

## Notes: Using Lewis Dots to Determine Molecular Structure

A) Recall: Atoms are most stable when they have \_\_\_\_\_ valence electrons.

This is called \_\_\_\_\_

1) There are 3 main exceptions to the octet rule:

a. Hydrogen (H) is stable with \_\_\_\_\_ valence electrons

b. Beryllium (Be) is stable with \_\_\_\_\_ valence electrons

c. Boron (B) is stable with \_\_\_\_\_ valence electrons

B) The Five Steps: When given a molecular formula (like \_\_\_\_\_)

1) Count up all the valence electrons that the atoms bring to the molecule:

2) If there's a singleton, it will go in the middle. If there isn't the more electronegative atom usually goes in the middle. Keep things symmetric if possible (symmetry is usually stable for molecules).

3) Bond everything with single bonds: a line counts as two shared electrons (aka a single bond).

4) Next, satisfy the octet rule for every atom (except H, Be, or B) by putting dots around the atoms that don't already have 8 bonded electrons around them

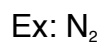
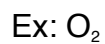
5) Count up all the electrons to make sure they equal the number of electrons brought by the atoms (step 1). If they do, you're done. If they don't, you may be dealing with a molecule that has some double or triple bonds. More on that later.

C) Single bond examples:



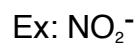
Practice: Worksheet #25

D) Double and Triple Bonds: When the electrons don't work



E) Two Important Extra Concepts:

- 1) Resonance: Occurs when the arrangement of the atoms is the same but there is more than one possible place to put a double or triple bond.



Ex: ozone

- 2) Isomers: Molecules with identical chemical formulas but different arrangements of atoms.

Ex: Ethyl alcohol and dimethyl ether. ( $\text{C}_2\text{H}_5\text{O}$ )