

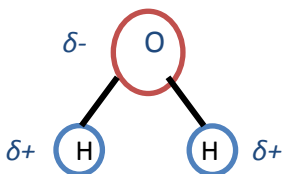
Polar Bonds – Supplemental Worksheet

1. True or False:

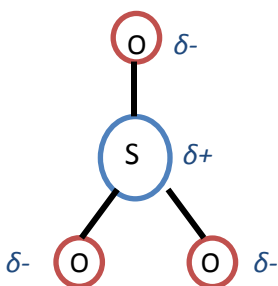
- a) Electronegativity trends are similar to ionization energy. *TRUE*
- b) As the electronegativity of an element increases the attraction for a shared pair of electrons decreases. *FALSE. The element will have a stronger attraction for the shared pair of electrons. Elements assigned a lower electronegativity value have a relatively lower attraction for the shared pair of electrons than an element with a higher value*
- c) The ΔEN for a covalent bond must have a value > 2.2 . *FALSE. A covalent bond has a small difference, large differences in electronegativity are ionic bonds. In general a rule of thumb is that $\Delta EN < 2.1$ is considered covalent.*

2. For the following compounds identify what has partial positive and partial negative charges.

- a) HF
- b) H₂O



- c) HCl
- d) SO₃



3. Explain the difference between pure covalent bonds and polar covalent bonds.

A pure covalent bond is an equal sharing of shared electron pairs in a bond; typically bonds are between 2 elements with identical electronegativities. A polar covalent bond is an unequal sharing of electron pairs in a bond that have different electronegativities but not large enough to be ionic bonds.

4. Label the bond in each of the following compounds

- a) F_2 *Pure (Nonpolar) Covalent. ΔEN equals 0.*
- b) HF *Polar covalent. ΔEN equals 1.9*
- c) KCl *Ionic. ΔEN equals 2.2*
- d) CuS *Polar covalent. ΔEN equals 0.6*

5. Which of the following compounds have dipole moments? For those that are not, explain why.

- a) HCl *Polar bond, dipole moment due to orientation.*
- b) Br_2 *Pure covalent. No dipole moment because no bond polarity occurs.*
- c) H_2Se *Polar bond, dipole moment because of bent shape, forces do not cancel out.*
- d) CCl_4 *Polar bond, but no dipole moment because tetrahedral shape causes forces to cancel out.*

6. True or False:

- a) Large dipole moments are non-polar, small dipole moments are polar. *FALSE. Large dipole moments are polar, and small dipole moments are non-polar.*
- b) Hydrogen's electronegativity acts similar to phosphorus because they have the same electronegativity. *FALSE. Hydrogen's electronegativity acts nearly identical to carbon.*
- c) $\delta+$ means that the electron spends more time with the element labeled $\delta-$. *TRUE.*