The Heritage Coffee Company Ltd.
Coffee Information and Facts Series

Decaffeinated Coffee

Coffee contains between 1.1% to 2.3% of caffeine in the green bean depending on the type and genus. In the brewed format, total caffeine content ranges from 50 to 75 mg for a six-ounce serving. While coffee is not a health risk, some people may be sensitive to caffeine or wish to reduce their coffee intake during pregnancy. In such cases, decaffeinated coffee may be the product of choice.

Background

The first patented coffee decaffeinating process was developed by Ludwig Roselius in 1905. Green beans were pre-soaked in water and then mixed with benzene to remove the caffeine. The method was harsh and had a deterious effect on the quality of the coffee, but did remove the caffeine, as well as much of the aromatic flavours and oils.

Decaffeinating Methods

Today, the decaffeinating process leaves more flavour in the beans than before. The following methods all remove the caffeine to a level of at least 97% with varying degrees of cup quality and cost.

Direct Method (Methyl Chloride, Ethyl Acetate)

In the direct method, green coffee beans are steamed until soft for about 30 minutes and then rinsed in the solvent repeatedly for about 10 hours. The solvent captures the caffeine and is drained away from the green beans, which are then steamed for another 8 to 10 hours to evaporate the residual solvent. The decaffeinated beans are then air dried to their appropriate moisture level.

Indirect Method, sometimes called the Water Method (Methyl Chloride, Ethyl Acetate)

In the indirect method, the green coffee beans are actually soaked in a hot water/coffee solution for several hours. Slowly, the solution removes the caffeine from the beans, as well as some of the desirable flavour elements of the coffee. The solution is then drained off and treated with the solvent, which absorbs the caffeine. The mixture is then heated to evaporate the solvent and caffeine leaving only the water/coffee solution. This caffeine free solution is then re-introduced to the green beans, allowing them to regain most of the flavour components lost during the soaking stage of the process.

Methyl chloride is used as an effective solvent in the decaffeinating process in both the direct and indirect methods due to its excellent soluble properties. While methyl chloride does pose a health risk in high doses, the amount of this solvent present in the decaffeinated green bean weighs in at no more than one part per million. Further, methyl chloride evaporates at 170 degrees F, leaving virtually no trace of the solvent after the 400 + degree F roasting process.

Ethyl acetate is commonly referred to as a natural solvent in the decaffeinating process as it is derived from various fruits and vegetables. Decaffeinated coffees processed with ethyl acetate are often called "Natural Decafs".

Triglyceride Method

Triglycerides, found in coffee oils, are used as a solvent to remove caffeine in coffee beans. In this process, the beans are soaked in a water coffee solution to bring the caffeine to the surface of the bean. Next, the beans are submersed in coffee oils for several hours at high temperature. The triglcyerides remove the caffeine, but not the flavour from the coffee beans. The beans are removed from the oils and dried. Once the caffeine has been removed from the oils, the oils are then recuperated for use in the next decaffeinating cycle.

Swiss Water Method

The Swiss Water method uses the same principle as the Indirect (Water) Method previously indicated. The main difference is that instead of using a solvent to remove the caffeine from the water, a series of charcoal or carbon filters are used to trap the caffeine. The re-introduction of the flavour components after the caffeine has been removed is the same for both the Indirect Method and the Swiss Water Process.

Supercritical Carbon Dioxide/Oxygen

By using special chambers, CO2 or Oxygen are transformed into a liquid state at 88 degrees F under tremendous pressure (73 atmospheres). The CO2 takes on the characteristics of both a liquid and a gas allowing for better penetration of the bean to dissolve the caffeine. Once the pressure is brought to near normal levels, the caffeine precipitates into another chamber and the green coffee is released. The CO2 or Oxygen is then ready to be re-pressurized for the next cycle.