



“Daddy, what’s polysorbate 60 and where does it come from?”

That innocent question from the six-year-old daughter of Steve Ettlinger started him on a long journey researching the origins of the ingredients of one of America’s favorite processed foods: Hostess Twinkies®. Stores sell 500 million annually.

In *Twinkie, Deconstructed* Ettlinger shares his discoveries by taking us through the complex chemical manipulations of all Twinkie’s 39 ingredients. He explains how a balance of proteins, fats, oils and sweeteners build structure, provide tenderness and prolong shelf life.

Some Twinkie ingredients such as sugar, flour, corn, eggs and soy, start as recognizable foods which undergo supreme processing. Others with chemical-sounding names, like ferrous sulfate and polysorbate 60 are by-products of inedibles such as petroleum and rocks. While flour, fat and sugar are what defines a cake, most are made from at least five different kinds of raw materials many of which come from very surprising places.

On his Twinkie journey, Ettlinger spent as much time interviewing scientists about complicated and sometimes dangerous, chemical reactions in mines and foundries as he did visiting farms. Here are some of his amazing findings:

Wheat

Wheat and flour, the staples of baked goods, are not as simple as they seem. Six different varieties of flour vary in moisture and gluten content. Twinkies are made from soft cake flour that is low-protein and high-starch, allowing it to blend well with sugar, oil and water. From the grass in the fields to the Twinkies on the shelf is a dangerous automated process because flour dust is highly explosive.

Bleach

Before shipping, the flour requires the addition of industrial bleach and vitamins. Bleach? Yes, Twinkie flour is whitened with poisonous chlorine gas. Why? To achieve that white look and lightness that consumers love in baked goods. Unbleached flour is beige and heavy. Who wants that in cake?

Ferrous Sulfate Plus B Vitamins Equals Enrichment

B vitamins such as niacin (B3) and thiamine mononitrate (B1) that enrich most flours, are derived at least partly from petroleum. “It’s pure chemistry,” says Ettlinger. Another ingredient, the mineral ferrous sulfate, available as an iron supplement in your pharmacy, is made in steel mills by running steel through a bath of sulfuric acid.

Sweeteners

Sweeteners are the second, third and fifth ingredients in Twinkies. Cane sugar, corn syrup and high fructose corn syrup together account for about half the total contents in volume: a whopping 4 ¾ teaspoons of sweet stuff in each Twinkie.

The search for sweeteners took Ettlinger down the Mississippi and Missouri Rivers, from the corn fields of Iowa to Florida, Texas and Louisiana. Most sugar for Twinkies is imported from the Dominican Republic, however.

Water and Baking Soda

Even the water in Twinkies is processed. A huge treatment facility in New Jersey supplies freshly chlorinated and filtered H₂O to Hostess. The author went underground in Wyoming to observe the mining of trona, a rock containing sodium sesquicarbonate, from which baking soda is derived. Water brings a mixture of dry powders, including baking soda, to life.

Soy

Another gigantic processing miracle turns simple soybeans into partially hydrogenated vegetable shortening, soy lecithin and soy protein isolate. Most of the US soybean (and other seed crops) are controlled by the chemical giant Monsanto, which genetically modifies the seeds and then treats them with fungicide. Shortening provides the base for that crème (not cream) filling.

Eggs

Twinkie bakeries use a million eggs a year. No wonder they don’t break them. Rather they buy dried, liquid or frozen eggs from companies specializing in egg-breaking. Drying and freezing keep the eggs’ baking qualities intact, allowing them to add structure to the dough by holding together the oil and water.

Flavors and Dyes

Petroleum and one of its byproducts, benzene, a flammable colorless, carcinogenic, sweet-smelling, liquid solvent play a major role in making artificial colors and flavors. A complicated reaction between benzene and nitric acid yields nitrobenzene, which eventually leads to the all-important aniline, a colorless, oily (and highly poisonous) liquid. Aniline is the basic chemical from which food dyes (and inks, paints, and varnishes) are made.

Artificial vanilla manufacturing starts a long way from the beautiful tropical orchid flower fields, the origin of real vanilla. Synthetic vanilla flavoring, called vanillin, is made in petrochemical plants in China and Baton Rouge, Louisiana. Surprise! The buttery flavoring in Twinkies, red dye no. 40 and yellow No. 5 also come from a collection of synthetic chemicals made from petroleum.

Polysorbate 60

Answering the question that started Ettlinger’s odyssey was difficult. The truth is that this mysterious chemical is an emulsifier: the magic something that makes foods creamy. Butter, cream and egg yolks are natural emulsifiers; polysorbate 60 does the same thing chemically, and is so potent that it takes less than .001 ounce of it to work its magic on one Twinkie, because it’s so good at retaining water around those luscious fat molecules.

And where does polysorbate 60 come from? Processing corn, oil palms and petroleum. The “poly” is from “polymer, the “sorb” from “sorbitol,” and the “ate” means that it contains oxygen. The number 60 distinguishes it from its cousins who are cooked up slightly differently to emulsify ice cream, soap, and shampoo.

So now you know. *Twinkie, Deconstructed* touches on nutrition, food science, consumerism, eating, baking, home cooking, and even history and geology. Once you read it, you may never eat another processed food again. To learn more about Twinkies and the author, go to www.twinkiedeconstructed.com.