

Name ANSWERS

Date \_\_\_\_\_

Period \_\_\_\_\_

**Polarity & Electronegativity Worksheet**

1. What does it mean to say a bond is polar?

There is an unequal sharing of  $e^-$  in the bond

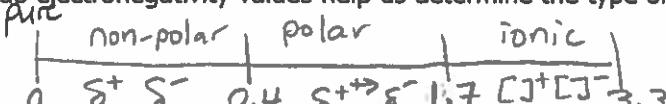
2. How are ionic bonds and covalent bonds different?

ionic bonds result from gaining + losing  $e^-$  to form ions  
covalent bonds " " sharing of  $e^-$  to become stable

3. How does a polar covalent bond differ from a non-polar covalent bond?

Polar covalent (0.4-1.7) creates a permanent pole ( $\delta^+ \delta^-$ )  
whereas non-polar (0.1-0.4) does not ( $\delta^+ \delta^-$ )

4. How do electronegativity values help us determine the type of bond created?



5. For each of the following molecules, determine if it is covalent, polar, or ionic. Show your work by listing the electronegativities of each element in the bond.

Molecule	Electronegativity Values	Difference in Electronegativity	Bond Type
H - Cl	H: 2.2 Cl: 3.16	0.96	polar covalent
H - H	H: 2.2 H: 2.2	0	pure covalent
H - I	H: 2.2 I: 2.66	0.46	polar
Cl - Cl	Cl: 3.16 Cl: 3.16	0	pure
C - O	C: 2.55 O: 3.44	0.89	polar
Ca - O	Ca: 1.0 O: 3.44	2.44	ionic
H <sub>2</sub> O	H: 2.2 O: 3.44	1.24	polar
Al - Fe	Al: 1.61 Fe: 1.83	0.22	metallic

6. For each of the following sets of elements, identify the element expected to be most electronegative (EN) and which is expected to be least electronegative (EN).

a. K, Sc, Ca      most EN = Sc      least EN = K

b. Br, F, At      most EN = F      least EN = At

c. C, O, N      most EN = O      least EN = C

7. Complete the following table.

Bond	$\Delta EN$	Type of Bond (ionic, pc, np, pure)	Diagram (show partial charges and dipole moments if applicable)
C--O	O 3.44 C 2.55 0.89	pc	$\delta^+ C \rightarrow \delta^- O$
S--Cl	Cl 3.16 S 2.58 0.58	pc	$\delta^- Cl \leftarrow \delta^+ S$
P--I	I 2.66 P 2.19 0.47	pc	$\delta^- I \leftarrow \delta^+ P$
F--I	F 3.98 I 2.66 1.32	pc	$\delta^- F \leftarrow \delta^+ I$
N--O	O 3.44 N 3.04 0.40	pc	$\delta^+ N \rightarrow \delta^- O$
P--Br	Br 2.96 P 2.19 0.77	pc	$\delta^- Br \leftarrow \delta^+ P$
C--I	I 2.66 C 2.55 0.11	np	$\delta^- I - \delta^+ C$
H--O	O 3.55 H 2.20 1.35	pc	$\delta^+ H \rightarrow \delta^- O$
N--Cl	Cl 3.16 N 3.04 0.12	np	$\delta^- Cl - \delta^+ N$
O--I	O 3.44 I 2.66 0.78	pc	$\delta^- O \leftarrow \delta^+ I$