO_3$	Neutralizer	
Sodium Carbonate	Na_2CO_3	Neutralizer	
Sodium Chlorate	$NaClO_3$	Oxygen Donor	1) In smoke formulations an equal or greater weight of bicarbonates or carbonates is required; 2) In all other devices the total chemical composition cannot exceed 4 grams of which no more than 15 percent can be chlorate salts; 3) Permitted in firecrackers, party poppers and booby traps.
Sodium Fluorosilicate; (Sodium Silicofluoride)	Na_2SiF_6	Color Intensifier	
Sodium hexafluoroaluminate (Cryolite)	Na_3AlF_6	Color Agent	
Sodium Nitrate	$NaNO_3$	Oxygen Donor	
Sodium Oxalate	$Na_2C_2O_4$	Color Agent	
Sodium Salicylate	$C_7H_5NaO_3$	Whistle	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Sodium Sulfate	Na_2SO_4	Oxygen Donor	
Starch (Amylum) (Wheat, Corn, Rice)	Not Required	Binder	
Stearic Acid (Octadecanoic Acid)	Not Required	Fuel	
Strontium Carbonate	$SrCO_3$	Color Agent	
Strontium Chloride	$SrCl_2$	Color Agent	
Strontium Nitrate	$Sr(NO_3)_2$	Oxygen Donor / Color Agent	
Strontium Oxalate	SrC_2O_4	Color Agent	
Strontium Phthalate	$Sr(C_8H_504)_2$	Whistle / Color Agent	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Strontium Sulfate	$SrSO_4$	Color Agent	
Sucrose	$C_{12}H_{22}O_{11}$	Fuel	
Sulfur	S	Fuel	
Terphthalic Acid; (*Para* -Phthalic Acid)	$C_6H_4(COOH)_2$	Whistle	The individual or combined use of benzoates, phthalates, salicylates and terephthalates with metal powders greater than 149 microns, must not exceed 10 percent of the total burst charge formulation weight
Titanium > 149 microns	Ti	Fuel	The individual or combined use of metal powders greater than 149 microns, with benzoates, phthalates, salicylates and terephthalates, must not exceed 10 percent of the total burst charge formulation weight or the total propellant charge formulation weight
Wood Powder (Cellulose)	Not Required	Fuel	