

Colored Smoke

WARNING

Never grind, pound, pulverize or compress mixtures containing chlorates.

Whenever chlorates are used, be extremely careful to avoid friction during the mixing process and **never** mix them with sulfur, sulfides, sulfates or antimonies. The resulting mix is extremely sensitive to heat, friction, impact and pressure.

As with any Pyro device and/or mix, smoke generation produces heat and flame during combustion. Caution *must* be used to evaluate the surrounding area they will be used in to avoid spot fires.

All of the compositions here listed contain Chlorates. They will generate chlorine derivatives, do not use in confined spaces or inhale for prolonged periods.

Always read the material data sheets for all the chemicals you will use. Be aware of all ignition sources and be ready to do fire control/suppression.

The best mixing method, and most recommended one is the diaper method

Colored smoke composition

All formulations provided are based in a percentage by weight ratios.

] General Information

To produce color, the dye must be vaporized by the combustion heat and exit the reaction zone attached to the gaseous by-products where it will condense in air to re-form into solid dye particles generating the color effect. Moisture *plays* a big role here, a higher humidity will generate higher smoke density.

All usable dyes must meet the following criteria:

- a) Must volatilize rapidly at temperatures *well below* 500°C with a minimum of decomposition. (typically/ideally less than 20%)
- b) Smoke formed should condense into distinct, specific color as per the dye sample and should remain stable until dispersed by the air.
- c) The dye candidate must be of a concentration to produce rich color with a minimum of 30% present in the formulation. The larger its percentage, the *slower* the combustion rate is.

Recommended Chemical dyes groups

Anthraquinone

Azo derivatives

Diphenylmethane (auramine 00)

Ketone Imine (auramine 0)

Perinone

Rosindone

Thiazine (methylene blue)

Triphenylmetane (basic green)

Xantene (rhodamine B)

Violet / Raspberry

Rhodamine B (Xanthene) 48.0 Dye

Potassium Chlorate 26.0 Oxidizer

Lactose 15.0 Fuel

Cellulose (ground wood or paper) 6.0 Fuel/ash quality

Magnesium carbonate 5.0 stabilizer

Formulation comment: very rich, bright color. Word of caution, Rhodamine B stains everything it comes in contact with and is extremely difficult to remove. Cover all surfaces and wear rubber gloves.

Green

Blue (Anthraquinone dye) 12.0 Dye

Yellow (Diphenilmethane) 28.0 Dye

Potassium Chlorate 26.0 Oxidizer

Sulfur, Flour 10.0 Fuel

Sodium Bicarbonate 24.0 Stabilizer/Coolant

Comments: Rich green color, the dye ratio can be adjusted to go from lime green to forest green. This formula is not so dependant on humidity to generate the smoke cloud.

Green (Anthraquinone) 42.0 Dye

Potassium Chlorate 26.0 Oxidizer

Sulfur, Flour 9.0 Fuel

Sodium Bicarbonate 23.0 stabilizer/coolant

Comments: Good, rich emerald green color. Not dependant on humidity, military style composition.

Red

Red (Mono Azo or anthraquinone) 45.0 Dye

Potassium Chlorate 25.0 Oxidizer

Lactose 15.0 Fuel

Cellulose 10.0 Fuel/ash quality

Magnesium carbonate 5.0 Stabilizer/Coolant

Comments: Good color, easily ignited and smooth burn.

Paranitriline red (Aniline dye) 48.0 Dye

Potassium Chlorate 27.0 Oxidizer

Lactose 19.0 Fuel

Magnesium Carbonate 6.0 Stabilizer/Coolant

Comment: Deep, rich blood red color. Easily ignited with smooth burn.

Yellow

Auramine 0 (Diphenilmethane) 40.0 Dye

Potassium Chlorate 25.0 Oxidizer

Sulfur, Flour 10.0 Fuel

Sodium Bicarbonate 25.0 Stabilizer/coolant

Comment: Good color and volume, not dependant on humidity. Military style composition.

Custom Colors

To generate custom colors, dyes should have approximately the same melting and decomposition point of each other. Usually, if the dye works by itself, they will work in combination to produce custom colors.

Do not mix with Potassium Nitrate in attempt to dilute the color. Potassium Nitrate burns to hot and will destroy the dye before being able to generate the desired effect.