

## Smells Great!

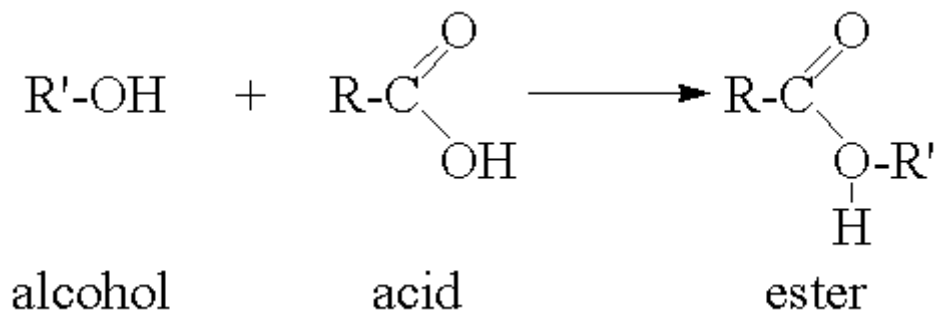
Both your mouth and your nose contribute to the tasting of foods. This explains why you lose interest in eating when you have a cold or experience other forms of nasal congestion: Food loses some of its appeal when you can't smell it. Taste and aroma of food contribute to its flavor. The term flavor also refers to the complete food experience. The presence of fat tends to enhance the flavor of foods. When the fat content increases, the intensity of the flavor also increases as many aromatic compounds are soluble in fat. Flavors dissolved in water are quickly detected, but also quickly dissipated. This explains why most people prefer premium ice cream over frozen popsicles.



*“Food preferences are influenced by a number of factors such as personal experiences, cultural influence and perceived health benefits. Taste and smell are arguably the most important determinants of whether a food is liked or disliked (1). Individual differences in the perception of bitter, sweet, salty, sour, or umami\* may influence dietary habits, which can affect nutritional status and risk of chronic diseases. The sense of smell is also an important determinant of the perception of various flavors, and genetic variability affecting olfaction may influence food preferences.*

*Olfactory genes form the largest multi-gene family in humans and consist of approximately 9,000 genes. These genes encode olfactory receptors, which interact with odorant molecules in the nose to initiate a neuronal response that triggers the perception of smell. Humans can recognize approximately 10,000 odors. Because olfaction is strongly linked with flavor perception, odor stimuli may play a major role in food preference, and consequently nutritional and health status. As with the TAS2R50 bitter receptor gene, a single nucleotide polymorphism in the OR13G1 gene has been linked with an increased risk of myocardial infarction. This olfactory receptor gene may play an indirect role in increasing the risk of MI by affecting food preferences that are determined by the sense of smell.” • Tepper B.J. & Ullrich N.V. (2002) Taste, smell, and the genetics of food preferences. Topics in Clinical Nutrition 17(4):1-14*

Many flavorings and fragrances, both natural and artificial, are a class of organic molecules called esters. These molecules contain a carbonyl group bonded to an oxygen atom that is bonded to a carbon atom. Esters can be prepared in the laboratory by reacting alcohols with carboxylic acids.



In this activity, you and your class will prepare small but fragrant quantities of different kinds of esters and attempt to identify their smells. To minimize the production of organic wastes, each lab group may be assigned specific esters to prepare.

### Safety!

**This lab requires the use of concentrated sulfuric acid, H<sub>2</sub>SO<sub>4</sub>. Only one drop per reaction will be used, but because this acid is concentrated, these drops can be very harmful to skin. Your instructor will be dispensing drops of concentrated sulfuric acid onto your watch plates. Handle your samples with care. They may smell good, but do not taste them, because they may still contain residual amounts of sulfuric acid. Wear safety goggles at all times. When you are finished with this activity, empty your samples into the provided waste container. Rinse your watch glasses with the solvent provided for you by your instructor and then clean them with soap and water.**

**Purpose:** In this activity, you will prepare a variety of fragrant esters.

### Procedure:

1. Place 1mL of an alcohol along with 1mL or 1gram of the corresponding carboxylic acid as given in Table 1 onto a watch glass. Smell your samples before adding sulfuric acid.

**Note: It is improper and unsafe laboratory practice to stick the sample really close to your nose and sniff heavily. Instead, odors can be brought to the nose by waving your hand over the watch glass, which may be held several inches away from your face.**

2. To initiate the formation of an ester from the alcohol and the carboxylic acid, bring your samples to the instructor who will add a drop of concentrated sulfuric acid. Gently stir with a microspatula to promote mixing. As the ester forms, a noticeable change in odor will occur. Some samples may take longer than others – allow up to 10 minutes.

