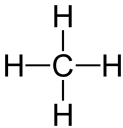
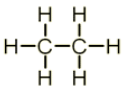
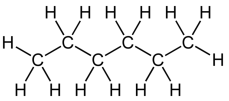
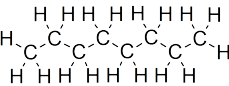
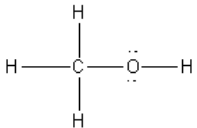
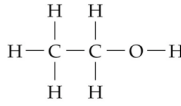

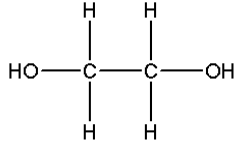
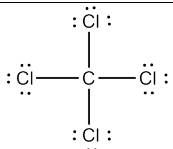




IMF Unit - Electrostatic Forces – Liquids

Draw the Lewis structure for each of the molecules, and answer questions 1-4 which refer to this data table.

Molecule	Formula	Molecular Weight	Boiling Point	Lewis Structure
Methane	CH ₄	16 g/mol	- 161 °C	
Ethane	C ₂ H ₆	30 g/mol	- 88.7 °C	
Hexane	C ₆ H ₁₄	86 g/mol	68.7 °C	
Octane	C ₈ H ₁₈	114 g/mol	126 °C	
Methanol	CH ₃ OH	32 g/mol	64.7 °C	
Ethanol	CH ₃ CH ₂ OH	46 g/mol	78 °C	
Water	H ₂ O	18 g/mol	100 °C	
Ethane-di-ol (Ethylene Glycol)	CH ₂ OHCH ₂ OH	62 g/mol	197 °C	
Carbon Tetrachloride	CCl ₄	154 g/mol	77 °C	



1. Look at the table on previous page, and comment on the correlation between the molecular weight and the boiling point.
As molecular weight increases, the boiling point increases BUT the pattern is only followed only if you're looking at molecules with the same number of $-OH$ groups.
2. Look at the Lewis structures of the molecules and comment on the correlation between the structure of the molecule and the boiling point.
The $-OH$ groups matter when determining boiling point! The bigger, more stretched out the molecule and/or the greater number of lone pairs it has correlates to a higher boiling point.
3. Comment on the correlation between the number of O-H bonds and the boiling point.
The more $-OH$ groups the higher the boiling point (see ethanol vs. ethylene diol).
4. From this data, what factors would you predict affect the physical properties of liquids?
Molecular weight, polarity and the degree of polarity.
5. Study the graph below:
 - a) What is the y-axis? What is the x-axis?
Boiling Point. Period on the Periodic Table.
 - b) What is the trend in B.P.'s of hydrides within a period of the periodic table?
As you move across a period, boiling point increases.
 - c) What is the trend in B.P.'s for hydrides within a group?
In general, as you move down a group, boiling point increases.
 - d) What is the trend within period 2? Within period 3?
Period 2 is more dramatic. Molecules with F, O, N attached to H do not follow the trends because they experience hydrogen bonding IMFs! Period 3 follows the expected trends.

