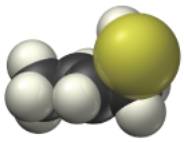
Pearson

21.1: Fragrances and Odors

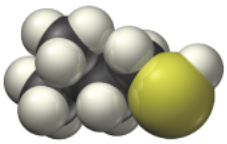
Have you ever ridden an elevator with someone wearing too much cologne? Or found yourself too close to a skunk? Or caught a whiff of rotting fish? What causes these fragrances and odors? When we inhale certain molecules called *odorants*, they bind with olfactory receptors in our noses. This interaction is largely determined by the kind of structure-dependent lock and key mechanism that we discussed in the beginning of Chapter 5. When an odorant binds to its receptor, a nerve signal is sent to the brain that we experience as a smell. Some smells, such as that of cologne, are pleasant (when not overdone). Other smells, such as that of the skunk or rotting fish, are unpleasant. Our sense of smell helps us identify food, people, and other organisms, and it alerts us to dangers such as polluted air or spoiled food. Smell (*olfaction*) is one way humans and other animals probe the environment around us.

Odorants, if they are to reach our noses, must be volatile (easily vaporized). However, many volatile substances have no scent at all. Nitrogen, oxygen, water, and carbon dioxide molecules, for example, constantly pass through our noses, yet they produce no smell because they do not bind to olfactory receptors. Most common smells are caused by **organic molecules**—molecules containing carbon combined with several other elements such as hydrogen, nitrogen, oxygen, and sulfur. Organic molecules are responsible for the smells of roses, vanilla, cinnamon, almond, jasmine, body odor, and rotting fish. When you wander into a rose garden, you experience the sweet smell caused in part by geraniol, an organic compound emitted by roses. Men's colognes often contain patchouli alcohol, an earthy-smelling organic compound extracted from the patchouli plant. If you have been in the vicinity of skunk spray (or have been unfortunate enough to be sprayed yourself), you are familiar with the unpleasant smell of 2-butene-1-thiol and 3-methyl-1-butanethiol, two particularly odoriferous compounds present in the secretion that skunks use to defend themselves.



$CH_3CH{=}CHCH_2SH$

2-butene-1-thiol



$CH_3CHCH_2CH_2SH$ (with CH_3 branch)

3-methyl-1-butanethiol

The smell of skunk is due primarily to the molecules shown here.

The study of compounds containing carbon combined with one or more of the elements mentioned previously (hydrogen, nitrogen, oxygen, and sulfur), including their properties and their reactions, is known as **organic chemistry**①. Besides composing much of what we smell, organic compounds are prevalent in foods, drugs, petroleum products, and pesticides. Organic chemistry is also the basis for living organisms. Life has evolved based on carbon-containing compounds, making organic chemistry of utmost importance to any person interested in understanding living organisms.