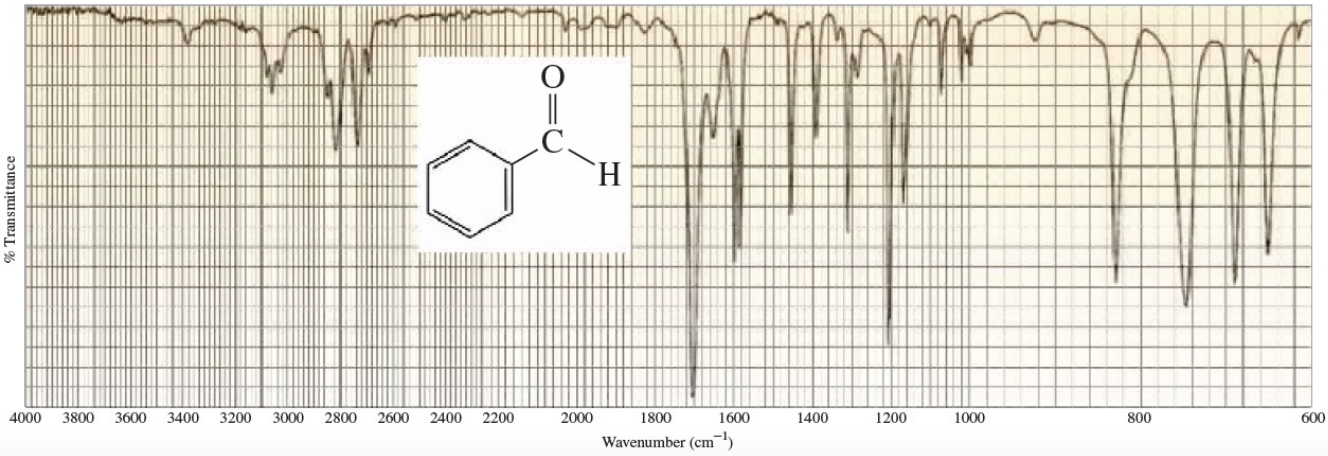
10.15 HOW TO INTERPRET AN INFRARED SPECTRUM

We will now look at some IR spectra and see what we can deduce about the structures of the compounds that give rise to the spectra. We might not be able to identify the compound precisely, but when we are told what it is, its structure should fit our observations.

Compound 1. The absorptions in the 3000 cm^{-1} region in Figure 10.18 indicate that hydrogens are attached to sp^2 carbons (3050 cm^{-1}) but not to sp^3 carbons. The sharp absorptions at 1600 cm^{-1} and 1460 cm^{-1} indicate that the compound has a benzene ring. The absorptions at 2810 cm^{-1} and 2730 cm^{-1} show that the compound is an aldehyde. The characteristically strong absorption band for the carbonyl group (C═O) is lower (~1700 cm^{-1}) than normal (1720 cm^{-1}), so the carbonyl group has partial single-bond character. Thus, it must be attached directly to the benzene ring, so electron delocalization from the ring can reduce the double bond character of the carbonyl group. The compound is benzaldehyde.



Compound 2. The absorptions in the 3000 cm^{-1} region in Figure 10.19 indicate that hydrogens are attached to sp^3 carbons (2950 cm^{-1}) but not to sp^2 carbons. The shape of the strong absorption band at 3300 cm^{-1} is characteristic of an O—H group of an alcohol. The absorption at 2100 cm^{-1} indicates that the compound has a triple bond. The sharp absorption band at 3300 cm^{-1} indicates that the compound has a hydrogen attached to an *sp* carbon, so we know it is a terminal alkyne. The structure of the compound is shown on the spectrum.