(7) **Today**

Sections 1.12
Drawing Chemical Structures

Next Class (8)

Sections 2.1 - 2.4
Polar Covalent Bonds, Formal Charges,
Resonance/Electron Delocalization

Sections 2.4 – 2.6
Resonance/Electron Delocalization

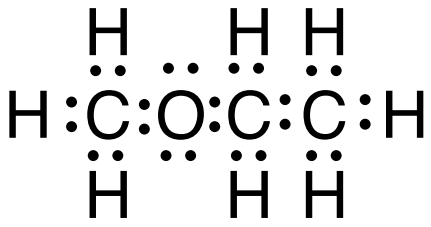
(9) **Second Class from Today**

Sections 2.4 – 2.6
Resonance/Electron Delocalization

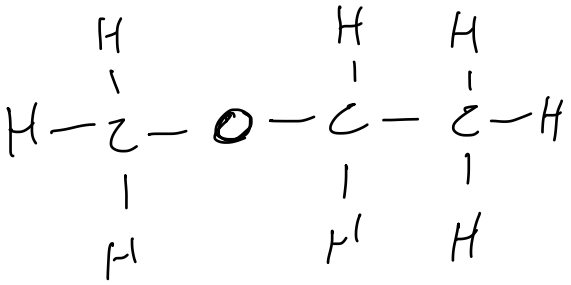
Sections 2.7 – 2.11
Acids and Bases

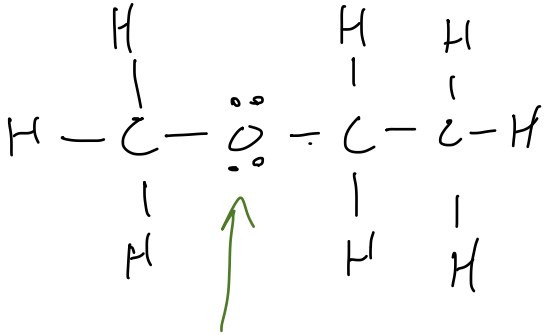
Third Class from Today (10)

Sections 2.7 – 2.11
Acids and Bases



emphasize the pairs of e⁻'s





lone-pair e⁻'s

lone-pair e⁻'s are not drawn but are understood to be present...

if the e⁻'s were missing the O atom would have a ⊕ charge... no ⊕ charge means the O must have a complete octet ... 2 bonds 2 sets lp e⁻'s

Chemists use different drawings to place emphasis on different aspects of a molecule.

Representations are used to solve typographical issues.

Molecular Formulas as Compared to Condensed Structures/Structural Formulas

In organic, molecular formulas are written C_xH_y(and other elements listed alphabetically)

C_3H_8O this could be 3 different molecules

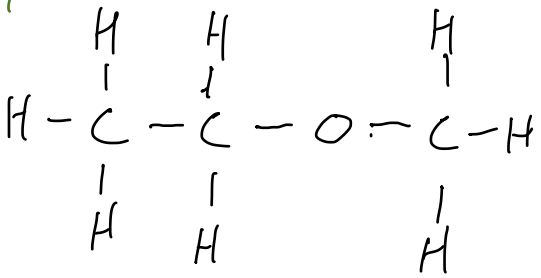
↑ # of atoms but no information about how they are connected.

These are formulas that show structure but bonds are not drawn.

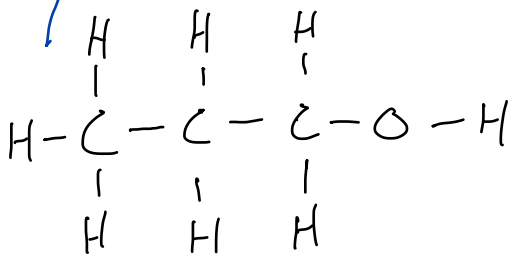
In organic, condensed structures typically start with a C, and everything immediately to the right of the C is connected to that first C. When the the first C is finally connected to the second C, now that atoms right of the second C are connected to second C. In acyclic unbranched molecules atoms to the right of the second C are not connected to the first C.

C_3H_8O

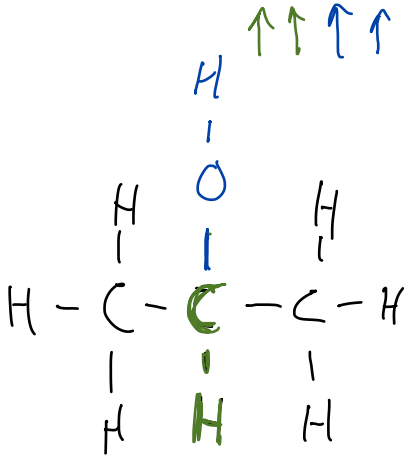
$CH_3CH_2OCH_3$



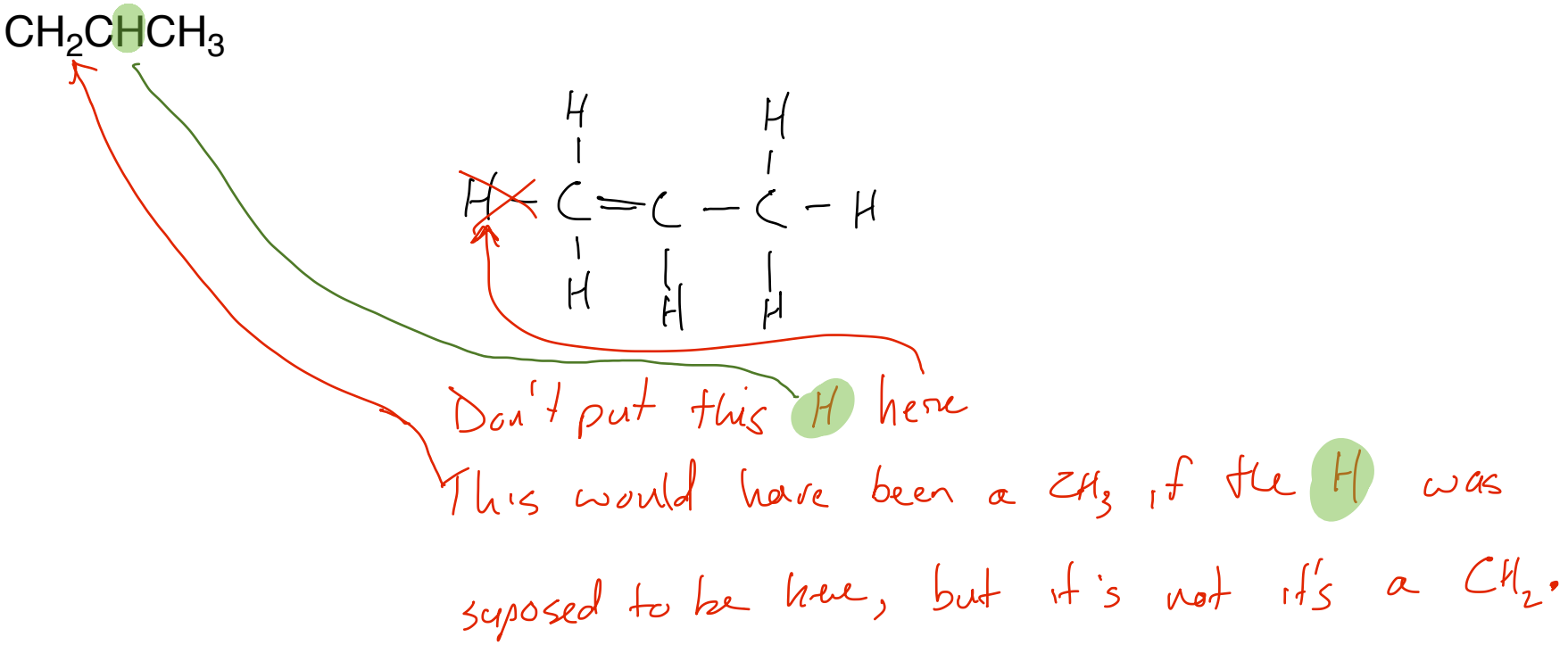
$CH_3CH_2CH_2OH$



$CH_3CHOHCH_3$

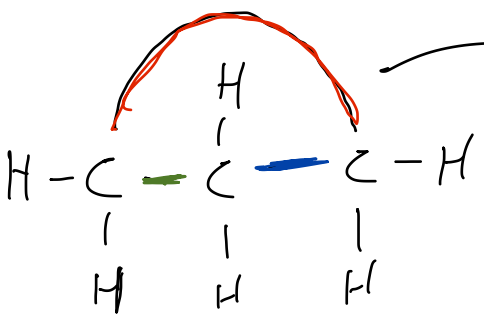


In organic, condensed structures typically start with a C, and everything immediately to the right of the C is connected to that first C. When the first C is finally connected to the second C now that atoms right of the second C are connected to second C. In acyclic unbranched molecules, atoms to the right of the second C are not connected to the first C.

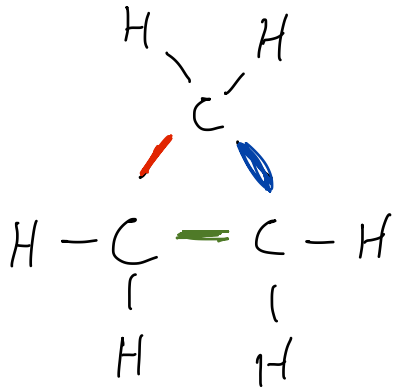


Because bonds are not drawn, condensed structures require the reader to bring some chemical knowledge to their interpretation.

the bracket indicates a bond from C_1 to C_3

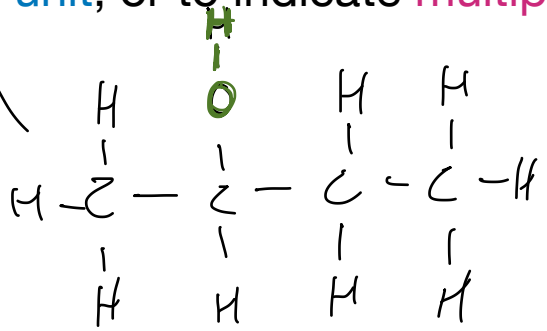


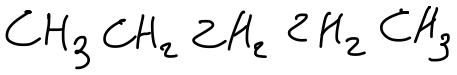
redraw to clean up

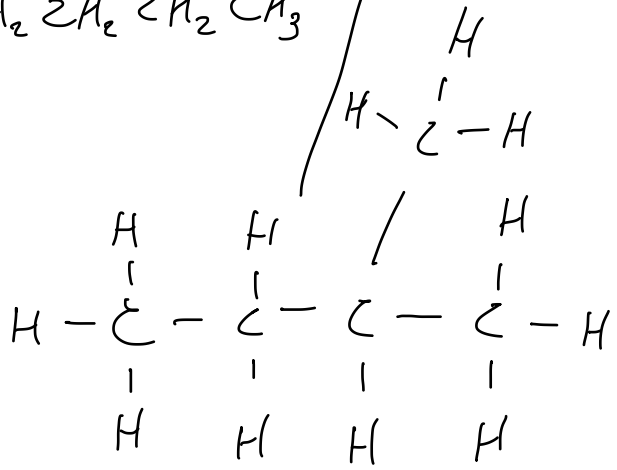


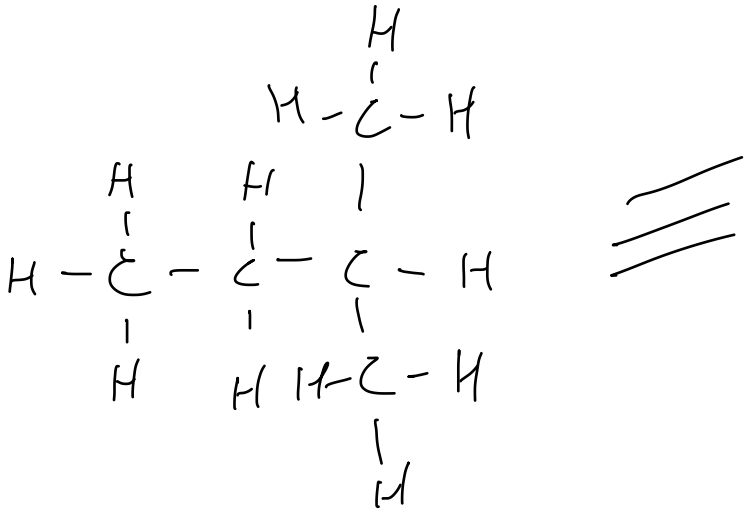
$CH_3CH(OH)CH_2CH_3$ $CH_3(CH_2)_3CH_3$ $CH_3CH_2CH(CH_3)_2$

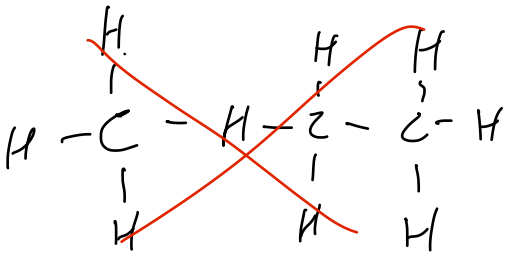
Parentheses **( )** in structures are typically used to set off side chains, to indicate a repeating unit, or to indicate multiple groups of the same structure.











strings of CH_3's are not possible

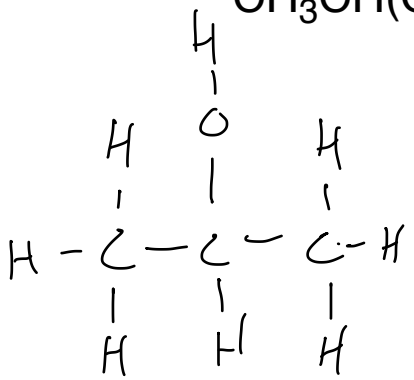
Often, chemists omit parentheses when they are not absolutely necessary,

$CH_3(CH_2)_3CH_3$

parentheses are required for repeating units

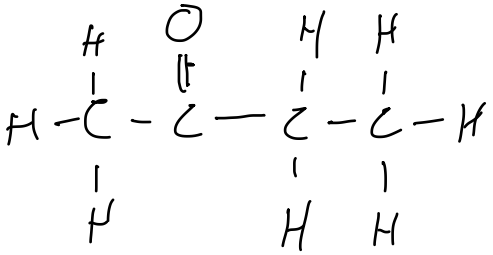
$CH_3CHOHCH_3$

$CH_3CH(OH)CH_3$



$CH_3COCH_2CH_3$

$CH_3C(O)CH_2CH_3$



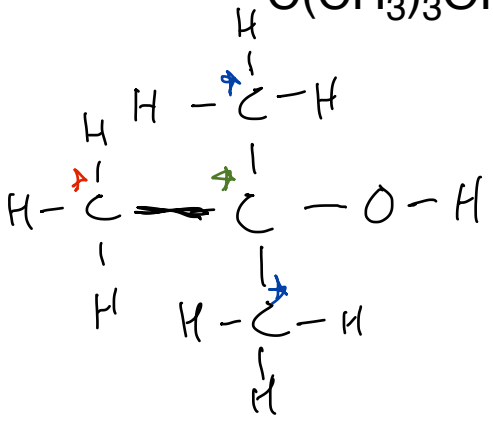
parentheses are not really necessary here because there is only 1 way to put these together.

and sometimes chemists do things for aesthetic reasons.

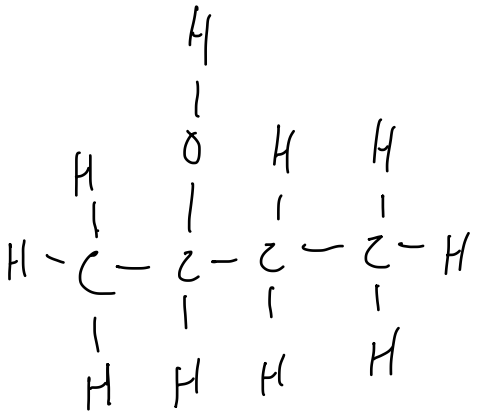
$C(CH_3)_3OH$

$CH_3C(CH_3)_2OH$

$(CH_3)_3COH$



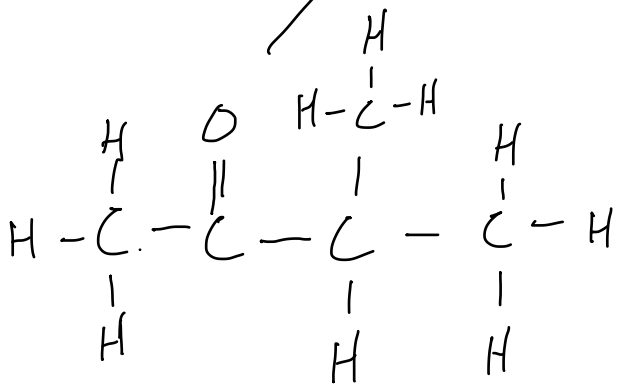
$CH_3CHOHCH_2CH_3$



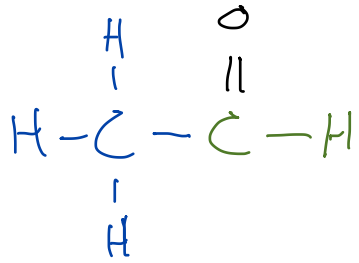
$CH_3C(O)CH(CH_3)_2$

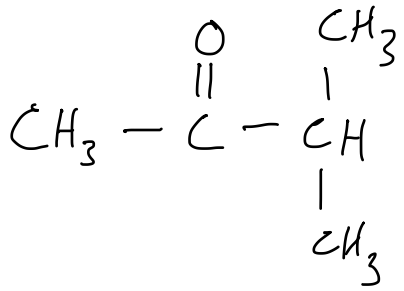
branch

2 CH_3 units



CH_3CHO



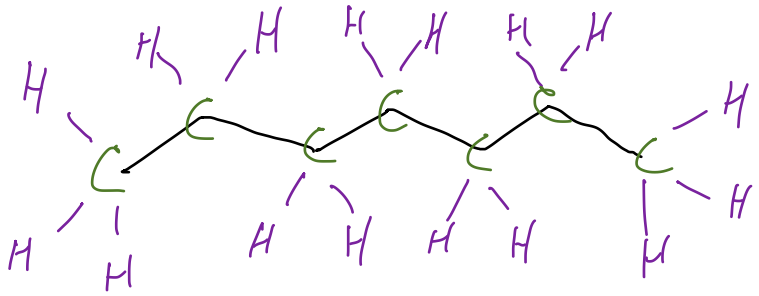


When a bond ends and the atom isn't labeled it is assumed to be C.

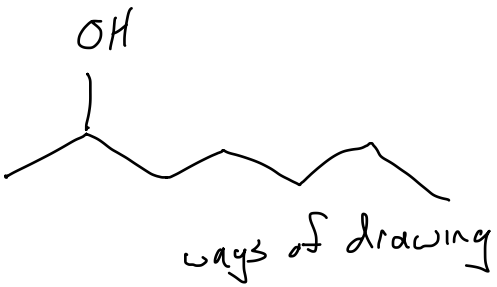
When there aren't enough bonds drawn to a C atom, the "missing" bonds are C atom to H atom bonds.

All other atoms are labeled.

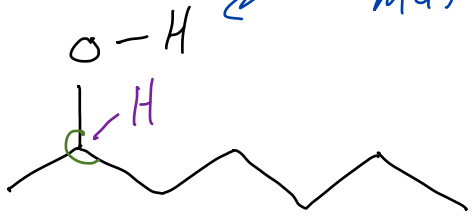
Heptane $CH_3CH_2CH_2CH_2CH_2CH_2CH_3$



2-heptanol $CH_3CHOH(CH_2)_4CH_3$



ways of drawing



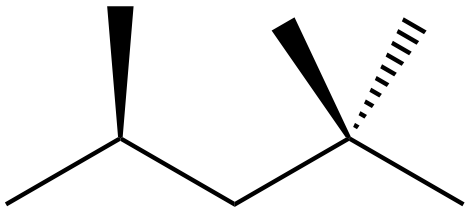
must draw bonds from atoms other than C to H

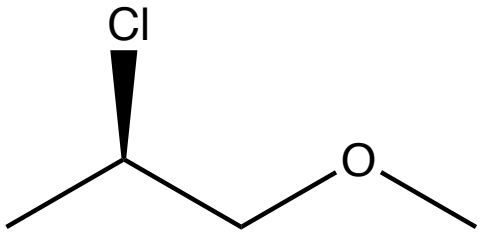
O-H

N-H

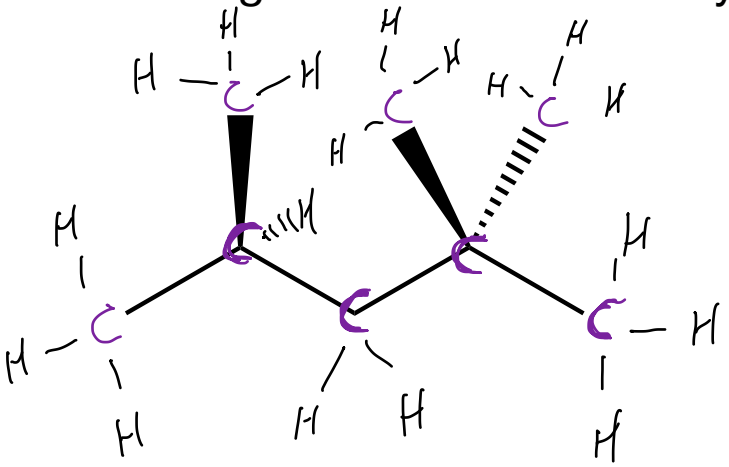
S-H

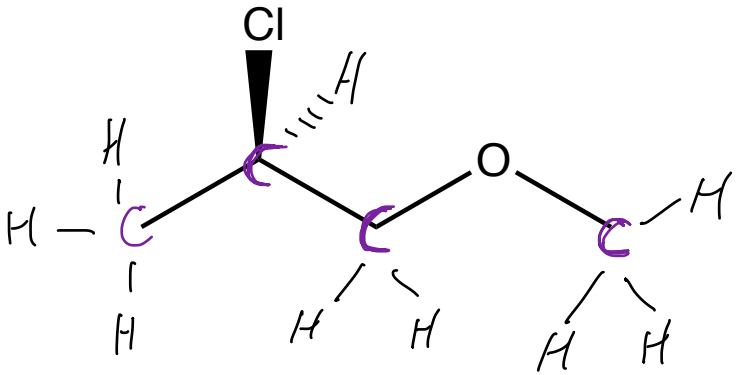
Different structures serve different purposes, but they represent the same things



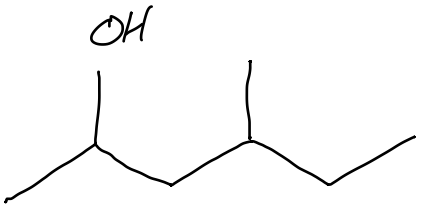


$CH_3CH(OH)CH_2CH(CH_3)CH_2CH_3$





$CH_3CH(OH)CH_2CH(CH_3)CH_2CH_3$



ignoring 3-D structure