

Determining Bond & Molecular Polarity: ΔEN 0 – 0.4 = Non-Polar Covalent ΔEN 0.5 – 1.7 = Polar Covalent ΔEN >1.7 = Ionic

1. Complete the chart below (except the last column)

Use Phet Molecule Shapes & <http://bit.ly/2Za8zLb> chart to help with shape names and determining symmetry.


Compound	Atom with greater EN	EN Difference	Type of Bond(s)	Shape	Electron Symmetry (yes/no)	Polar or Non-Polar Molecule?
HCl	Cl	3-2.1 = 0.9	POLAR COVALENT	LINEAR	YES	POLAR
H ₂ S	S	2.5 – 2.1 = 0.4	NON-POLAR COVALENT	BENT	NO	POLAR
CaO	O	3.5 – 1 = 2.5	IONIC	NO SHAPE	NONE	IONIC
PCl ₃	Cl	3-2.1 = 0.9	POLAR COVALENT	TRIGONAL PYRAMID	NO	POLAR

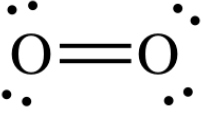
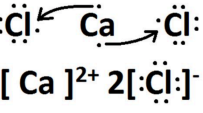
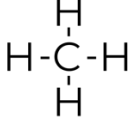
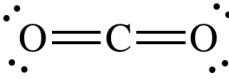
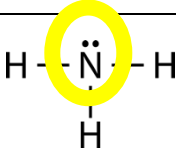
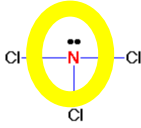
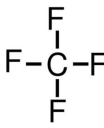
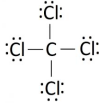
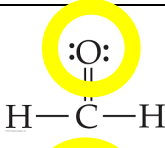
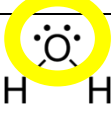
Molecule Polarity Determined by:

- If all of the bonds are all ionic the polarity is just **"Ionic"**
- If all of the bonds are non-polar covalent then the molecule is **"Non-Polar"**
*** Unless there are unbound electrons ***
- If the only bond is polar then the molecule is **"Polar"**
- If one or more of the bonds are polar then look at symmetry of electron distribution:
 - If the polar covalent bonds are arranged in a way that causes them to cancel each other out (ie. linear, tetrahedron, or trigonal planar and all bonds are the same) then the molecules is **"Non-Polar"** due to symmetry
 - If the polar covalent bonds or lone pairs of electrons do not cancel each other out (ie. pyramid, linear, or bent) then the molecule is **"Polar"**

2. Label the last column in the chart above "Polar or Non-Polar?" and complete the chart.

3. Complete the chart below.

Compound	Molecule Diagram	Type of Bond(s)	Shape	Electron Symmetry (yes/no)	Polar or Non-Polar Molecule?
H ₂	H—H	H-H NPC	LINEAR	YES	NON-POLAR MOLECULE
N ₂		N-N NPC	LINEAR	YES	NON-POLAR MOLECULE

Compound	Molecule Dot Diagram	Type of Bond(s)	Shape <i>*Use Phet to help*</i>	Electron Symmetry (yes/no)	Polar or Non-Polar Molecule?
O ₂		O-O NPC	LINEAR	YES	NON-POLAR MOLECULE
CaCl ₂	 [Ca] ²⁺ 2[:Cl:] ⁻	Ionic	NO SHAPE	NONE	IONIC
CH ₄		C-H NPC	TETRAHEDRAL	YES	NON-POLAR MOLECULE
CO ₂		C-O PC	LINEAR	YES	NON-POLAR MOLECULE
NH ₃		N-H PC	PYRAMID	NO	POLAR MOLECULE
NCl ₃		N-Cl NPC	PYRAMID	NO	POLAR MOLECULE
CF ₄		C-F PC	TETRAHEDRAL	YES	NON-POLAR MOLECULE
CCl ₄		C-Cl NPC	TETRAHEDRAL	YES	NON-POLAR MOLECULE
H ₂ CO		H-C NPC C-O. PC	TRIGONAL PLANAR	NO	POLAR MOLECULE
H ₂ O		O-H PC	BENT	NO	POLAR MOLECULE