

-- Flash Powder (Presented by Steve Hubing 5/18/2013)

What is "Flash Powder"

- Flash Powder is a pyrotechnic composition or mixture made of a oxidizer and a metallic fuel. Optionally a "sensitizer" can also be added to the mixture.
- Flash Powder is static sensitive, friction sensitive, and impact sensitive.
- Flash Powder is considered a "high" explosive by the ATFE and as such would "detonate" rather than "deflagrate".
- Because Flash Powder is a "high" explosive, it must be stored in either a Type 1 or Type 2 magazine.

Oxidizers

Potassium Chlorate -- Potassium Perchlorate --- Potassium Nitrate

Most sensitive -----> Least Sensitive

- Avoid the use of Potassium Chlorate in Flash compositions
- Potassium Perchlorate is the most commonly used oxidizer in Flash compositions
- Potassium Nitrate will work in Flash compositions, but it needs to be contained very well and does not easily produce as "loud" a report at Potassium Perchlorate would.
- Potassium Nitrate is used more often in "slow flash" compositions.
- Screen oxidizers through a 40 mesh screen to break clumps before use.

Metal Fuels

Magnesium

- Needs to be a very fine powder to work well
- Will detonate with a loud report when it's unconfined
- Reacts with water to produce heat which could set off the mixture
- Because of increased risk, I would not recommend its use in flash compositions.

Aluminum (metal of choice for flash compositions)

- Particle shapes are available in granular, spherical, or flake with flake being the most reactive.
- Particle size is important in flash compositions with the smaller (e.g. sub 10 micron) size being the most reactive.
- Examples of "very good" aluminum to use for flash compositions would be Eckart 5413H (3 micron), German Blackhead (3 micron), Indian Blackhead (2 micron).
- Examples of "good" aluminum but not as reactive as the "very good" aluminums would be Eckart 10890 (-325 mesh), Oberon 809, other "dark" aluminums.
- Spherical aluminums, while they may work under the right conditions are generally not use in flash compositions.
- Blue Aluminum is a new pyrotechnic aluminum now available to make flash powder. Because it contains a range of particle sizes is less reactive, but when contained, produces a loud report similar to the small particle size aluminums.

Sensitizers

- Sensitizers are chemicals other than the oxidizer and metal that are added to flash compositions to help lower the ignition temperature of flash powder which makes it more sensitive to static, friction and impact.
- Some people think that sensitizers make the flash report have more of a deep booom rather than a sharper crack and that it's louder. This is very debatable.
- Examples of sensitizers are sulfur and antimony.
- Never mix sensitizers with potassium chlorate flash compositions
- DO NOT use sensitizers in flash compositions until you are VERY experienced with making and using flash mixtures.

Mixing Flash Powder Safety

- You are at the most risk when the flash powder is being mixed.
- Never use any mixing method that exposes the mixture to static, friction, or impact.
- Never use any metal when working with flash powder that will produce sparks.
- Non-sparking metals such as aluminum, stainless steel, or brass are “safer” to use with flash powder, but be aware that they can create an increased risk of impact, because they are hard and heavy. Finger nails on aluminum screen is a good example a hard material grating against another hard material.
- Avoid situations and conditions where static electricity may be produced
 - Mix flash on days or times of days with high humidity or dew point (above 50 F).
 - Don't use plastics or synthetic materials when mixing flash powder.
 - Best to ground yourself before mixing flash.
 - Use an anti-static spray such as Static Guard.
- Best to use only paper or cardboard when mixing flash powder.
- Be gentle and work slowly when mixing flash powder.
- Never mix flash powder in your house or where others live.
- Best to mix flash powder outside.
- Mixing flash powder is dusty, wear a mask.
- Be aware of your surroundings.

Flash Powder Formulas

- Potassium Perchlorate 70% and Aluminum powder 30%
- 70/30 Flash powder is the ONLY flash powder you should be using until you are VERY experienced with making and using flash powder. This mixture produces a VERY loud report and is relatively easy to ignite.

Mixing Flash Powder Methods

- Diapering
 - Using a piece of paper and “rolling” the pile of flash powder back and forth to mix the two chemicals.
- Cardboard can or tube
 - Use a cardboard can or closed tube to put the two chemicals in then gently roll the container and tip it end of end to mix the flash powder
- Screening
 - Use an aluminum (not nylon) screen to gently sieve and mix the two chemicals. Pass it through the screen 3 or 4 times. Not recommended for the inexperienced.
- Binary
 - The screened Potassium Perchlorate and Aluminum are dumped into an empty container (usually the final container) and tumbled to mix. Example would be to put Perc and Al in a prepared shell then finish the shell. The handling will mix the flash.