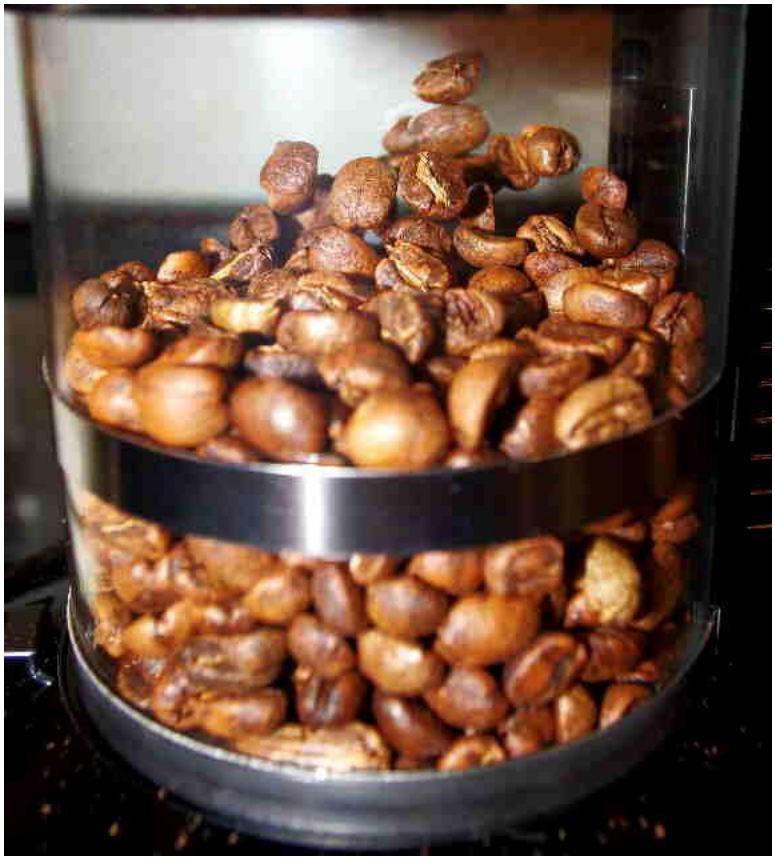
Deejay's

Coffee Bean Basics



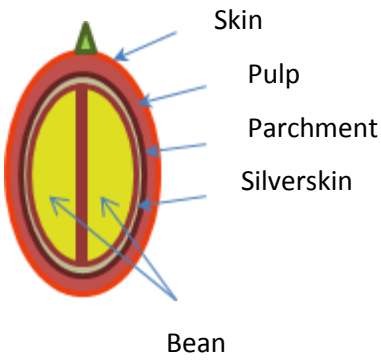
By D.A.Jacobs

Contents

Coffee Bean Basics

It may surprise you to learn that coffee is actually a fruit. It grows on a tree much like a cherry or apple tree. It is carefully cultivated and nurtured until after about 3 to 5 years when it finally blooms and produces a tiny red cherry. Inside of the cherry there are normally two seeds, these are what we know as coffee beans. The reason I said normally two seeds is that there are occasionally abnormalities just like everything else in life where only one seed is formed. That malformed bean is known as a *peaberry*. Some people consider these beans to be highly prized and others consider them garbage. I guess it's an individual thing. We shall see …

CHERRY LAYERS



Here is a picture of what a coffee cherry looks like. Only the very center of the cherry is used to make coffee – the bean.

As the cherry is roasted the skin, pulp, parchment and silver skin shrink and dehydrate this is known as the chaff. The action of the cherry bouncing around eventually loosens and dislodges the *chaff leaving only the bean behind. The bean will then continue to roast hopefully until just the right level of roasting is achieved.

*Chaff is just a thin layer of skin that surrounds the bean and doesn't add anything to the coffee so it gets removed.

Chaff kind of looks like those little skins that come in a can of Spanish peanuts and can make a mess as it blows around easily and no matter how careful you are – it gets everywhere!

Different beans have different levels of roasting to achieve the perfect roasted flavor profile. These different levels are known as Roasts. The beans will be roasted from between 370°F to 450°F degrees for up to 20 minutes. During this time they will actually lose 18 to 23% of their weight, but swell and increase in size by as much as 35 to 60%. The color of the bean will go from a light straw green color to medium brown. Some coffees may even become a dark brown, depending upon the degree of roasting you choose.

Processing Methods of Green Coffee

Before they can be roasted, green coffee beans must be separated from the moist, sweet cherry pulp and inner hulls, then cleaned and dried. This series of steps is known as processing or preparation. The main processing methods are known as natural (dry), washed and semi-washed.

The method used for preparing beans has a dramatic effect on coffee flavor, as we'll see below. Also, preserving the subtle, intense cup quality of Specialty beans requires processing steps far beyond the simple hulling and drying needed to prepare other coffees, seeds and grains for their markets. These extra steps, directed by expert quality management, add significant expense and value to specialty coffee beans.

Natural or Dry Processing

The traditional way of preparing coffee beans for market, it is the preferred method for many origins, especially where water is at a premium. At its most basic, ripe cherries are spread on the ground in the sun. When the fruit is dry, it's pounded and winnowed to separate the beans away from the dried fruit and hulls; they're then graded, weighed and bagged.

In terms of appearance, the presence of fruit pulp during drying and the pounding during cleaning mean that Natural beans are pretty varied in color and shape. Many technical quality improvements have been incorporated to prepare Naturals for the specialty market - drying patios of gravel/cement instead of earth, or elevated racks to facilitate quicker drying. Also, machinery is now commonly used to hull, separate and clean the dried beans. The result is cleaner cupping specialty Naturals with beans that have a more consistent appearance.

In the cup, Natural coffees exhibit heavier body and flavor profiles with deeper-toned and more varied fruit, chocolate, spice and savory notes than the same beans prepared by the washed method. These coffees add depth and authority when used in blends. Natural coffees also tend to have more chaff when roasting.

Washed or Wet Processing

Wet processing, with its improved physical consistency, cleanliness and appearance of coffee beans, developed during the Industrial Revolution to facilitate advances in technology. It requires abundant water resources, and was pioneered in the tropical uplands of the New World.

Washed processing has 2 stages. The first "wet milling" stage starts with several washing and brushing cycles to separate the sweet pulp completely from the hull encasing coffee beans known as 'parchment'. Next, the cleaned parchment soaks in concrete pools for several hours, allowing chemical changes that develop beans with very clean and bright flavor profiles. They are then dried; either by the sun on cement patios, or mechanically in huge rotating heaters called gardiolas.

In the second “dry milling” stage, the beans pass through a series of machines: they’re hulled and de-chaffed; graded by high-speed sorters to regularize size, color and/or density; then weighed, bagged and marked for shipping. The extremely consistent size, shape, color and flavor of beans processed by the washed method facilitates larger batch sizes and longer, darker roasting with less fire danger.

In the cup, washed coffees exhibit bright, clean flavor and aroma, with notes of fruit, citrus, floral and spice. Flavor is mainly perceived from tongue-tip through mid-mouth and up into the sinuses. Washed coffees have light to medium-heavy body, and provide a blend’s crisp, vital first impression.

Semi-dry or Semi-Washed Processing

A hybrid process used in Indonesia, Brazil and other origins with abundant water, it is used to improve the flavor and physical consistency of Natural coffees. It is used mainly for Specialty-grade beans due to its higher expense.

The process begins with removal of the outer cherry using wet pulping machines. The beans, still coated with sweet pulp, are ‘rested’ - cured for up to a day to develop the characteristic ‘Natural’ flavor profile. The pulp is again rinsed and the parchment coffee, still with traces of pulp, is fully sun-dried. Grading, weighing and bagging is accomplished in mechanized dry mills, similar to those used in wet processing.

By gently removing most of the fruit before drying, controlling the amount of pulp contact during drying, then using mechanized dry milling – coffee flavor, and especially its physical consistency, is greatly improved. The beans retain the same flavor and body as Natural process coffees.

Storing Coffee Beans

Green beans will last for around *two years* without any appreciable loss of flavor. Green coffee beans should be stored in some sort of container that will allow them to breathe, but not impart another flavor to the beans. Burlap or paper bags are recommended. Avoid plastic containers as they will hold in humidity allowing the beans to develop molds and they will impart a plastic smell to the beans. Storing them at room temperature is fine a cool place out of direct light around 70°F with a relative humidity of 50% is ideal.

Roasted coffee beans store best in a sealed canister at room temperature. You should never roast more than you can drink in *4 to 7 days!*

Ground coffee beans only grind what you're planning to brew right away.

Stages of Bean Roasting

At approximately 398 to 402°F the moisture in the beans will begin to release and the beans will begin pop and crack open. Once the bean splits open you will begin to smell the rich aroma of the coffee. Up until that point it smells more like wet grass. This is called the first crack. It sounds very similar to popcorn popping and is much more pronounced than the second crack which is more subtle and should take place at approximately 453 to 455°F. Once the second crack is heard you should really consider stopping the process because at this point you are looking at very darkly roasted beans.

The degree of roast will go from City Roast at about 435°F, to Full City Roast at 445°F, to Vienna French Roast or Continental Roast at 465°F, to a Full French Roast at 474°F, to burnt at 486°F.

Common Roasts and Characteristic:

Bean Color	Name of Roast	Bean Properties	Final Bean Temperature	Bean Acidity	Body	Aroma	Sweetness	Comments
	Raw bean	Raw 12% moisture	NA	NA	NA	NA	NA	Smooth green bean
	Light Brown to Cinnamon Roast	Beginning to expand 1sr crack begins	380- 402°F	High	Weak	Medium	Low	Dry bean surface, very light roast Rarely used, more tea like. Can taste can be grainy and sour.
	Medium light Brown American Roast	1st Crack	402- 415°F	High	Full	Full	Mild	Dry bean surface, commonly used in the eastern US
	Full Medium Brown City Roast	1st Crack is finished	415- 435°F	High	Full	Strong	Mild	Dry bean surface, commonly used roast in the western US
	Medium-dark brown Full City	2nd Crack begins	435- 445°F	Medium	Very full	Strong	Strong	Slightly oily bean surface, a little

	Roast Viennese or Light French Roast							bittersweet, most common roast in Pacific northwest
	Dark brown French Roast or Espresso	2nd Crack finished	445-460°F	Low	Full	Medium	Full	Shiny bean surface, popular for espresso, burned undertones, acidity diminished, commonly used roast in France and Italy
	Very dark to black Dark French, Spanish or Italian Roast	Very burned charred bean	460- 480°F	very low	Weak	Mild	Low	Very shiny bean surface, burned, bitter flavors are predominant This is not very popular in the US.

Descriptions Used For Coffee

Acidity	This is the tangy flavor similar to lemon, orange or grapefruit. Known as the 'high notes' in coffee, this can be both a positive or a negative. Does the tanginess enhance the overall flavor or detract from it? Does it lend a sweetness to the flavor or is it sour? Acidity in coffee might be described by terms like bright, clear, snappy, dry, clean, winey, etc. Coffee with little or no acidity taste flat, while too much can taste sour.
Aroma	Coffee should smell like coffee. Is it a slight smell or does it smell strong? Does it smell nutty, earthy, floral, fruity, rotten, smoky, or leathery? Aroma is greatest in the middle roasts and is harsh or has burnt smells in darker roasts.

Balance	Coffee may have several different strong attributes present but no single attribute that drowns out the others – this would be a balanced or mellow coffee. If it lacks any strong attributes might be considered dull.
Bean Descriptors	Musty, Dirty, Rioy, Rough. A bunch of bad words. The first two terms relate to poor storage conditions, improper aging, or unpleasant earthiness. "Rioy" is an industry term for harshness, (pronounced ree-o-ee after Rio De Janiero), like poor quality low-grown Brazilian arabicas.
Bitterness	Coffee should not be bitter. Bitterness is one of the four taste sensations, sharp, unpleasant, like the taste of quinine.
Body	Body is how the coffee feels in your mouth; like comparing cream to skim milk. It is perceived as a heaviness to the coffee.
Complexity	Complexity is the combined presence of attributes in a coffee. Acidity, body, earthiness, sweetness, etc., combine to make a coffee complex. It could be different types blended to create the overall complexity.
Finish	This is how long the aftertaste lasts. Is it short and weak, or long and strong? Does it leave you 'wanting' for another taste right away or are you still tasting the coffee several moments after the swallow. Is it smooth or harsh? A long, smooth finish should be a few seconds and leaves you anxious for the next sip.
Flavor or Balance	Here you measure how all of the above harmonize with each other to create balance. Wild, Earthy, Natural or Spicy may relate to the processing method used, when the fruit of the coffee cherry is allowed to dry on the beans before removal. Earthiness can also be detected, I presume, based on the soils the coffee grows in (there are earthy Indonesian coffees that are wet processed). Earthiness can quickly become dirtiness. Dirty coffee is unpleasant. The winey flavors of some wild coffees is called sour when it becomes unpleasant.
Plant Species	**Arabica:** This is one of the two main species of coffee known for better flavor against its sister Robusta. It has less caffeine, and depending on the variety within the species, the bean can be very versatile in roasting profiles. ALL Hilo Coffee Mill coffees are Arabica. **Robusta:** The other of the two main species, has primarily been known for its inexpensive cost. Because it is known to be higher in caffeine and inferior in the major flavor characteristics, it is often used for blending, or filler to reduce the cost of a

	quality coffee (Arabica). Hilo Coffee Mill does NOT sell Robusta.
Roast Descriptors	**Sweet -** caramelized flavors in balance with other characteristics of a coffee. **Baked or Bready -** Under-roasted coffees, coffees roasted with too little heat leaving the inside under roasted and the outside scorched or simply scorched beans . **Bittersweet -** The bitter-sweetness developed as the roast gets darker until all acidity is gone but the caramel taste of burnt sugars form like dark chocolate. Think Starbucks! **Burnt:** No description necessary!

Coffee bean size classifications

Coffee is commonly classified based upon screen size, i.e., the size of the holes of a screen sorting system. The screen holes are based on sixty-fourths of an inch, so for example if you had a #15 bean size that bean would be 15/64. Bean classification helps ensure bean size uniformity which makes roasts more even (though some roasters eschew uniformity for complexity, at least for certain bean varieties). Some people believe that larger size beans have a better taste profile, though that does not necessarily hold true when comparing different varieties of coffee some of which are inherently smaller varieties that have a "richer" taste than some of the larger varieties.

There are also regional classifications rated from smallest to largest:
Central American and Mexican - Terceras, Segundas, and Superior
Colombia - Excelso or Supremo
African and Indian - C to B to AA
Kona - No. 1, Fancy, and Extra Fancy

A single "named size" may translate to different screen size depending on the intended export destination. Named classifications may have other differences such the Kona rankings also account for the average defects per pound.

Size grading is usually done for export purposes, with the lowest grade beans not considered exportable.

Coffee Bean Descriptions By Origin

AUSTRALIA	Delicate and well balanced; soft acidity; mellow sweetness; full body; bright; fruity; flowery aroma; delicate, wine-like feel in the mouth.
BRAZIL	Brazilian coffees have nutty, dark/bittersweet cocoa characteristics and good body. Being lower-grown coffees, the beans aren't as dense and tend to roast up a bit faster.
COLOMBIA	Colombian coffees are generally medium-bodied, sparking and rich, with a winey characteristic and good complexity.
COSTA RICA	A smooth, rich, subtly fruited and well-balanced. slightly nutty, and fruity.
ETHIOPIAN	Ethiopian and Yemeni coffees are arguably the most complex in the world. Harars are dry-processed coffees that are intensely fruited, intoxicatingly aromatic and have a great complexity of flavors.
GUATEMALA	The Antiguas include the subtle, complex, chocolaty and fruity to nutty , floral and bright.
HAWAIIAN	Hawaiian coffees are known for being soft, smooth, rich and complex, yet subtle; in a word "fragile". Careful though, it's very easy to over-roast these coffees and roast out the subtlties and complexities, especially the larger *Typica* varietals, i.e. Konas & Jamaican Blue Mountain. In general, these coffees are very well-balanced, with delicate fruity or red wine brightness and subtle notes of nuts, chocolate and spice. Brightness is key to a great Hawaiian/Caribbean. Brightness in a coffee is what is responsible for, or what "carries" the flavors. As these coffees are delicate and subtle, if there isn't enough brightness, they can taste "flat". Lighter roasts tend to preserve the the brightness, hence the varietal subtleties well. As previously stated, it's very easy to over-roast Hawaiian/Caribbean coffees, destroying the subtle flavors that make them so wonderful.
INDIA MALABAR	Aged India coffee exposed to monsoon conditions, with a golden color and a unique mellow flavor.
INDIA MYSORE	The India coffee district of Mysore coffee tends to be sweet, spicy, and super rich with a light body and full aroma; Arabica
JAMAICA	The best Jamaica Blue Mountain coffee is characterized by a nutty aroma, bright acidity and a unique beef-bouillon like flavor. Jamaican High Mountain is a term that applies to coffees of lesser quality that are grown at a lower altitude than Jamaican Blue Mountain.
KENYA	Kenyan coffees have long been known for their intense (albeit fairly thin-bodied), bright, complex, fruity/red wine character. This fruity character can show up in a wide range of flavors from citrus to apricot to berry, depending on the particular lot. If you're a fan of bright, bold, in-your-face coffees, then Kenyans can be right up your alley.

MEXICO	Typically, Mexican coffees are soft and smooth, yet bright, with a light to medium body. The vast majority of good, specialty-grade Mexican coffees comes from the Oaxaca and Chiapas regions in the very southern end of the country, although we will occasionally run into good coffees from Coatepec in central Mexico as well. Chiapas borders Guatemala on the south, with Oaxaca bordering Chiapas on the north.
NEW GUINEA	Unmistakable cup; great body; herbal acidity; wonderful light finish; Arabica
NICARAGUA	Nicaraguan coffees are typically Central American, smooth, and well-rounded, with nice brightness; medium-bodied with a trademark floral quality.
PANAMA	Panamanian coffees can range from subtly fruity to sparkling and winey. They are complex and smooth, well-rounded, rich and satisfying.
SULAWESI	Sulawesi coffees, though very similar in characteristics to Sumatrans, are a bit lighter, mellower and more balanced.
SUMATRA	Heavy, almost syrupy body, pronounced earthiness, trademark "funk"* (not as a defect though, as a good thing!), and despite the brighter, winey character of many Lintong coffees, low acidity. Many people who shy away from coffee because of the acidity can actually drink Sumatran coffees without the unpleasant "acid stomach".
YEMENI	They are intensely fruited, with flavors running from banana to berry. Yemens can also exhibit a musky earthiness that adds a nice balance to the cup. Should be given extended rest after roasting.

Coffee Roasters

It seems there are a multitude of gadgets used for roasting coffee beans. From what I have read this could be anything from a cast iron skillet to a popcorn popper. They also have dedicated coffee roasters for home use that are not too terribly pricey. I even saw one guy that adapted a rotisserie for a charcoal grill into a coffee bean roaster.

It seems that one of the most popular methods for DIYers to roast green coffee beans is to use a whirly bird type or hot air popcorn popper. That's right - an everyday popcorn popper. The only requirement is that they must be the side-vented models .These things can be bought for less than $50 new or picked up at Good Will or yard sales for around $5 so this doesn't have to be a costly venture. I am not recommending any brand or models but they might look like this.

Whirly-bird stove top

Whirly-bird fireplace

common hot air popper

You could also use a dedicated cast iron skillet and constantly stir the beans and monitor temperatures with a candy thermometer but getting a consistent or even roast would be difficult. It is claimed that this method will produce a roast with more body and deep notes but will lose some of the bright notes. Once the proper color has been achieved just pour the beans into a large metal colander and toss in the air to cool and remove chaff.

It is important to use a dedicated skillet as the coffee will absorb the flavors from the pan. Hmmmm bacon flavored coffee … That may be another article for later.

Another method you could use is gas or convection oven roasting. This method requires your oven go to at least 550°F and you have a pan baking sheet with holes spaced ½ inch apart. You must put one layer of beans on the pan at a time and a raised lip so they don't fall out. This will do large batches of beans but is very difficult to get even roasting. Once the proper color has been achieved just pour the beans into a large metal colander and toss in the air to cool and remove chaff.

Coffee roasting does produces some smoke and fumes and should be done in a well-ventilated area. Many home roasters do this outside but I find my roaster works well on top of the stove with the vent on high. The smell although rather pleasant at first tends to change to more of an unpleasant burnt smell after the first day. So if you can't open a window to exchange the air you might want to rethink where you are going to roast your coffees.

The two most popular methods for home roasting coffee beans are the Fluid Air Bed roaster and the drum roaster. It is a common belief that fluid bed roasters produce more "acidity" in the coffee beans, and drum roasting tends to produce more "body".

The biggest drawbacks in home roasters is the capacity of the roaster, the ability to cool the beans quickly and stop the cooking process and the price tag. Much like meat the beans will continue to roast due to residual heat stored in the beans after the roaster had been turned off, so I believe one important feature it is to have method of quickly cooling the beans built into the machine.

Stovetop Whirley-Pop Popper - The Conduction method

This popper can produce any style of roast, from City roasts to Dark French/Spanish roasts. The lighter roasts are more difficult with this method because it is difficult to turn the beans evenly for even roasting. Air roasting produces even roasts with less effort, but if you like doing things the "olde tyme way", you may enjoy this! Beans can be observed during the roast since half the Whirley-Pop lid is hinged and flips up. Since there is no fan or motor, it is very easy to hear the cracks with this method. This produces a roast close to drum roasting (just more smoky since there is no air flow) and you can roast 8 oz of coffee at a time. More effort required than a roasting appliance or even an air popper because you have to crank to agitate the beans. And if you don't like this roast method, the stovetop poppers are incredible popcorn poppers!

What You Need: Whirley-Pop (previously known as the Felknor Theatre II) or Back to Basics

Stainless Steel popper, or another similarly designed device, gas stove (electric with larger burner OK too), thermometer is mandatory for this method, a metal colander or two for cooling, and oven mitt.

The **benefits** of Stovetop roasting:
You can roast more in one batch than air roasters, and more than some expensive drum roasters! 1/2 to 1 pound batches are possible. With the Stainless popper you might be able to roast a bit more too. This means you can probably roast enough for a week in one sitting, and with 1 or 2 batches.

You can get good roast results through the entire range, from City roasts to Dark French/Spanish roasts. Lighter roasts are a bit more difficult with this method. But all levels can be done well with a proper technique.

It's fairly quiet and with experience you should be able to hear the first crack and second crack easily.

You can have total control over the length of the roast, getting more of a "drum roast" profile, which some people prefer for espresso.

You can go nuts and modify/customize the process endlessly. People have added spit motors or electric screwdrivers to power the agitator, bolted the roaster to camp stoves so it doesn't move around on them, installed thermometers of all sorts...

The **problems** with Stovetop roasting:
Stovetop roasting produces a lot of smoke, mainly because you are roasting more coffee in each batch. You must have a hood over your stove that actually goes to the outside, or roast outdoors on a camp stove ... or maybe you *really* like smoke..

This method requires some skill - you need to set the heat source so you don't roast too fast and scorch coffee, or too slow and bake it.

You need to be patient ... to roast coffee well the process takes 8 to 15 minutes, and you need to stand there and slowly crank the roaster the whole time. Sometimes the popper doesn't crank easily and you need to overcome that ... Stovetop poppers might require some adjustments and occasional repairs to keep working right. Poppers are for DIY people (do-it-yourself). You may need to fix gears, replace rivets with screws, modify the stirring paddle, etc.

Some coffees don't get along with stovetop roasters and tend to jam them up ... namely the Yemeni coffees and other small-bean types. Peaberry coffees roast especially well because they "roll" in the popper.

Stovetop roasting takes some practice. There are more variables than other methods since you set the heat and provide the agitation. But the results can be outstanding and the 1/2 lb. batch is nice. It sometimes seems like a 3-handed act: before you start, try a dry-run by adding green coffee without any heat, and agitate it. In the course of the roast, agitation gets easier as the coffee loses weight and expands.

Instructions:
Turn on your stovetop exhaust fan, or open a kitchen window. Have all your supplies within reach.

Measure out about 8-9 ounces of coffee by weight, or about 12 ounces by volume.

Use a low flame / medium electric burner setting. **NEVER use highest heat settings/flame - you'll scorch the coffee!** See the tip below about using a heat-diffusing cast iron pan if necessary. Heat until thermometer reads about 400 degrees. **PLEASE NOTE:** A thermometer is going to give an incurrate reading when the inside of the popper is shiny and reflective, so use a LOWER heat until the popper is broken in and seasoned.

Put your beans in the popper and start your medium paced, steady cranking. Thermometer will drop to around 350. Don't let it drop much below 300, or get much above 400 except at the end. These temps are starting points; you will ultimately personalize the process once you have done it a few times. And remember, you are measuring the air temperature in the popper, and the actual temperature on the bottom will be higher. DO NOT ROAST BY TEMPERATURE ALONE - watch the beans and popper to be sure the roast is moving neither too fast, nor too slow.

Around 6 minutes you should hear the "first crack" and see roast smoke. Wait 1 minute and slightly reduce the heat (or lift the popper off the heat), not so much that the roast stalls, but enough so that the roast does not progress too quickly. Start checking the roast by flipping back the lid at about 30 second intervals or less. Second crack ought to occur anywhere from say 9 minutes to 12 minutes, depending on how you like to time the roast. TIP: If you can learn to roast by smell and sound only (and avoid opening the lid), you can reduce escaping roast smoke and any reduction in temperature.

You want to pour the beans out of the popper into a colander when they are a tad lighter than the color you desire, since roasting continues a little into the cooldown process .

Agitate beans in metal colander or bowl with a big spoon until they are warm to your touch. You may need oven mitts for this. You may want to shuffle the beans between 2 pans/ colanders.

You may want to walk out to a porch to aid cooling.

If beans have light colored chaff still attached to them, simply agitating them in the colander should remove it. If you blow lightly on the beans the chaff will fly off, but do this outside or over a sink to avoid sweeping the floor. Chaff has no flavor so if a bit of chaff remains with the roasted coffee, it is of no real consequence.
Coffee should be stored out of direct light (and not in a fridge or freezer) in an airtight glass jar, but with a fresh roast, wait 12 hours to seal the jar tightly; it needs to vent off C02.

Warm, fresh roasted beans are wonderful, but the coffee attains its peak 4 to 24 hours after roasting. If you store it as recommended, we'll call it fresh for 6 days. When you open that jar in

the morning, you will know what fresh coffee truly is.

More Tips:
If the agitator jams while cranking, don't force it. Work it free by cranking the opposite direction. When the popper is cool, see if you can bend the agitating tines to hug the bottom of the pan a little closer.

If the flame is too high, or you worry about burning up the pan, you can use a cast iron pan, or cast iron heat diffuser under the pan.
Having trouble getting an even lighter roast? You need to slow down the initial warm-up period of roasting (from the time you put the coffee in until first crack).
Clean the popper with scalding hot water every so often to reduce the coffee oils ... it is not necessary to clean it after every roast. I clean mine after every 15-20 roasts.

Modifications and Refinements:
We recommend *Home Coffee Roasting* by Ken David's for more information. You can use the stovetop popper without a thermometer - but the thermometer gives you more information that can help you make roasts more consistent. Stove popping is great! It's like cranking an old butter churn or a meat grinder.

Resist the urge to peek all the time! Listen to the sounds and smell the steam/smoke. After you do this a few times, you'll know what stage the roast is without looking, which lets a lot of heat escape and makes the kitchen smokier. Remember, first crack sounds like corn popping, while second crack sounds like the snap from an electric spark (or a "snap" in the sense of "snap, crackle pop").

When the roast is done, there may be a lot of smoke that makes it hard to judge the color. A good overhead light helps a lot. I keep the popper closed, walk outside with my metal colander, and then transfer the beans.

Here's a helpful overview of the stovetop process written by Philip Scott-Smith. a home roaster on the island of Guam. It sounds like his inital temperatures are probably too high for the stainless poppers with the plexi window - unless you have modified the popper and replaced this with a pie plate:
"I believe I finally have the Whirley-Pop method worked out right.

The most important thing to remember is that the W-P is a CONDUCTION roaster. Consequently, the beans always are at risk from scorching. Even if the thermometer is reading acceptable temps, it's easy to get scorched results because simply cranking the agitator doesn't get them far enough away from the hot skin of the roaster.

Here's my new method, which has produced consistently superb coffee (possibly even better than my Hearthware roaster):

Once the temperature reaches 450*F, I lower the flame to the smallest available (I use a single-burner Coleman stove in my carport). When the temp has stabilized at 500*F, I add 9 oz. of green beans and swirl them for initial, even distribution (swirling as though they were marbles in a covered sauce pan). Then, I crank at a moderate speed until I see the temperature start to rise. At that point, I swirl the beans for about 30-40 seconds, keeping

the pot's bottom centered fairly closely over the flame (the swirling mimics some of the levitation we see in fluid bed roasters, and that's how I got the idea).

The cycle continues: more cranking (faster now), then the next temperature rise, then more swirling, etc... . With each rise in temperature, I crank a little faster after swirling. I take my first look inside the chamber after the first crack. As the temp passes 375* and approaches 400*, I swirl continuously, take one last peek, and dump them in the colander. At that point, they usually are just right for me (Full City/Vienna). If still not dark enough, back they go for a few more seconds. If I'm after a lighter roast (e.g.: Harar), I check the beans more frequently after the first crack. Once I'm satisfied (beans slightly lighter than the desired final color), I shuttle them between two colanders until cool. And that's it! Fast and furious at the end, but gosh! the coffee's wonderful. - And there's a 9 oz. payload for the effort! "

Fluid Air Bed Coffee Roasting

The Hot Air Popcorn Style Coffee Roaster

The advantage of this unit is that it keeps the beans moving so they don't burn and it gives you a fairly even roast. While the beans are jumping around in the popper it knocks off the chaff and sends it flying out the front of the popper.

The plastic cover needs to be replaced with a tin can or something as it will melt but it seems to work rather well although limited to roasting one rather small batch of coffee and must be cooled down before using again.

I have also heard of people using modified bread makers to stir the beans and heat guns to roast them but I haven't bothered to research this one.

There are also dedicated commercially built, fluid air bed roasters available that are basically redesigned popcorn poppers. These roasters have built-in controls for time, temperature, blower speed and a cool down mode to stop the cooking process of the beans. Many parts are built of steel not plastic so they should last much longer and due to these changes they will allow you to roast one batch right after the other unlike the home modified versions.

Here are a few examples of the fluid bed roasters available today to the home roaster:

FreshRoast SR 500 - $160

Nesco Pro – $135 - made in Wiconsin

Hearthware I Roast - $180

Model	Capacity	Adjustable temperature	Adjustable fan speed	Smoke Reduction	Built in Memory	Price
FreshRoast SR 300	4 oz.	preset	preset	No	no	$110
FreshRoast SR 500	4 oz.	yes	yes	No	no	$160
Nesco Pro	4 to 5 oz.	preset	preset	No	no	$135
I Roast	5.3 oz.	yes	yes	Yes	yes	$180

Drum Roasters

Drum roaster tend to roast coffee beans at a slower rate but they have a larger capacity and larger price tag. While fluid air bed roasters are limited to 4 or 5 oz. batches drum roasters can roast up to 16 oz. at a time. Your choice may be simply based on the amount of coffee you drink, and the price you are willing to pay. Time may also be a consideration. You can conceivably roast two batches of coffee in a fluid bed roaster in the same amount of time it will take one batch to roast in the drum roaster. So if your plan is to roast more than one type of bean you could save time by buying a fluid bed roaster. If you predominately drink only one type of coffee you might just want to roast a larger batch in the drum roaster.

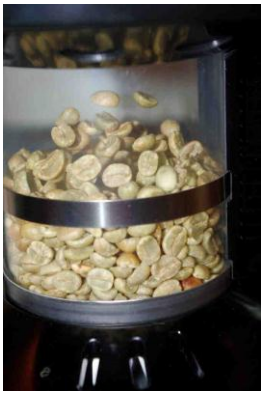
Model	Capacity	Adjustable temperature	Adjustable fan speed	Built in Memory	Programable	Price
Gene Café	12 oz.	yes	yes	No	no	$495
Behmor 1600	16 oz.	yes	yes	No	no	$300
Hot Top Basic	9 oz.	yes	yes	yes	yes	$730
Hot Top Programmable	5.3 oz.	yes	yes	yes	yes	$930

Roasting Your First Green Coffee Beans

When roasting coffee beans there are a few thing you need to carefully watch and they will be pretty much in this order:

Bean Color – as the beans are roasted they will gradually change color from green, to yellow, to tan to brow to black. Some color changes will occur faster than others.

Here is an example using some Costa Rican Honey Palmares beans an excellent coffee!




Green Yellow Tan Brown

Temperature - If you are using a process which does control temperature automatically you will need to monitor temperature based on the style chart at the end of this section.

Aroma - the beans will start out smelling much like wet grass and as they get closer to the target temperature your will smell the aroma of a good fresh roasted coffee.

Sound - the beans will crack as they release moisture. *The first crack* is fair loud and similar to popcorn popping. *The second crack* is least distinct but more rapid sounding more like bacon frying. The first and second crack will determine what levels different varieties are roasted too.

Time – as you use your roaster make a note of the time it takes to get to the first crack, and different color levels and the second crack if needed. When roasting the same variety of coffee you will be able to duplicate or make subtle adjustments until you roast your perfect cup.

Once the beans have been roasted they need to be cooled as rapidly as possible to stop the roasting process. A metal colander works well for this if you don't have a cool down mode on your roaster or a chaff collector, just toss the beans up in the air and at the same time blow off the chaff or use a small fan or even a light wind. The beans are light so be careful not to lose them.

Once the beans are roasted you could grind up the beans and brew a pot but it is best to allow the built up carbon dioxide to be released from the beans. This is known as degaussing the beans. Some people recommend a few hours while other suggest a few days. I generally wait overnight to 24 hors or more although I have brew a pot or two with new beans to see what they taste like right out of the roaster. It's danged good!

Roasting Green Beans Using the Fresh Roast SR 500

Roasting coffee is a simple process and using the Fresh Roast fluid air bed coffee roaster makes it even easier.

Simply add 4 scoops of beans, turn on the timer, turn the heat up to full, fan up to full and let it go.

As the beans cook and become lighter you can turn down the fan if you wish. This could conceivably prevent the beans from smashing themselves apart. At some point you may also like to turn down the temperature. Different beans will require slightly different roasts. Often the vendor will have suggestions for where to start. As I said this is pretty simple but the smell and taste are amazing! I should have done this years ago!

The Basic Roasting In a Nutshell

You'll need to get your beans heated up to between 460°F and 530°F

Do your roasting in small batches, to keep things manageable.

Your green beans will first turn yellow, then start to brown.

The moisture within the beans will begin to steam off.

The steam will soon take on a familiar coffee aroma.

First Crack - a loud crack can be heard as the remaining moisture bursts from the bean. At this point, the sugars are starting to caramelize and you can consider your coffee roasted. Of course, this is only the lightest roast. You can keep roasting until the you reach the darkness you prefer. Your beans will darken quickly, so you will have to keep an eye on them.

The sugars caramelize further, and the oils of the coffee bean are released, creating a more flavorful roast. Only your own taste preference can determine how dark you want to go. Trial and error will help. You may want to save a few beans from a roast you like, so you can compare the color.

Yes, there will be some smoke as you roast. Be prepared to get a fan going or open a window.

Second Crack - another loud crack will be heard. Your coffee is quite dark at this point. Most people reach their desired 'doneness' before the second crack takes place.

If your roast much beyond the second crack, all of the sugars will have burned off and your beans will produced a harsh and bitter cup of coffee.

The length of time it takes to reach the various stages really depends on what method you are using. It may take anywhere from 10-20 minutes for a dark roast. Keeping note of the time may help when trying to replicate your results, but you should ultimately trust your eyes and nose when watching for 'doneness'.

One more point: your beans will continue to roast under their own heat once you remove them from your roaster. Keep this in mind when you are watching them brown. You should stop the roasting a wee bit before they reach the desired darkness level. Cooling them quickly by tossing the beans in a colander or even spritzing with a little water will help keep the prolonged roasting to a minimum.

There you have it. It's really quite simple. Coffee roasting is not an exact science, so be prepared to try and try again until you master the perfect roast.