Decaffeinating Coffee

Using the Swiss Water Process

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Assignment #3: Process Description
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Overview

Whether or not you limit your intake of caffeine, you might wonder how caffeine is removed from coffee beans. Whereas three decaffeination methods use either a chemical or a gas, another method uses water. The three non-water methods cause caffeine to molecularly bind with methylene chloride (a chemical), ethyl acetate (a naturally-occurring chemical in fruit), or carbon dioxide (a gas). The Swiss Water Process (SWP), illustrated in this report, removes caffeine from coffee beans using water instead of chemicals or a gas. So, how is caffeine removed from coffee using the SWP?

The Swiss Water Process of Coffee Bean Decaffeination

The following descriptions explain coffee bean decaffeination using the SWP; these seven numbered steps correspond with the flowchart numbers on page 3.

1. **Soaking of coffee beans and water**
   Unroasted, green coffee beans and plain, hot water are placed in a vessel. The coffee beans absorb the water, which opens the cellular structure of the coffee beans. Both the water-soluble small caffeine (c) molecules and larger coffee flavor (F) molecules dissolve in the water, but the coffee beans remain intact.

2. **Disposal of used coffee beans**
   The used coffee beans, devoid of caffeine and coffee flavor, are discarded.

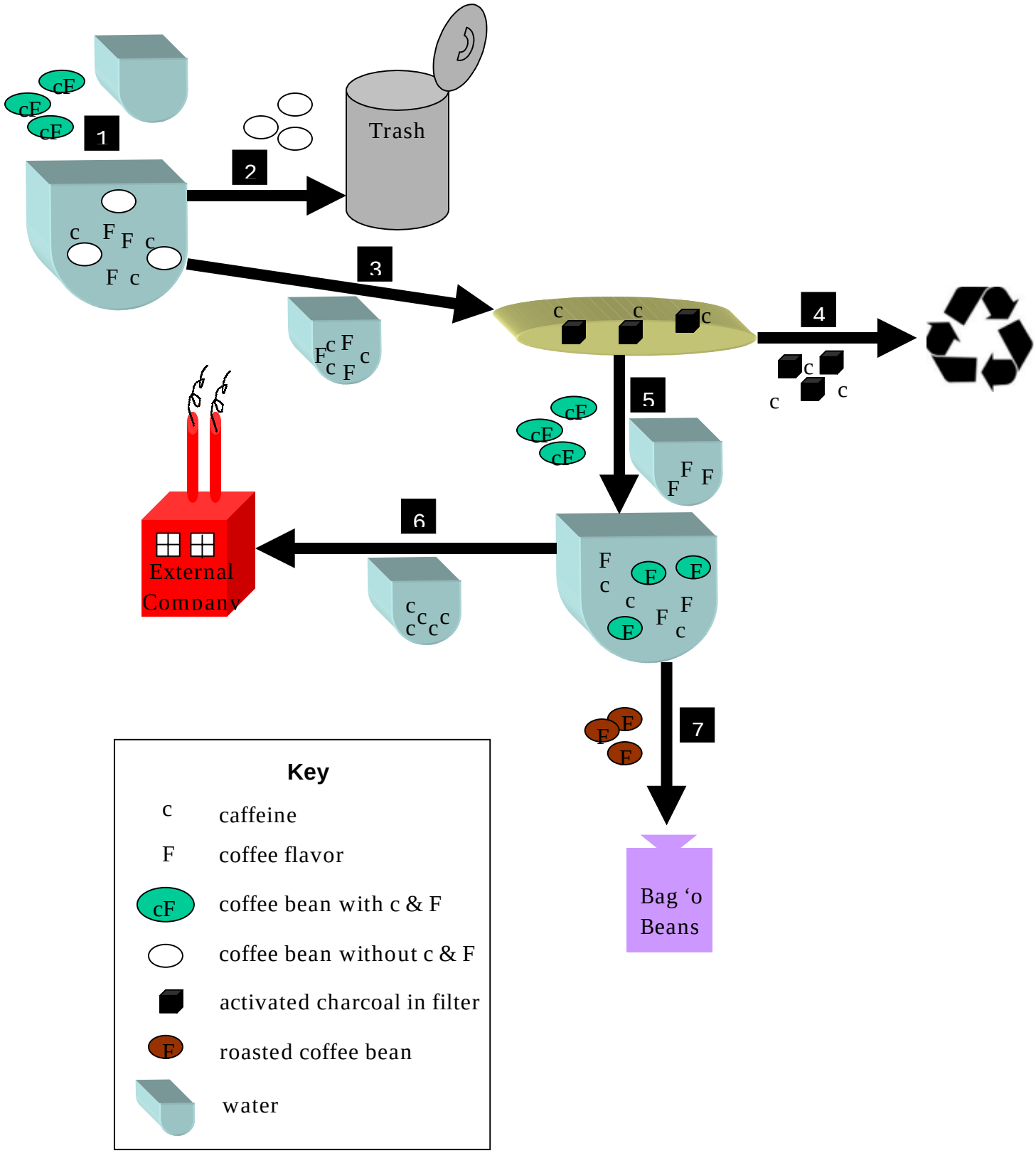
3. **Filtration**
   Saturated with caffeine and coffee flavor from step 1, water is run through activated charcoal (carbon) filters. Because the caffeine molecules are smaller than the coffee flavor molecules, the caffeine is trapped in the carbon filters and the coffee flavor stays with the water.

4. **Carbon regeneration**
   The caffeine-containing carbon is recycled for future use in subsequent SWP batches. A natural gas furnace burns the carbon to regenerate it. The caffeine burns off but the carbon remains intact.

5. **Soaking of coffee beans and coffee-flavored water**
   New, unroasted, and green coffee beans are added to the filtered, caffeine-free, and coffee-flavored water. This time, because the water already contains coffee flavor, only the caffeine from this step's coffee beans dissolves in the water. Why? No room exists for more coffee flavor—that is, the solution is super-saturated (which is similar to adding so much salt to water that the salt can no longer dissolve).

6. **Sale of caffeinated water**
   Sales of the caffeinated water to soft-drink manufacturers and drug companies help recuperate the cost of the decaffeination process.[1]

The Swiss Water Process of Coffee Bean Decaffeination



7. **Finishing the coffee beans**
   The caffeine-free coffee beans are then dried, cleaned, polished, roasted, and packaged.[2] Distributors receive the coffee beans that can be ground and brewed to create the decaffeinated coffee beverage. A five-ounce cup of caffeinated coffee contains from 70 to 155 milligrams of caffeine, whereas the same cup of decaffeinated coffee contains less than 5 milligrams. (The average, healthy adult can consume up to 600 milligrams a day of caffeine.) At least 97% of the caffeine has been removed by the SWP.

Footnotes

[1]One coffee manufacturer, Starbucks, only charges $.25 more for its decaffeinated coffee using the SWP compared to using the methylene chloride process for all its other decaffeinated coffees. This price differential excludes other factors that affect price such as obtaining coffee beans from different regions. All but one of its decaffeinated coffees uses the methylene chloride process to remove caffeine. Why does Starbucks offer only one decaffeinated coffee that uses the SWP? According to Che, the consulted Customer Service Representative, using the SWP with other coffee beans does not produce the desired flavor according to Starbucks standards. Another coffee seller that uses the methylene chloride process, Cosi's, helps defray the cost to decaffeinate its coffee beans by slightly increasing the cost of less expensive products that it offers. It feels that consumers might not buy a decaffeinated product that is more expensive than a caffeinated product because it would be perceived as less product for more money.

[2]Only some sources that explain the SWP include portions of this last step as part of the decaffeination method.

Notes to Photographer/Illustrator/Editor

1. Please change the flowchart as necessary. For example, the white numbers in the flowchart's squares appear on screen, but not when I print the page on my HP LaserJet 4L printer.
2. Feel free to re-size the flowchart to fit on page 2 instead of page 3.

Bibliography

Graphics

"girlcup.jpg." State University of New York Faculty Student Association. http://www.fredonia.edu/cafes.htm. 22 September 2002. Gal holding mug of joe.

"hp_promo90_wirelessuser.jpg." http://www.starbucks.com. 22 September 2002. Guy in suit sipping java.

"pic_propaganda.jpg." http://www.dazbog.com/pages_learnmore/propaganda.html. 22 September 2002. Guy holding cup of coffee.

"recycle.jpg." www.oardc.ohio-state.edu/centernet/images/logos/recycle.jpg. 27 September 2002.

Other Sources

Café Altura. "What does S.W.P. mean when used along with the word decaffeination?" http://www.cafealtura.com/store/FAQs.html#swp. 25 September 2002.

Che. Telephone Interview. 27 September 2002. Starbucks Customer Service Representative. 1-800-STA-RBUC.

Coffee Quality Institute. "Decaffeination: Swiss Water Process." http://www.coffeeinstitute.org/coffee_knowledge/swiss_water_process.html. 25 September 2002.

DelightfulDeliveries.com. "Swiss-water process Decaf [sic]." http://www.coffeeville.com/delightful/watprocdec.html. 25 September 2002.

General Chemistry Online. "How is coffee decaffeinated?" http://antoine.frostburg.edu/chem/senese/101/consumer/faq/decaffeinating-coffee.shtml. 27 September 2002.

Katz, Saul N. "Working Knowledge: Decaffeinating Coffee." https://www.sciamarchive.com. Online archive obtained on 25 September 2002 of Scientific American. June 1997.

Marshall Brain's HowStuffWorks. "[…] How are coffee, teas [sic] and colas decaffeinated?" http://www.howstuffworks.com/question480.htm. 27 September 2002.

North Coast Coffee Company. “Decaffeinations: Swiss Water Process.” http://www.northcoastcoffee.com/ACSwiss.htm. 25 September 2002.

Richard. Personal Interview. 28 September 2002. Cosi's in Arlington, Virginia.

Swiss Water Process. “The SWISS WATER® [sic] Decaffeination Process.” http://www.swisswater.com/general.asp?id=90&ac=&pg=141. 25 September 2002.

Swiss Water Process. “SWISS WATER® [sic] Process Versus Other Decaffeination Methods.” http://www.swisswater.com/general.asp?id=102&ac=&pg=157. 25 September 2002.

World Wide Mart "Choice Coffee- [sic] Key Facts about Decaffeination." http://www.worldwidemart.com/choice/decaf.html. 27 September 2002.