

Compounds associated with aroma in foods: Part I

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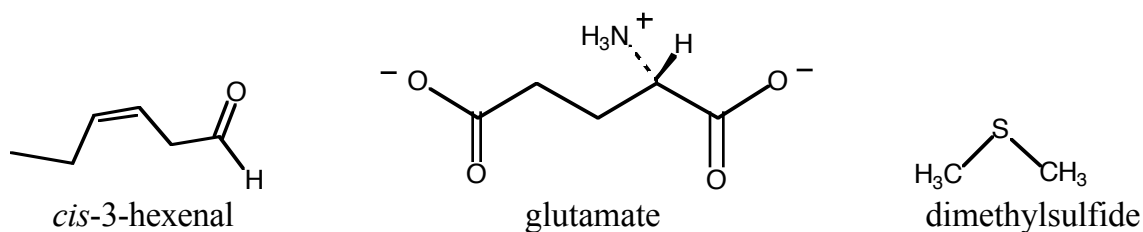
Food aromas are very complex, and literally hundreds of compounds might contribute to characteristic odors we associate with particular foods. Gas chromatography and mass spectrometry are two of the main techniques that have been used to separate and identify food aroma compounds; there is even a crude but obviously effective technique referred to as "capillary GLC sniffing" that has been used to identify characteristic odors in mixtures.

Tomatoes

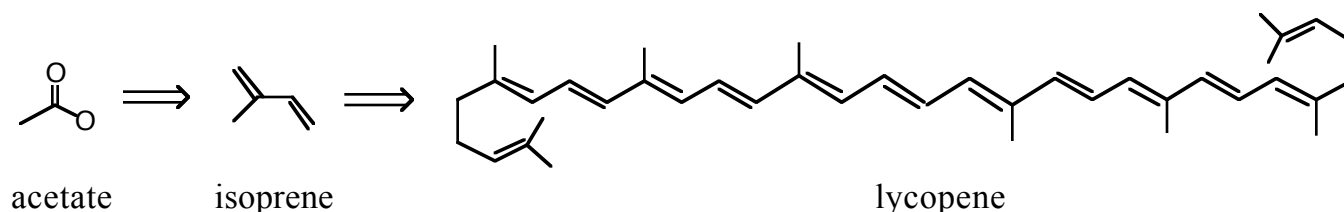
Over 400 volatile compounds have been identified in tomatoes, including (minimally) 39 alcohols, 73 ketones and aldehydes, 47 esters, 22 acids, 11 lactones, 15 N containing compounds, and 12 containing S. *cis*-3-Hexenal seems to be necessary for us to identify the smell of garden picked tomatoes; it is present in fresh tomatoes at levels of 9 - 16 mg/kg.

Tomatoes also contain high amounts of glutamic acid, a flavor enhancing amino acid; in fact there is apt to be more glutamic acid (or MSG, depending on the pH) in food containing cooked tomatoes than in Chinese restaurant food.

When tomatoes are cooked, the composition changes. The dominant characteristic smell of tomato juice is due to dimethylsulfide; it has to be present in what is called a critical concentration of 0.5 - 2 mg/kg for us to respond positively to what we think of as tomato juice smell. At higher concentrations it smells putrid.



The tomato's red color is due to lycopene. Lycopene is a carotenoid compound that is in the news because it is possibly linked with cancer prevention. Lycopene is biosynthesized from isoprene, which in turn comes from acetate, a very basic biosynthetic building block. Can you find the isoprene units in lycopene?



Tomato odds and ends: The tomato is South and Central American in origin and was taken to Europe by the Spanish conquistadors. It is a member of the nightshade family (so are peppers, potatoes, tobacco, and deadly nightshade) and its stems and leaves contain a glycoalkaloid, tomatine, which is moderately neurotoxic. Researchers in North Carolina are studying a tomato product that they claim repels mosquitoes at least as well as DEET.

The word tomato is derived from the Aztec *xitomatl* but it became known in Europe as *poma amoris* or *pomme d'amour* (love apple) as it was thought to be an aphrodisiac; for this reason it was maligned by the church. The tomato has a lively history and it developed a colorful lore as it moved from being a suspected and forbidden fruit to a staple in diets the world over.

Although it is botanically a berry, the tomato was reclassified as a vegetable by the US Congress in 1883 for importation tax purposes. The legal reclassification was upheld on appeal in 1893.

Stewart Lee Allen, "In the Devil's Garden" Ballantine Books (New York) 2002.

Patricia Conant, www.epicureantable.com (2003)

Henk Maarse, ed., Volatile Compounds in Foods and Beverages, Dekker (New York) 1991.

Elmin Yilmaz "The Chemistry of Fresh Tomato Flavor" *Turk J Agric For* **2001** 25 149-155

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