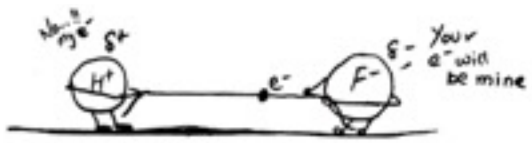
3.10 Notes Name____Date_________

Polar vs. Non-Polar Covalent Bonds

There are two types of Covalent bonds: ___________ **Covalent** and ________________**Covalent.**

In general, polarity refers to the distribution or sharing of charge across the bond or molecule. Think of this as a tug-of-war between the atoms to see who wants the electrons more.



Polar Covalent Bonds

•__________ distribution/sharing of charge
•One atom pulls the electrons closer due to a higher EN
•The two atoms involved have different EN values

Example: HCl

Step 1 Use table S to find the Electronegativity value for each element.

EN of H = ______ EN of Cl = ______

Step 2 Subtract EN of each element to find the difference (Δ EN)

Δ EN = (EN of Cl) – (EN of H)
Δ EN = _______ - ______ = _______

Step 3 Δ EN = 0 → NON-POLAR BOND
Δ EN ≠ 0 → POLAR BOND

HCl is a ____________ Covalent Bond

Practice

NH_3 (look at one N – H bond)

Step 1 EN of N = _________ EN of H = ___________

Step 2 Δ EN = (EN of N) – (EN of H)

Δ EN = _______ - _______ = _______

Step 3 Δ EN = 0 → NON-POLAR BOND
Δ EN ≠ 0 → POLAR BOND

NH_3 contains ____________ Covalent Bonds

Non-Polar Covalent Bonds

•___________ distribution/sharing of charge
•The two atoms involved are the same element and/or have the same EN values

Example: Cl_2

Step 1 Use table S to find the Electronegativity value for each element.

EN of Cl = ______ EN of Cl = ______

Step 2 Subtract EN of each element to find the difference (Δ EN)

Δ EN = (EN of Cl) – (EN of Cl)
Δ EN = _______ - ______ = _______

Step 3 Δ EN = 0 → NON-POLAR BOND
Δ EN ≠ 0 → POLAR BOND

Cl_2 is a ____________ Covalent Bond

O_2

Step 1 EN of O = _________ EN of O =

Step 2 Δ EN = (EN of O) – (EN of O)

Δ EN = _______ - _______ =

Step 3 Δ EN = 0 → NON-POLAR BOND
Δ EN ≠ 0 → POLAR BOND

O_2 is a ____________ Covalent Bond

Polar vs. Non-Polar Molecules

SNAP

In additional to bonds being either Polar or Non-Polar, entire MOLECULES can be classified as either Polar or Non-Polar.

Polar Molecule
- Unbalanced distribution of charge throughout the molecule
- ASYMMETRICAL shape
- Molecule includes unbonded or ___________ __________ electrons.

Non-Polar Molecule
- EQUAL/Balanced distribution of charge throughout the molecule
- SYMMETRICAL shape
- Any Dipole moments cancel each other out

How to test a Molecule's Polarity

Step 1 Draw the Lewis Dot Diagram for the Molecule
Step 2 Test the molecule for lines of symmetry paying attention to lone pair electrons as well as bonds
Step 3 Symmetrical molecule → NON-POLAR MOLECULE
Asymmetric Molecule → POLAR MOLECULE

Example **H_2O**

Water (H_2O) is a ______________________ molecule
* with **Polar/Non-Polar** covalent bonds (circle one)

CBr_4

CH_4 is a ___________________________ molecule
* with ____________ covalent bonds

Practice

NH_3

NH_3 is a ______________________ molecule
* with ____________ covalent bonds

$SiBr_4$

$SiBr_4$ is a ___________________________ molecule
* with ____________ covalent bonds