The Black Powder Cheat Sheet

by Harry Gilliam -- February 2012

Black Powder

Black powder (BP) is the most widely used composition in fireworks. The standard mix contains potassium nitrate, sulfur, and charcoal.

Black Powder Substitutes

Black powder substitutes (Pyrodex, Hodgdon, etc.), including smokeless powder and most reloading powders, are not suitable for use in fireworks.

Black Powder Grades

There are currently two grades of black powder available in the US.

- **"A" or "Blasting" grade powders:** BATF license required for purchase
- **"G" or "Sporting" grade powders:** No license required for purchase

"Grades" refer to particle sizes (see table below). There is no difference in the 3 chemicals in the two powder grades.

A-grades are the preferred powders for use in fireworks.

As long as the particle sizes are equivalent, G and A powders are interchangeable in fireworks. Some powders are polished with shiny graphite, but perform in fireworks identically to uncoated powders.

If you are buying G grade powder, see the chart below to determine which grade is suited for which fireworks use.

Black Powder Grades & Their Uses in Fireworks

Blasting Grades (A)		Sporting Grades (G)		Fireworks Applications
You must have a BATF explosives user or manufacturer license to purchase.		You can purchase up to 50# *without* any BATF license. Label may read 2FG or ffg.		Black powders used most often in fireworks are shaded green.
Grade	**Size**	**Grade**	**Size**	**What the powder is most often used for**
1FA	8.0-4.0			
2FA	4.76-1.68	**Cannon**	4.76-1.68	• Lift powder for aerial shells 3 inches and larger • Burst powder in smaller shells
4FA	1.68-.84	**1FG**	1.68-1.19	• Lift powder for shells smaller than 3 inches • Priming comets and other large devices
		2FG	1.19-.59	• Lift powder for shells smaller than 3 inches • Priming comets and other large devices
5FA	.84-.297	**3FG**	.84-.29	
7FA	.42-.149	**4FG**	.42-.15	• Use instead of Meal-D
Meal-D	.42			• Rocket fuel, fountains, drivers, spinners • Coating rice hulls • Priming stars • Ingredient in various fireworks compositions
Fine	.149	**5FG**	.149	• Use instead of Meal-D

Where Can You Buy BP?

A grades: Contact distributors:

http://www.goexpowder.com/distributors.html

To buy A-grade powders, you are legally required to have a BATF explosives user or manufacturer license. A-grade powders usually come in 25 lb. bags, two bags per box. Some distributors sell 1 lb. cans.

G grades: Retail gun stores, sporting goods stores, and online.

You can buy up to 50 lbs. of G powder without a BATF license. Since 9/11, BP is harder to find, more expensive, with high shipping and hazmat costs.

Online sources for G grade powders:

http://www.powderinc.com/
http://www.jackspowderkeg.com/

Buying BP online is expensive. Cut your cost per pound by ordering as much as possible in each single order.

Making Your Own Black Powder

As of this writing under US federal regulations, it's legal to make your own BP and fireworks without a BATF license as long as:

- It is for your own use
- You do not give it away or sell it
- You store it in accordance with BATF regulations

The government allows you to make your own BP as long as you are not "distributing" it. "Distributing" means giving away or selling.

Your BP must be stored in what *would* be a "BATF-legal" magazine—something that is easy to do. Details on magazine construction and physical placement are in the BATF "Orange Book," available free online from BATF, or printed from Skylighter.com. You can also make your own black powder magazine.

Be sure and check your local and state laws as well.

Up-Front Black Powder Costs

Making virtually any kind of black powder usually involves some investment in equipment.

On the low end, you can make BP with household equipment and one or two screens. Two framed screens can be bought for about $60.

At the other end of the spectrum, to make black powder with a ball mill, you should expect to invest $250 and up for a ball mill, lead balls, screens, a press, and some tools. At this end of the investment range, you can make black powder within 2-4 hours, with relatively little work that is as powerful as any commercial powder.

In making black powder, generally, the more money you invest in equipment, the better the powder, the faster you can make it, the more you can make, the less labor you'll have to invest, and the cleaner the process. Properly ball milled and corned black powder will work in any fireworks application.

Conversely, the less equipment you have, the less powerful the powder, and the more limited its use will be. Although, many smaller fireworks can utilize hand-mixed BP, once you pass a certain size, you need better BP. There are fireworks applications which simply will not work with the hand-mixed powders. Cleanup is significantly greater, and personal risk is greater.

Basic Options for Making Black Powder & Tradeoffs

The table below will give you a general idea of costs and issues in the most common methods of making black powder. Generally, the more money you spend in equipment, the better the results and the easier the process is.

This is not intended to be a complete list of all methods, and the data below should be used as rough guidelines only. There are lots of ways to cut costs, particularly if you can make your own ball mill. Another significant cost in ball milling is for lead or brass milling media. Again, if you can cut costs there, you can save considerably.

Skylighter's recommendation for anyone just getting started, on a low budget would be to make Red Gum Black Powder. If you have more money to spend, we recommend you start with the 3 lb. ball mill method.

Manufacturing Method (click link for tutorial)	**Difficulty**	**Risk**	**Time, Effort**	**Equipment Needed** (a scale + these)	**Equipment Cost**	**Chemicals Needed**	**Power** (5 is best)	**Batch Size**	**Fireworks Use**
CIA Method (not recommended)	Low	Mod.	High, dirty	Electric stove/hot plate, cook pot, stir stick, screen	Low $40-$75	Alcohol, dextrin, potassium nitrate, sulfur, charcoal	1	1 - 5 lbs.	Small devices only
Mortar & Pestle (not recommended—friction ignition danger)	Low	Mod.	Mod.	Mortar, pestle	Low $30-$100	Dextrin, potassium nitrate, sulfur, charcoal	1	1 - 3 grams	Small devices only
Hand Mixed 3 chemical (standard BP)	Low	Low-mod.	Mod.	Blade/coffee mill, 40m screen, 20m screen	Low $40-$75	Dextrin, potassium nitrate, sulfur, charcoal	2	1 - 5 lbs.	Small devices only
Hand Mixed Red Gum BP	Low	Low-mod.	Mod.	Blade/coffee mill, 40m screen, 20m screen	Low $40-$75	Alcohol, red gum, potassium nitrate, sulfur, charcoal	3 - 4	1 - 5 lbs.	Any
Ball Mill – 3# (weight refers to loaded mill jar weight, not quantity of powder)	Low	Low	Low	Ball mill, lead or brass balls, 40m screen, 20m screen	Moderate $250-$350	Dextrin, potassium nitrate, sulfur, charcoal	4	< 1 lb.	Any
Ball mill – 15# granulated (weight refers to loaded mill jar weight, not quantity of powder)	Low	Low	Low	Ball mill, lead or brass balls, 40m screen, 20m screen	Mod—high $500-$700	Dextrin, potassium nitrate, sulfur, charcoal	4.5	> 1 lb.	Any
Ball mill – 35# corned (weight refers to loaded mill jar weight, not quantity of powder)	Low	Low	Low	Ball mill, lead or brass balls, 40m screen, 20m screen, comet pump, hydraulic or arbor press	Highest $600-$1200	Potassium nitrate, sulfur, charcoal	5	> 4 lbs.	Any