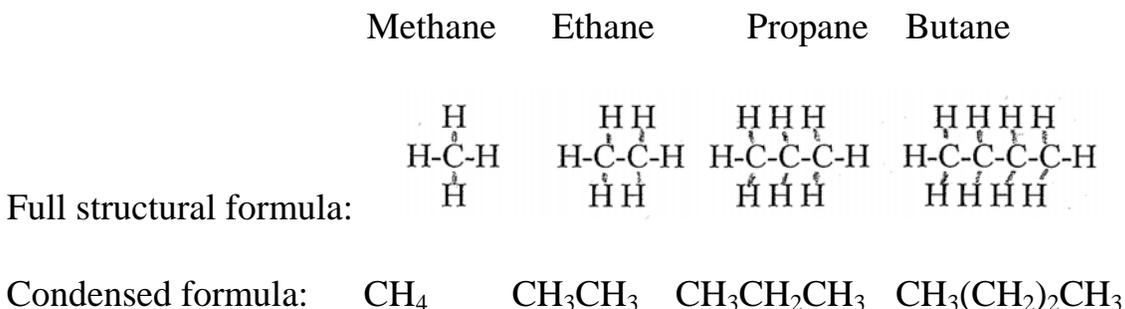


1.4 Condensed notations

We will frequently use several types of condensed formulation for organic molecules, rather than writing the full structure that shows every bond:

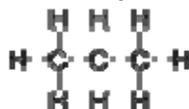


Likewise the condensed formula for pentane is $\text{CH}_3(\text{CH}_2)_3\text{CH}_3$
and hexane is $\text{CH}_3(\text{CH}_2)_4\text{CH}_3$

Practice problems. Write the condensed formula for

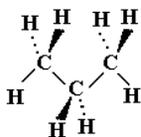
Heptane Octane Nonane Decane

A still more abbreviated notation, line-angle or line-bond notation, emphasizes the 109.5° tetrahedral bond angle of C-C single bonds and does not explicitly show any atoms at all! It is commonly used.

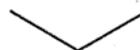


Thus propane, commonly written as

can be drawn in wedge and dash notation as



or in line-bond form as



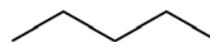
The end of each line as well as each “kink” is understood to be a C atom and the kink is made at approximately a 109.5° tetrahedral bond angle. It is understood that enough H atoms are added to each C to meet the bonding rules.

The line bond notation for C chains containing 4-7 C atoms are shown below.

Butane



pentane



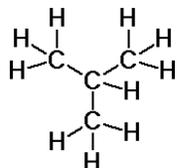
Hexane



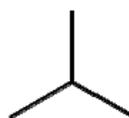
heptane



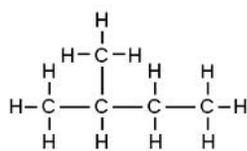
Isobutane has the structural formula



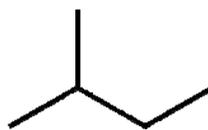
and the line-bond notation:



and similarly the structural formula

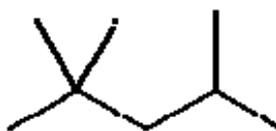
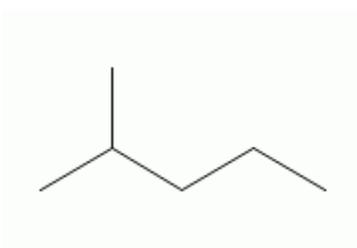


has the line-bond notation



Note that the structural formula makes the bond angles look like 90° , but the line-bond notation must show the tetrahedral 109.5° bond angle.

Write out the full structural formula for the following line-bond notations:

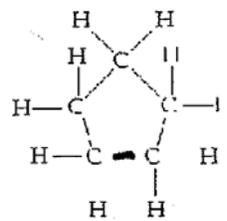
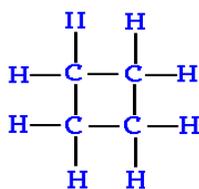
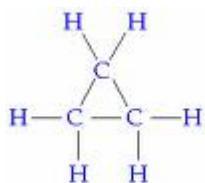


Carbon chains can also form rings as in the following examples:

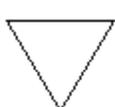
Cyclopropane

Cyclobutane

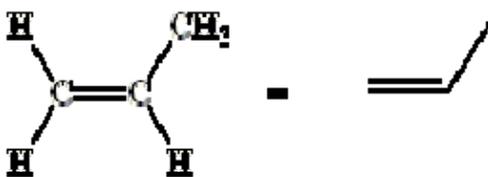
Cyclopentane



The shorthand notation similar to line-bond notation that we shall use for rings in the future is shown as follows:

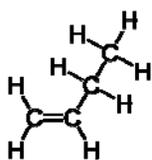


The line-bond notation for double bonds is shown with the example of propene below:



As in the previous examples of line-bond notation, all the atoms are left off and only the bond angles are shown, leaving the reader to supply just about everything!

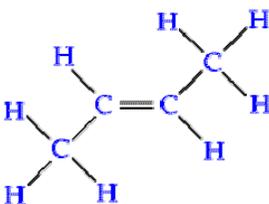
Likewise



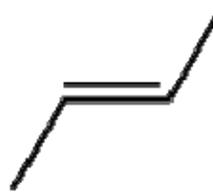
has the line-bond notation



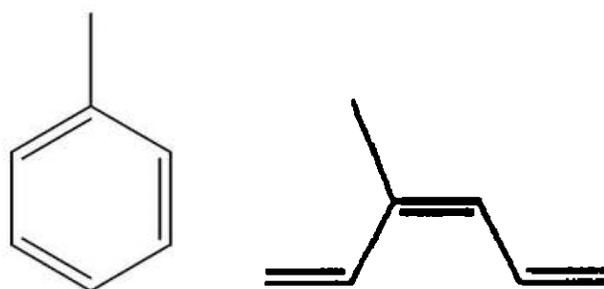
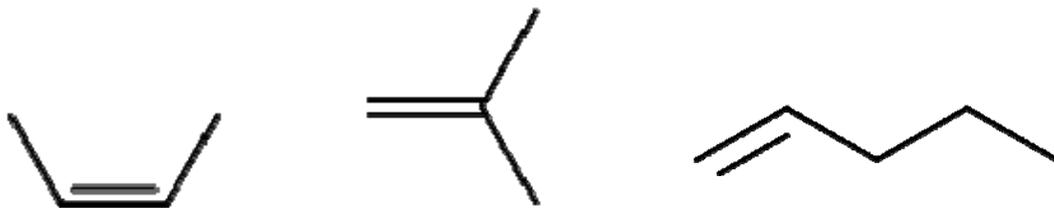
and



has the shorthand notation

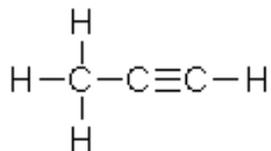


Try writing out the full structural formula for the following line-bond notations on a separate sheet of paper. Make sure your full structural formulas have the appropriate number of bonds on each atom!



When you've done the full structures for each of the line-bond structures above, see if you can work backwards and draw the original the line-bond notation from the full structure!

The line-bond notation for C-C triple bonds is shown below



becomes



Write the full structural formula for each of the following line-bond notations:

