

[sg\_popup id="59" event="onload"][/sg\_popup]What is it about chocolate that makes us crave it so much? The way it sends tingling electricity down our spines or hurls us into a state of mild euphoria? It might feel like not magic, but it's not. It's chemistry.

Chocolate is one of the most popular feel-good foods since its invention more than 3,000 years ago by the Aztecs. Ironically enough, the Aztecs were also trying to make beer. We admire your efforts, Aztecs, but perhaps they did not read our tech note on Hop acids from beer. I digress.

This delectable treat—chocolate—may look like a simple mixture of sugar, milk and cocoa but the main reason behind its irresistible delectability is in the cocoa's very complicated chemistry. More than 300-500 known chemicals help to make up chocolate, with a large majority of those chemicals affecting the brain and endocrine system, altering moods or inducing feelings of euphoria.

Let's break down the top three aspects with chocolate chromatography to separate out what makes this sweet so delicious.

## Smell - Odor

You don't even have to taste chocolate to be motivated by its power. Just the mere smell of it sends people into a state of happiness. Aroma chemicals are volatile in nature, so one must use Gas Chromatography and Mass Spectrometry to separate the chemicals to understand what makes up the aroma.

This analysis reveals 33 potent odorants, of these three of which create the strong chocolate aroma: 2-methylpropanal, 2-methylbutanal, and 3-methylbutanal. Mmm, sounds delicious right?

## Taste

The flavor of chocolate is a very serious business, and chocolatiers take numerous measures to ensure their chocolate's flavors remain consistent, batch-to-batch. This is where the analytical chemist comes into play. The flavor of chocolate is mandated by the fermentation process, resulting in the degradation of certain amino acids. The end result leaves behind the most important and crucial compounds for the flavor profile of chocolate: aldehydes and keytones. Let's take a look at the volatile components that give chocolate its flavor notes.

- 2-Phenylacetaldehyde – Honey, floral flavor
- 2-Methylpropanal – Chocolate flavor
- 2-Phenylpropanal – Floral
- 2-Methylbutanal – Chocolate
- 2-Phenyl-2-butenal – Sweet

Just to name a few. Hungry yet? By raising the ratio of one or more of each component through the fermentation process, the chocolate now has its own distinct flavor. Liquid – liquid extraction prior to injection onto a GC Column is the basic method for testing the consistency of chocolate flavors.

## Chocolate's Effects on the Mind

Chocolate as the food of love? Chocolate has several chemicals which affect mood and state of mind. Besides the known chemical caffeine, which gives you a jolt of energy, the main “mood chemical” in chocolate is phenylethylamine (PEA). PEA holds the key to the love inducing attributes of chocolate and is sometimes referred to as the “love drug”. PEA is a chemical that is naturally produced in the brain and highly concentrated in chocolate. PEA

acts as a stimulant, increasing the neurotransmitter—dopamine—the feel good stimulant. The result is a slight euphoric feeling, elevation in mood, and feelings of pleasure.

PEA isn't the only chemical that leads to the good vibes of chocolate: anandamide (AEA), which is naturally produced by the body as well, mimics the activity of cannabis compounds commonly known as alkaloid and belongs to the methylxanthines like caffeine and theophylline.

Other chemicals in chocolate also affect our mood, including:

- Tetrahydrocannabinol-9 - like the fatty acid cannabinoids
- Phenylethylamine (PEA) - slight aphrodisiac
- **Tryptophan** - a neurotransmitter that produces feelings of “happy”
- Theobromine - also a cannabinoid
- Polyphenols - increased blood flow to the brain
- Histamine - responsible for the craving of chocolate and change in mood

Having a chocolate craving right now? Enjoy!

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