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## How to Build a Charcoal Cooker & Make Charcoal

### CAUTION!!

Working with pyrotechnic devices is a very rewarding endeavor that can become a lifetime passion. To ensure continued enjoyment of this hobby, please follow appropriate safety guidelines. Work in an open area outdoors, keep all pyrotechnic mixtures in closed containers, limit any compositions to only the amount needed for a particular item, store finished items in an appropriate day box or magazine, be sure to wear appropriate non-synthetic clothing, wear eye protection and keep a source of water nearby. FireSmith cannot be held responsible for any accidents or incidents resulting from the construction and use of any pyrotechnic devices. It is highly recommended to check and adhere to all local, state and federal regulations. Please consider joining the PGI and any pyro clubs in your area so that you may construct pyrotechnic items in a safe and legal environment. Additional information can be found at [www.pgi.org](http://www.pgi.org).

Charcoal is the foundation for everything pyro. Upon this one substance an almost infinite list of formula and devices are built. Charcoal is a requirement for a multitude of comps and an absolute necessity for anything black powder based. In essence, it is nearly impossible to be involved in pyrotechnics without having access to quality charcoal. Unfortunately, sourcing this charcoal seems to be a stumbling block for many new to the hobby. Black powder that has good performance is tough to make with many of the commercial charcoals on the market. Luckily making charcoal is a very simple process and is quite satisfying. Additionally, black powder made using "home brewed" charcoal is typically much faster than what can be sourced commercially.

In essence, producing charcoal is nothing more than "cooking" wood in an environment absent of oxygen. During this procedure volatile hydrocarbons, water and saps are driven from the wood, leaving pure carbon behind. The quality of this charcoal is the critical component of black powder performance. Generally speaking, a hard wood produces a "slower" charcoal while a soft wood produces a "faster" charcoal. Though some blazingly fast charcoal can be made from woods such as willow and paulownia, my preference is to make charcoal from wood that is readily available in my area. This way I am able to produce charcoal with consistent performance from batch to batch.

I use pine as the foundation for my fast BP (useful for shell lift & break and hot rocket fuel) and oak for slower BP (primarily for stars, comets and rocket delay). Because these woods are available from just about any lumber or home improvement store I never worry about having to find a new source of wood to convert to charcoal. In fact, the wood used in this tutorial is simply pine 2x4 scraps from the local lumber store. This wood is cheap, easy to work with (no nails, bark or dirt to remove), makes fast charcoal and is available all the time.

The charcoal cooking pot (or "retort") is best made from stainless steel. Though plain steel pots, cans and tubs will work, they tend to break down very quickly and can introduce rust into your finished charcoal. Stainless lasts much longer and will not present impurities into your finished product. Cheap stainless pots can be sourced from just about any discount store. The techniques detailed in this tutorial can be scaled up to produce as much charcoal as you wish. When I am making large batches of charcoal (20lbs at a pop) I use a stainless beer keg as a retort. This is then placed in a pottery kiln that is fired with a propane burner. I can produce enough charcoal to last a year in just a couple afternoons.



#### Required Materials

Stainless Steel Stock Pot  
Aluminum Tape  
6 Small C-Clamps  
Wood of Your Choice  
Fiberglass Pipe Insulation  
Turkey Fryer Base & LP Tank  
Drill & 1/4" Bit



#### Step 1

Using the 1/4" bit, drill 4 vent holes in the lid of the stainless pot. Space these vent holes evenly around the lid.



**Step 2**

Load the stainless pot with wood chunks. When filling the pot be sure to load the wood loosely and with plenty of air gaps. This will help the charcoal to cook more quickly and evenly.



**Step 3**

Wrap the pot with 2 layers of fiberglass insulation, securing it with aluminum tape. Though this insulation is not absolutely necessary, it does help cook the charcoal a bit quicker while using less fuel.

Now that the pot is filled with wood and insulated it will be referred to, in proper charcoal making terminology, as a "retort". (A container or furnace for carrying out a chemical process.)



**Step 4**

Secure the lid with 6 c-clamps evenly spaced around the perimeter of the retort.



**Step 5**

Set the retort on the burner and turn the heat to the highest setting. Though the base of a turkey fryer is used in this tutorial, just about any BBQ grill will serve the same function. However, the fryer base puts out plenty of heat and is very portable.



**Step 6**

After about 10-15 minutes, small wisps of smoke will begin to appear from the vent holes.



**Step 7**

After another 10-15 minutes the volume of smoke being emitted from the vent holes will increase dramatically. This smoke consists of water, saps and various hydrocarbons contained within the wood.



#### Step 8

The smoke being vented from the retort is quite flammable. As the wood cooks a bit more and the temperature inside the retort continues to rise this smoke will catch fire. At this point the smoke will completely disappear as the charcoal cooking by-products continue to burn away.

If charcoal is being made on a windy day, it is entirely possible these flames will not remain lit. Instead, thick volumes of smoke will continue to come from the vents. The charcoal is still cooking and the same chemical transformation is still occurring but the wind is simply preventing the smoke from igniting.



#### Step 9

After approximately 2 hours the flames emitted from the vent holes of the retort will subside. Small wisps of smoke will still appear from the vent holes as the remainder of the undesirable elements continue to be cooked from the wood. At this time continue to keep heat applied to the retort for another 10-15 minutes. The charcoal is done cooking when only small traces of smoke are being observed from the vents.



#### Step 10

Turn off the flame and let the retort sit for another 10 minutes.



#### Step 11

The retort should now be cool enough to be sealed. Using pieces of aluminum tape, cover the vent holes. This will prevent any oxygen from entering the retort and causing the charcoal to smolder, eventually turning to ash. Let the retort cool overnight. So long as it is sealed air-tight, the retort should be cool to the touch the next morning. If it is still warm, it is quite likely the retort wasn't completely sealed and the charcoal continued to burn throughout the night.



#### Step 12

Remove the lid and examine the results. Charcoal produced using the method detailed in this tutorial will still maintain the same basic shape and size of the wood initially placed in the retort. However, the charcoal will be much lighter and quite brittle. The actual weight of the charcoal is about half that of the beginning weight of the wood. A good rule of thumb is that 10lbs of wood will produce about 5lbs of charcoal.



#### Step 13

Spend a few minutes breaking up the charcoal. As long as the charcoal was cooked long enough, this is quite easy to do by hand. This charcoal can then be further processed using a coffee grinder or ball mill.