Black powder
Source: Various sources Pressed to 1.7g per cubic centimeter
Comments: Two methods of preparation exist, the precipitation or CIA method, and the ball milling method. The latter produces slightly superior results. Special attention should be given to the charcoal used. Charcoal is best obtained by pyrolysis of soft-wood. Preferred types of wood are willow, grapevine and laurel. In general all young, thin soft-woods without hard knots can be used. Although several different compositions are used for several purposes, the composition given here is used most often:
Preparation: Merely mixing the charcoal, sulfur and potassium nitrate by hand does not make black powder. They must really be incorporated into each other. This can be done by ball milling or by the salting out ('CIA') method. A detailed description of the process can be found in many books.

				Percentage Recipe
Potassium nitrate.....	75	150	300	76.923 %
Charcoal.....	15	30	60	15.385 %
Sulfur.....	10	20	30	7.692 %

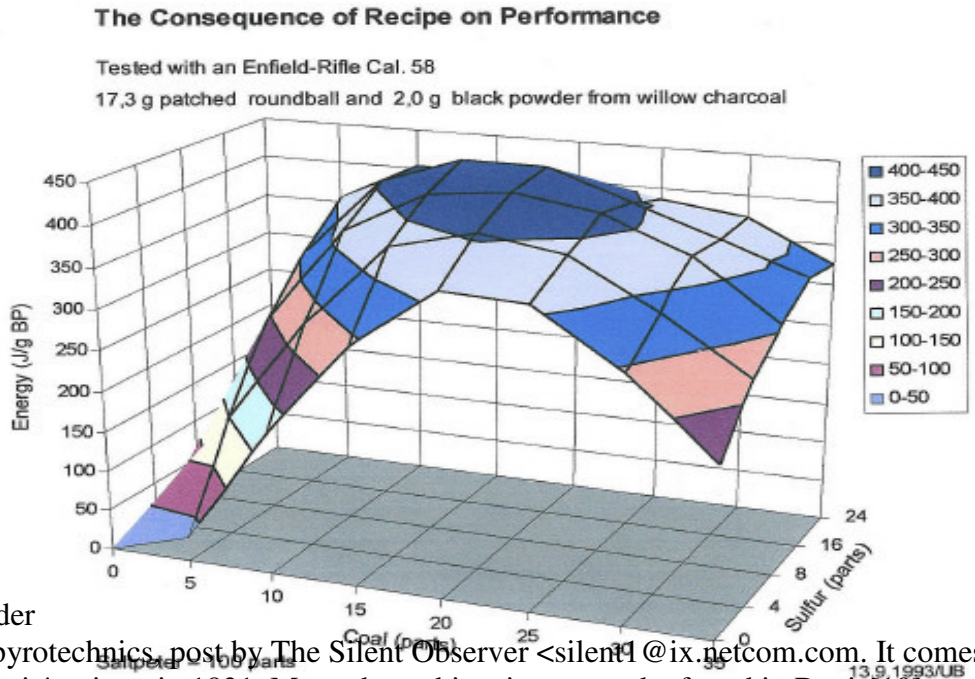
Ulrich Bretscher's Black Powder

For the creation of the following graph showing the performance of black powder, I tested dozens of recipes and fired some hundred shots.
Reasonable recipes by weight are;

A standard black powder:	
Potassium nitrate	100 parts
Charcoal	18 parts
Sulfur	16 parts

A powder without sulfur:	
Potassium nitrate	100 parts
Charcoal	24 parts

As you noticed, I always give powder recipes on the basis of 100 parts saltpeter! Then, with the three ingredients, it leaves only two variables which can be compared or drawn on graphs easily.
The black powder samples were always mixed from saltpeter and sulfur supplied by the chemical industry. The charcoal I made from the wood of a willow tree, in fact from its young, dry, debarked branches of approximately 3 to 4 cm diameter, charred in a tin can at 400 Â°C until smoke free.



Yellow powder
Source: rec.pyrotechnics, post by The Silent Observer <silent1@ix.netcom.com. It comes from a text of 'Samuel Guthrie' written in 1831. More about this mixture can be found in Davis[10], page 30 and 31.

Comments: It is sometimes called "Fulminating powder". The mixture burns three times quicker than common black powder.
Preparation: The compounds are sometimes molten together, which appears to be a very dangerous operation.

Potassium nitrate.....3
Potassium carbonate.....2
Sulfur.....1

Priming composition #1
Source: rec.pyrotechnics
Comments:
Preparation:

Barium nitrate.....4
Potassium nitrate.....3
Sulfur.....1
Shellac.....1

Priming composition #2
Source: "Spelen met vuur"[9]
Comments:
Preparation:

Potassium permanganate.....54
Powdered iron.....47

Priming composition #3
Source:
Comments: Suitable for priming most stars. Chlorate stars or stars containing ammonium compounds should never be primed with this composition. It can be stored in small plastic containers.
Preparation:

Potassium nitrate, fine, sieved.....75
Sulfur, fine (preferably flour).....10
Charcoal, fine, sieved.....15

Priming composition #4
Source:
Comments: Suitable for priming stars. Aluminum and manganese dioxide aid in ignition, but are not necessary.
Preparation:

Potassium perchlorate.....80
Charcoal, fine.....15
Red gum.....4
Manganese dioxide (optional) 9
Aluminum, (fine flake or pyro grade; optional)....4
Dextrin.....2

Priming composition #5
Source:
Comments: This type of prime helps reduce the friction and impact sensitivity of chlorate stars which is especially important when shells fire from the mortar and experience set-back or "kick" from lift acceleration.
Preparation:

Potassium perchlorate.....68
Charcoal, air float.....20
Silicon or Aluminum.....9
Dextrin.....3

Priming composition #6
Source: PML, post by J. Humby <jhumby@iee.org
Comments: This prime is safe to use with chlorate stars and gives a much better color than a black powder prime. The difference is most noticable on red stars which tend to a dark salmon color when primed with black powder.
Preparation: Dissolve the potassium nitrate in hot water and mix with the charcoal.

Potassium chlorate.....52
Potassium nitrate.....8
Charcoal.....30
Lampblack.....10
Binder.....+5%

Priming composition #7
Source: Shimizu[1], page 218
Comments: A standard black powder priming cannot be used with stars that contain ammonium perchlorate, since a double decomposition reaction forms the highly hygroscopic ammonium nitrate. This makes the stars unignitable. Replacing the potassium nitrate prime by this priming composition solves that problem.
Preparation:

Sodium nitrate.....80
Paulownia coal.....15
Sulfur.....5

Priming composition #8
Source: Shimizu[1], page 225. Listed as "Ignition composition for twinklers".
Comments: Used for strobe stars of ammonium perchlorate base to prevent nitrates from the outer priming to react with the ammonium perchlorate. The layer should be at least 1-2mm thick.
Preparation:

Potassium perchlorate.....74
Rosin (BL combustion agent) or Red gum.....12
Hemp coal (or paulownia coal).....6
Aluminum (fine flake).....3
Potassium bichromate.....5

Delay composition #1

Source: Kirk-Otthmer technical encyclopedia[8], chapter 'Explosives and Propellants'.
Comments: Heat of reaction: 2.010 kJ/g; Gas volume: 13 cm3/g; Ignition temperature: 450°C; impact sensitivity test: 12 % of TNT.
Preparation:

Barium chromate.....90
Boron.....10

Delay composition #2
Source: Kirk-Otthmer technical encyclopedia[8], chapter 'Explosives and Propellants'.
Comments: Heat of reaction: 2.081 kJ/g; Gas volume: 12 cm3/g; Ignition temperature: 485°C; impact sensitivity test: 23 % of TNT.
Preparation:

Barium chromate.....60
Zirconium-nickel alloy.....26
Potassium perchlorate.....14

Changing Relay #1
Source: Shimizu[1], page 187
Comments: This type of composition is put between two color layers in a star to create the illusion that all the stars change their color clearly and simultaneously in spite of slight deviations in manufacture.
Preparation:

Potassium perchlorate.....35
Potassium nitrate.....35
Hemp coal (or Paulownia coal).....24
Soluble glutinous rice starch.....6

Changing Relay #2
Source: Shimizu[1], page 187
Comments: This type of composition is put between two color layers in a star to create the illusion that all the stars change their color clearly and simultaneously in spite of slight deviations in manufacture.
Preparation:

Potassium perchlorate.....81
Red gum.....13
Soluble glutinous rice starch.....6

Golden rain #1
Source: "Mengen en Roeren"[6], page 224
Comments: Burns with a yellow color, and emits yellow sparks that are formed by the slowly burning lampblack.
Preparation:

Potassium nitrate.....18
Sulfur.....8
Lampblack.....5

Golden rain #2

Source: "Mengen en Roeren"[6], page 224
Comments: Burns with a yellow color, and emits yellow sparks that are formed by the slowly burning lampblack and the iron filings.
Preparation:

Potassium nitrate.....10
Sulfur.....2
Lampblack.....2
Fine iron filings.....7

Fire dust
Source: Shimizu[1], page 67
Comments: The composition spreads a large amount of long lived orange fire dust particles. The lifetime of those particles depends mainly on the consistency and type of charcoal.
Preparation: The components must be intimately mixed. This can be done by dissolving the potassium nitrate in a minimum amount of boiling water, adding the charcoal and sulfur and precipitating the potassium nitrate in the form of fine particles by adding a large amount of isopropyl alcohol and cooling the solution as fast as possible to 0°C, followed by filtering and drying.

Potassium nitrate.....58
Charcoal.....35
Sulfur.....7

Senko Hanabi (Japanese sparklers), sulfur based
Source: Shimizu[1], page 70
Comments: For more details on what the effect looks like and how devices can be constructed, look at §10.4, "The phenomenon of Senko-Hanabi" in Shimizu's book (on page 68). Realgar may be used instead of sulfur, see 'Senko Hanabi (Japanese sparklers), realgar based' for a realgar based formula. The realgar based formula produces larger en more beautiful sparks.
Preparation:

Potassium nitrate.....60
Charcoal or soot.....10-20
Sulfur.....20-30

Senko Hanabi (Japanese sparklers), realgar based
Source: Shimizu[1], page 70
Comments: For more details on what the effect looks like and how devices can be constructed, look at §10.4, "The phenomenon of Senko-Hanabi" in Shimizu's book (on page 68). Sulfur may be used instead of realgar, see 'Senko Hanabi (Japanese sparklers), sulfur based' for a sulfur based formula. This realgar based formula produces larger en more beautiful sparks than the sulfur based formula.
Preparation:

Potassium nitrate.....35
Charcoal or soot.....20
Realgar.....45

"Pharaoh Snakes"
Source: "Mengen en Roeren"[6], page 223

Comments: When lighted, this composition produces very voluminous snake-shaped ash. Mercury compounds are very poisonous, and extreme caution should be excercised during preparing and handling this composition. Wear gloves at all times, and use a fume hood.
Preparation: Instructions for making mercuric thiocyanate: 1) Dissolve 64 parts of mercuric nitrate in water, and separately dissolve 36 parts potassium thiocyanate in water. 2) Mix both solutions, and filtrate to collect the precipitate that forms upon mixing. 3) Rinse the collected precipitate 3 times with distilled water, and place it in a warm (not hot) place to dry.

Mercuric thiocyanate.....100
Dragant.....5
arabic gum binder.....qs

Thermite
Source:
Comments: This composition produces an enormous amount of heat (83.7 kJ per mol of iron oxide that has reacted), molten iron and aluminum oxide. Other metal oxides can be substituted to make other thermite-like compositions that behave differently. Some may explode (like CuO with aluminum or PbO2 with aluminum), so caution is required when experimenting with different mixtures.
Preparation:

Red iron oxide, Fe_2O_3.....3
Aluminum.....1

Red thermit
Source: Shimizu[1], page 29
Comments: This mixture is sometimes used for priming.
Preparation:

Pb_3O_4.....80
Ferro-silicon.....20

Electric Match
Source: PML, post by Mike Carter <pyro@primenet.com
Comments: This composition does not require the use of a bridge wire. The composition itself acts as a resistor. Comments from the poster: "The matches fire just fine on 200 feet of #16 guage wire and a standard 12V battery two at a time. Sometimes there's a delay...I haven't tested these on the high power electric firing systems so I don't know how they fare."
Preparation: 1) Bind in water. Make CMC & Water into a mostly soupy mess. Add components into a container and mix well. 2) Dip freshly stripped wire with both conductors about 1mm or slightly less between them, evenly parallel. The longer the exposed metal on the wire, the less Ohmage the match will have. Allow to dry in vertical hanging position. Redip as necessary. I find that two dips is just fine. 3) Once the comp is dry, you will need to coat it with NC (Nitrocellulose) laquer. I find that two dips in the NC laquer is enough to keep the very brittle comp from cracking or splitting while manuevering the wire into your shell or mine or rocket motor. I normally will color the double-dippers with some Iron Oxide stirred into the NC Laquer so I have a visual that they're unsuitable for firing whistle motors. (Double Dipped tend to go BANG, and destroy the motor).

Potassium chlorate, Ball milled into a fine powder.....16
Conductive lampblack.....3
Magnalium (50/50), 200 mesh.....3

Atomized aluminum, 120 mesh.....2
Zirconium, 200 mesh (optional).....2
CMC Binder (carboxymethylcellulose).....5

Veline's priming
Source: rec. pyrotechnics, post by Lloyd E. Sponenburgh <lloyds@fiscalinfo.com. This set of compositions was invented by Robert Veline and is used in Kosankie's 'Chemistry of Fireworks (Chemistry of color) class'.
Comments: These compositions are part of a matched set invented by Robert Veline. The compositions mix compatibly to produce a wide range of other colors. Examples are given below. The wood meal in this prime makes the stars a little 'fuzzy', making the stars much more easy to ignite. Without the wood meal prime the stars are often blown blind.
Preparation: Summary of Robert Veline's own comments: "Potassium perchlorate is a fine powder. Parlon is Hercules brand or Superchlon brand from Ishihara co. ltd. Red gum is a fine powder. Copper(II)oxide may be substituted by copper carbonate without much change in performance. Calcium carbonate is 200 mesh, 'Whiting'. More pure forms slow the burn rate and degrade the color."

Potassium perchlorate.....55
Charcoal, air float.....20
Wood meal, 70 mesh.....6
Red Iron Oxide, Fe2O3.....5
Magnalium (50/50).....5
Potassium dichromate.....5
Dextrin.....4

Brilliant core coating composition
Source: Composition from Shimizu[1], page 219.
Comments: This composition can be used to prime the 'Brilliant Core' stars (see effect stars). roll the cores in this prime untill they are round.
Preparation:

Potassium perchlorate.....33
Barium nitrate.....34
Aluminum (fine flake).....10
Rosin (BL combustion agent).....8
Antimony trisulfude (or sulfur).....9
Boric acid.....1
Soluble glutinous rice starch.....5