**Herbfest Info about Organic Molecules**

**How It Works**  
In order to effectively use the hundreds of aromatic chemicals that interplay in building the flavor of food, flavor scientists categorize them by how they function. Esters, for example, are compounds that are responsible for most of the light sweet top-note aromas of fruits. On the other hand, fatty acids are strong and pungent, making up the mid- and bottom notes in fermented cheese and gamy meats.

**The classes of flavor compounds are:**  
Acids — Carboxylic acids have a pungent sour smell that is evident in many cheeses. This group includes common organic acids like acetic acid (the acidic flavor of vinegar) and less well known but equally recognizable compounds like propionic acid, which has a sour rancid smell, and is the dominant odor in Emmental cheese. The pungency of fatty acids disappears when they react with alcohols and become sweet fruity esters. For example, butyric acid (which accounts for the rancid smell of butter) when combined with an alcohol becomes the fruity aroma in pineapples and strawberries (ethyl butyrate), in apples and pineapples (methyl butyrate), in apricots (pentyl butyrate), or in cherries (geranyl butyrate).

Alcohols — Alcohols can form floral, fruity, or fermented flavors depending on their molecular weight and what other molecules they react with. Alcohols with lower molecular weight are soluble in water and are volatile and flavorful. Ethyl maltol, the flavor of caramelized sugar and cooked fruit, is an example. As their molecular weight increases, alcohols become oily and more subtle. Decanol, the flavor of orange blossoms, and menthol are large alcohols. Alcohol molecules generate different flavors when they react with other molecules. For example, benzyl alcohol is the aroma of jasmine and hyacinth, but when it reacts with an aldehyde it becomes benzaldehyde, which is almond flavor.

Aldehydes — Aldehydes are a varied group of flavor compounds that are similar to both acids and alcohols and therefore react easily with both. Aldehydes can be floral, fruity, grassy, nutty, toasted, coffee-like, or chocolaty. One of the most commonly used aldehydes is vanillin, the flavor of vanilla. Some, like ethyl cinnamaldehyde in cinnamon, or methyl salicylate (oil of wintergreen), are so pungent they tend to dominate other flavors in a plant.

Esters — Esters are a combination of two molecules — an alcohol and an acid. Acids give vegetables and fruits tartness, and they are part of the fatty acid structure of vegetable oils. Alcohols are mostly by-products of cell metabolism in plants. Fruits in particular contain enzymes that cause acids and alcohols to combine to form aromatic esters. Apple flavor is a combination of seven esters. But banana contains just a few strong-smelling esters that give it a less complex but stronger aromatic profile.

Ketones — Ketones are polar molecules that are highly soluble in water and form bonds easily with other molecules. The acetyl-based ketones are quite subtle, giving jasmine and basmati rice their floral fragrance. Others become more pronounced from browning, giving popping corn or toasting tortillas their pleasant aroma. Some ketones produce strong dairy aromas, from the sweet, tangy aroma of cottage cheese and sour cream to the more pungent notes of blue cheese.

Iones — This subgroup of ketones produces fruit and berry flavors.

Lactones — Lactones are cyclic esters with their acid component derived from lactic acid, one of the carboxylic acids in milk. Lactones contribute to the flavors of cream, butter, honey, wine, and coconut. They are frequently added to margarine, shortening, and some baked goods to give them buttery flavors.

Phenols — Phenolic compounds account for many of the defining aromatic characteristics of spices and herbs. Eugenol, the flavor of clove, is in allspice, basil, bay leaf, cinnamon, clove, and galangal to varied degrees. Anethole is in anise, fennel, and star anise, and sotolon, a spicy caramel-tasting phenol, is in maple syrup, molasses, and tobacco. Capsaicin, the pungent part of chiles, is a phenol, as are the polyphenols in tannins.