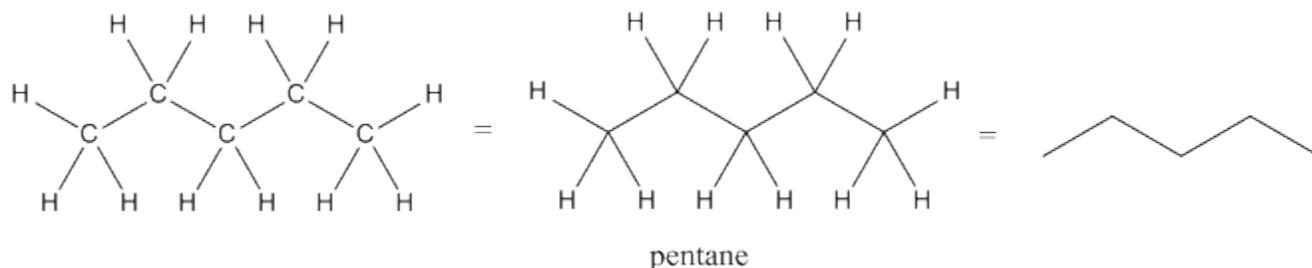


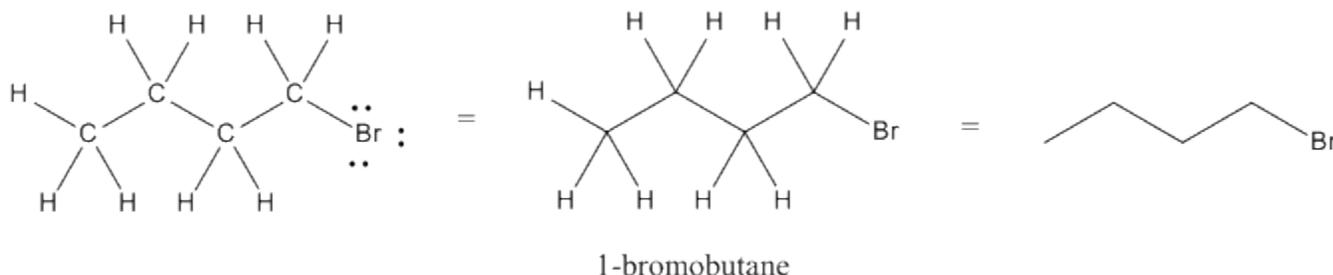
LINE DRAWINGS OF MOLECULE

Lewis structures can tell us a lot about how atoms come together to make molecules. They can also be cumbersome, especially if we are dealing with very large molecules. Drawing a line instead of a pair of dots for bonding pairs of electrons makes it easier to draw structures. There are other abbreviations that are helpful in some situations.

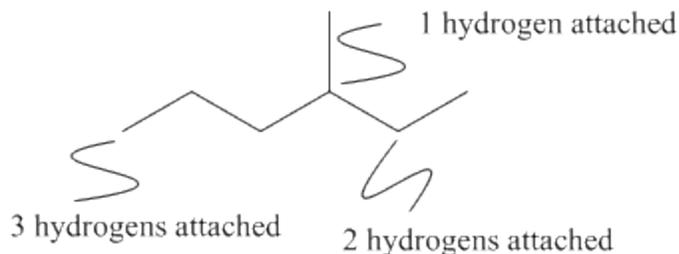
Because organic chemistry is based on the compounds of carbon, we would have to draw the letter C over and over again unless we had a shortcut. In line structures, we drop the label "C" for the carbon atoms. Anytime there is a joint between two bonds (drawn as a vertex in a zig-zag line), the atom attached to that bond is assumed to be a carbon unless written otherwise.



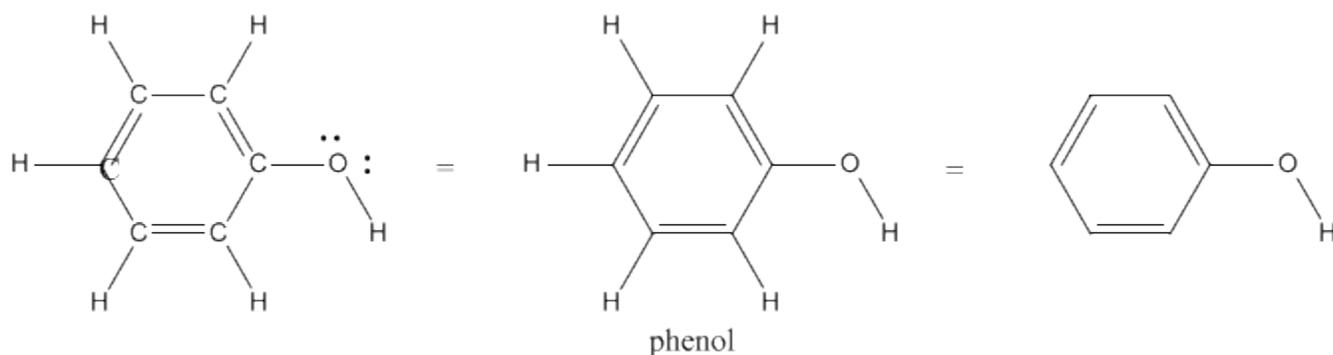
The atom at the end of a zig-zag line would also be a carbon, unless it is explicitly written as another atom.



Taken even further, we will omit the hydrogens from our structures, since the compounds of carbon almost always contain hydrogen as well. Since we know carbon has a valence of four, we always know how many hydrogen atoms are attached to each carbon in order to reach that valence. A carbon with two bonds drawn in must have two hydrogens on it. A carbon with only one bond drawn to it must have three hydrogens.

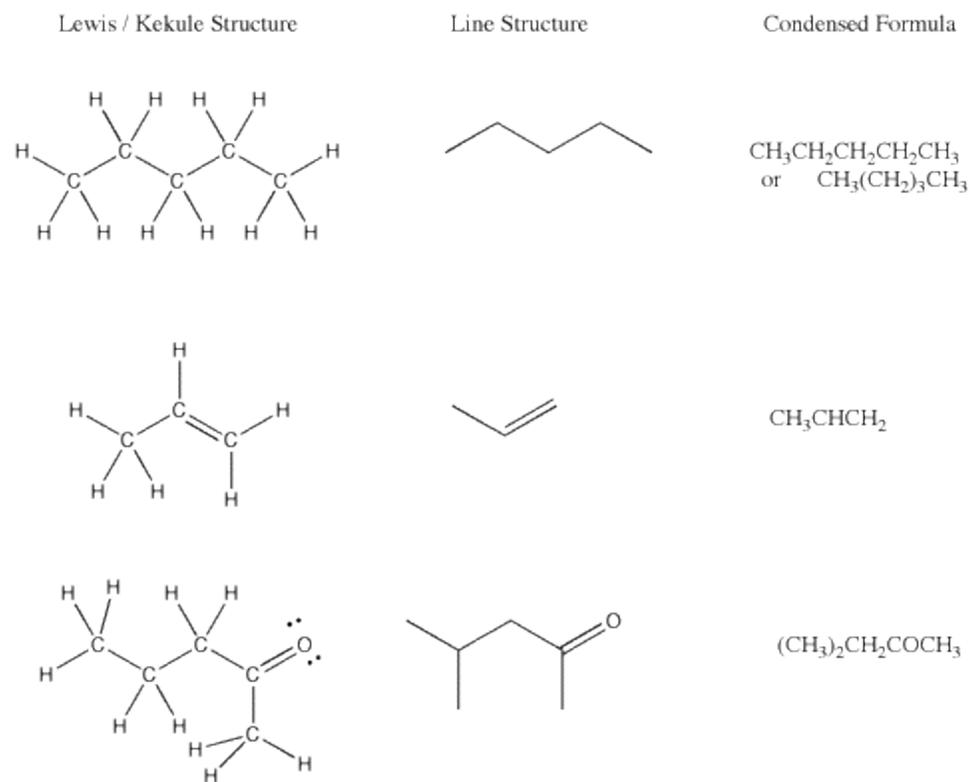


Note that the hydrogens are not normally omitted if they are attached to heteroatoms (atoms other than carbon, such as oxygen or nitrogen).



You will also note that lone pairs are frequently left out when we use line structures, so you will have to add them back in to think about Lewis structures. Adding the lone pairs back to the heteroatoms in line structures is a good habit to get into, because later in the course we will be very concerned with keeping track of where all the electrons are.

Below is a summary, showing the relationship between Lewis/Kekule structures, line structures and condensed formulae for a few different compounds.

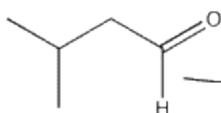
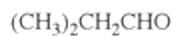
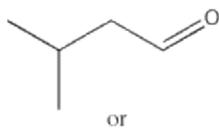
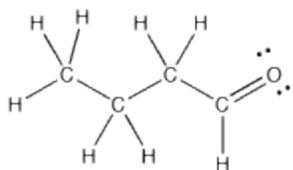


Remember, in phenol, the hydrogen attached to oxygen was labeled in the line structure. Sometimes there are exceptions in line structures, in which atoms that you might not think about labeling usually do get labels. The most common exceptions are shown below.

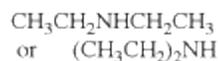
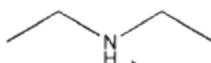
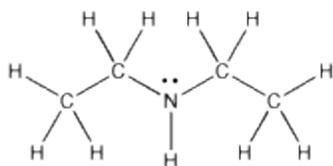
Lewis / Kekule Structure

Line Structure

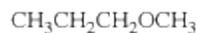
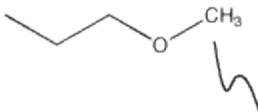
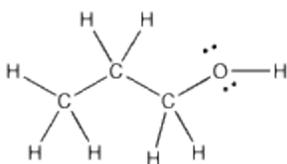
Condensed Formula



note: a C=O with a hydrogen attached is called an aldehyde. It is very common to label this hydrogen on an aldehyde.



note: hydrogens on heteroatoms (such as N or O) are usually labeled, unlike hydrogens on carbons



note: a one-carbon group ("methyl" group) attached to a heteroatom (such as N or O) is usually given a label, CH_3 .

Source : http://employees.csbsju.edu/cschaller/Principles%20Chem/molecules/1_8_line_drawings.htm