

Part One: Covalent Bonding

- 1. What kinds of atoms are held together by covalent bonds?
- 2. What is happening with the valence electrons of each atom in a covalent bond? Draw an example of this using the molecule H_2 .
- 3. Compare and contrast a molecular formula and a structural formula. Give an example of each.
- 4. Explain the HONC 1234 rule.
- 5. Can an atom have more than one bond with another atom? If so, explain what types of multiple bonds exist and give examples of atoms that can make those types of bonds.
- 6. What are isomers? Draw an example of 2 isomers.

Part Two: HONC Lab

Use the HONC 1234 rule and the general instructions below to create correct structural formulas from molecular formulas.

Example: C₃H₈S

- 1. Start by connecting the carbon atoms. C-C-C
- 2. Next insert the nitrogen, sulfur or oxygen atoms, either on the **ends OR** somewhere in the **middle** of the carbon chain.

3. Add the hydrogen atoms last.

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H-C- C- C-S-H	H-C-S-C-C-H	Н-С-С-С-Н
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4. Check that each atom follows the HONC 1234 rule.



You will be rotating around the lab stations in the classroom creating structural formulas and building molecular models for many different types of covalent molecules. If you are having trouble, start at the lower numbered lab stations and work your way up to the higher ones. (The lower numbered ones are easier and get more difficult at the higher numbered ones.)

In your lab notebook, copy the following chart and complete it as you visit each lab station. At each lab station perform the following tasks:

- 1. Draw the structural formula for the molecular formula given. **Draw ALL isomers indicated.**
- 2. Build one isomer of the molecule using the given parts at the lab station.
- 3. Draw a "ball-and-stick" model for one of the isomers.
- 4. On your "ball-and-stick" drawing, indicate how many electrons are being shared in each bond.

Station #	Molecular Formula	Structural Formula	Ball-and-Stick Model
1	H ₂		
2	CH4		
3	NH ₃		
4	H ₂ O		
5	C ₂ H ₆		
6	C ₃ H ₈		
7	C ₂ H ₄		
8	N ₂ H ₂		
9	C_3H_8O (3 isomers)		
10	C_2H_6O (2 isomers)		
11	C ₃ H ₉ N (4 isomers)		
12	C ₄ H ₈ O ₂ (2 isomers)		