The Buzz on Roasting Decaf

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With Willem Boot

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Decaffeination and Coffee Quality

The daunting mission of researchers to develop the best methods for decaffeination resulted in hundreds of patents to decaffeinate coffee. Today, three main processes are used to create decaf specialty coffee: the traditional chemical process, the water method and the hypercritical carbon dioxide method (see Getting the Lead Out on page 7 for a detailed description of these processes).

Despite all the improvements made with these technologies, no process completely preserves the natural flavor of the coffee bean. Caffeine has a distinct bitter taste but the major flavor change as a result of decaffeination is not caused by the lack of caffeine, but rather by the impact of the decaffeination method on the bean.

When discussing decaf coffees, there is always the million dollar question about quality: which method is best for the beans? Unfortunately, this question is hard to answer because it would require thousands of pounds of coffee beans to perform a comparative test, utilizing the same coffee. Most decaffeination plants require a minimum volume of 7,000 pounds, and we would need three times that amount of the same coffee to test all of the methods.

In general, I have found that the traditional chemical methods, such as methylene chloride, do a good job in maintaining the flavor profile of the beans and that these processes preserve quite well the lower and the higher notes of the coffee. Picture A. (shown right) shows a methylene chloride decaf bean from Costa Rica.

Most methylene chloride processing is done in Germany, which creates a challenge: it is hard to send lots smaller than one container (37,500 pounds) for decaffeination. Many brokers and importers in North America purchase stock lots of decaf beans from the German plants, and the quality of these stock lots tends to be very inconsistent, varying from abysmally bad (decaf coffee with robusta flavor) to very good (decaf coffee with bright, complex flavors).

The best advice when purchasing decaf green beans is to compare at least three alternatives before making a purchase. It is always important to cup your green coffee beans when purchasing decaf beans from any of the other processes as well. When buying water processed decafs, there is the advantage that North American brokers and importers generally carry a good selection of decaf beans from all around the world.

For the sake of this article, I will make a comparison between some types of Mountain Water- and Swiss Water-processed beans. Picture B. shows a Mountain Water-processed Mexican bean and picture C. displays a Swiss Water-processed Indonesian bean.

Picture A. Methylene Chloride process —Costa Rica

Picture B. Mountain Water process —Mexico

Picture C. Swiss Water process —Indonesia

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Roasting: Tips & Strategies

I am sure that anyone who has roasted decaf coffees before has struggled with developing a consistent roast profile. The key reason: decaf beans have already been processed once. This leaves the color of the beans ranging from a straw yellow to a light cinnamon brown. As a result, color changes during roasting are difficult to notice, especially towards the end of the process. Decaffeinated beans are also harder to roast because it is very difficult to gauge the development of the coffee during the roasting process. The last phase of decaffeination generally includes a polishing process which can be necessary to remove oil residues from the outer surface of the beans. This polishing process tends to clean the beans to the extent that little or no chaff is released during roasting. Most roaster operators know that when roasting regular specialty coffee, the outer surface of the beans tends to change from a corrugated profile (before the first crack) to a smooth profile (after the first crack).

With decaffeinated beans, the exterior part is already smooth before roasting. On top of that, the beans release little or no chaff, so it is understandable that even the more experienced roasters can be confused while roasting decaf. To make matters worse, decaf coffee has a more brittle cell structure, which allows these beans to release moisture easier, resulting in the likelihood of creating very fast roasting times. I have noticed roaster operators completing their decaf roast batch in less than 10 minutes while they would allow at least 12 minutes of roasting time for regular coffee beans. Decaf coffee beans that have been roasted too fast will easily develop sour or astringent flavor notes. Specifically, it is essential to control the roasting process from the start of the first crack, and at this point you should reduce the level of the gas flames.

When the first crack is almost completed, the bean temperature should only increase gradually, approximately one degree per five seconds, absolutely no faster. The objective is to be in control of the roasting process. To help you do this, you should create a time frame of at least three minutes between the start of the first crack to the start of the second crack.

If you keep your roasting colors light, which is a challenge with decaf beans, and if the end of the roast is before the second crack, then you must maintain three minutes between the start of the first crack and the end of the roast. As I have previously advocated, it is important to create the best possible light conditions around your roasting machine. I recommend using one or more 75- or 150-watt incandescent full-spectrum flood light bulbs.

It is interesting to observe how different the roast development is between Mountain Water and Swiss Water beans. Both coffees were roasted on the same sample roaster, using the same time temperature profile.

After five minutes of roasting, it is amazing how different the outside bean color is of both coffees (see pictures D. and E.).

Picture F. shows the lighter interior color of the Swiss Water bean (five minutes), and picture G. and H. display the roast color after eight minutes of roasting, right after the first crack. The Swiss Water bean has already developed a very dark color, and at this stage, the roaster operator has to reduce the level of the flames to stay in control of the process. It is also quite interesting to notice the progressed expansion of the Swiss Water bean at this point. Picture H. illustrates again the importance of controlling the bean temperature; the roaster operator must prevent the beans from expanding too fast, resulting in a premature second crack.

Picture D. Mountain Water process 5 minutes roasting

Picture E. Swiss Water process 5 minutes roasting

Picture F. Swiss Water process 5 minutes roasting

Picture G. Swiss Water process 8 minutes roasting

Picture H. Swiss Water process 8 minutes roasting

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The color development of the Swiss Water beans from the end of the first crack to the beginning of the second crack is shown in picture I.

Picture J. shows the same stages of development for Mountain Water processed beans. It appears that the differences in color between the Mountain Water-processed beans are much more significant than with the Swiss Water beans.

The comparative cupping between the different roast profiles of Swiss Water decaf beans revealed that this specific lot did not resist a darker roast profile very well. The darkest roast (I-5) had bitter, carbon-like notes which points to the fact that the roast profile has reached or exceeded the potential of the coffee to sustain such a dark roast.

The comparative cupping between the roasted samples of the Water Process beans had an interesting outcome as well. As in the previous test, it is amazing how the different roast profiles impact the flavor profile of the coffee. Samples J-3 and J-4 contained both a pleasant level of sweetness, which makes both roast levels very suitable for a successful coffee program.

Picture I. Swiss Water process Five stages during roasting

Picture J. Mountain Water process Four stages during roasting

On the next page you can see an overview of the differences between the roast profiles

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Description	Swiss Water Process Indonesian Decaf (Komodo Blend)		
	Roast I-1	Roast I-3	Roast I-5
Fragrance & Aroma	Malt	Toast Caramel	Died fruit Carbon-like
Body	Somewhat raw	Smooth	Full Pungent
Acidity	Mild sour	Slightly refreshing	Bland
Flavor	Somewhat underdeveloped	Balance between lower and higher notes	Carbon and paper notes Neutral
Aftertaste	Slightly citric	Lingering	Short and bitter

Description	Mountain Water Process Colombia Decaf		
	Roast J-2	Roast J-3	Roast J-5
Fragrance & Aroma	Malt	Neutral	Died fruit Floral
Body	Somewhat raw	Low Silky	Round
Acidity	Sharp	Refreshing	Mildly refreshing
Flavor	Underdeveloped Malty	Balance between sweetness and refreshing notes	Sweetness of dried fruits
Aftertaste	Slightly sweet	Lingering and sweet	Lingering and sweet