Molecular Model Lab

Purpose: To construct 3-D models of molecules and draw their structural formulas.

Procedure:
1. Construct the list of molecules below, using the chemical formula given, the code table for the atoms and the tips given for each one.
2. Draw a two dimensional structural formula of the resulting molecule.

Element	Symbol	Number of Bonds it can form	Color
Hydrogen	H	1	White
Oxygen	O	2	Red
Nitrogen	N	3	Blue
Carbon	C	4	Black
Sulfur	S	2	Yellow

Tips:
- All atoms should have **all** of their electrons occupied. Note: that *doesn't* mean plugging every hole on the model atom with bonds: some of the balls representing a particular atoms have more holes than the atom can form bonds.
- To represent double bonds, your kit has a few extra-long bendable sticks that can be paired together.
- Whenever possible, get into the habit of building your molecules (especially larger ones) by building functional groups, and then adding these to the molecule.

Note: feel free to use your phones to take pictures of these molecules. Upload them to a google doc, which you can share with your instructor or fellow students at some point.

Molecules to Build and Draw

Name	Chemical Formula	Structural Formula	Notes
1. Hydrogen	H_2		*The most common molecule in the universe.*
2. Oxygen	O_2		*Needed for aerobic respiration.*
3. Water	H_2O		*By weight, the main component of living things.*
4. Methane	CH_4		*Natural gas, produced by bacteria in your gut; also used as a fuel.*
5. Ethanol	CH_3CH_2OH		*Drinking alcohol*
6. Glucose: you can make both the ring and the straight chain form.	$C_6H_{12}O_6$		*At the cellular level, this is the main source of energy for all living things.*

Name	Chemical formula	structural formula	*Notes*
7. Amino acid: 1 carbon atom with 4 different attachments: Group 1 (amino) NH_2, Group 2 (carboxyl) COOH, Group 3: H atom, Group 4: "R-group" or "side chain." Use an H, or look up another possibility in Campbell	varies		*Building blocks of proteins (the all important substance that makes up muscles and enzymes*
8. Dipeptide: build 2 amino acids (choose the functional group). Combine them by removing an H from the amino group of one amino acid and and OH from the carboxyl group of the second.	varies		*Two monomers possibly on their way to becoming a protein.*
9. Saturated Fatty acid (note the $(CH_2)_5$, which indicates a 5 carbon long hydrocarbon chain). Remember that COOH is a carboxyl group.	$CH_3(CH_2)5$ - COOH		*Building block of fats. Fats are used for energy storage and insulation.*
10. Sucrose (a disaccharide)	$C_{12}H_{22}O_{11}$		
11. Unsaturated fatty acid: See # 9 above. Experiment with making the *cis* form and the *trans* form	varies with what you create		
12. A DNA Nucleotide Create a five carbon sugar (deoxyribose), a phosphate group, and a nitrogenous base (of which there are four possibilities: feel free to look these up in your textbook or online).	varies with which nucleotide you choose.		*the monomer of nucleic acids*