

Unit 5: Chemical Bonding
Covalent Bonds and Polarity

Name Key Pd 11

Electronegativity Table:

H 2.1																	He
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0	Ar
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe 2.6
Cs 0.7	Ba 0.9	La 1.1	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Tl 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn 2.4
Fr 0.7	Ra 0.7	Ac 1.1	Unq	Unp	Unh	Uns	Uno	Une									

Ce 1.1	Pr 1.1	Nd 1.1	Pm 1.1	Sm 1.1	Eu 1.1	Gd 1.1	Tb 1.1	Dy 1.1	Ho 1.1	Er 1.1	Tm 1.1	Yb 1.1	Lu 1.2
Th 1.3	Pa 1.5	U 1.7	Np 1.3	Pu 1.3	Am 1.3	Cm 1.3	Bk 1.3	Cf 1.3	Es 1.3	Fm 1.3	Md 1.3	No 1.3	Lr

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

One atom has a $>en$ and \therefore pulls on e^- more

2. How does a polar covalent bond differ from a nonpolar covalent bond?

major en diff (dipole) not a big difference in EN

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

More diff. in en indicates uneven sharing (polar)

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

Molecule	Electronegativity Values	Difference in Electronegativity	Bond Type
$H-Cl$ oops!	H: 2.1 Cl: 3.0	0.9	Polar C
Cl-Cl	Cl: 3.0 Cl: 3.0	0	Nonpolar C
Ca-O	Ca: 1.0 O: 3.5	2.5	Ionic

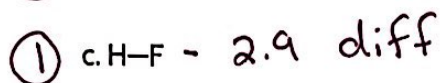
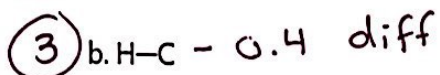
5. For each of the following sets of elements, identify the element expected to be most electronegative (EN) and which is expected to be least electronegative (EN).

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. The bonds between the following pairs of elements are covalent. Arrange them according to polarity, naming the most polar bond first.



8. Using the table of electronegativities from your Periodic table, calculate the EN difference for the atoms that are bonded in the following molecules. Then tell whether the bond is nonpolar covalent, polar covalent, or ionic. Tell which atom has the greater share of the bonding electrons. In your drawing, show which atom is partially positive or partially negative and draw the bond dipoles.

<u>Molecule</u>	<u>EN Difference</u>	<u>Type of Bond</u>	<u>Atom with greater EN</u>	<u>Electron Dot Structure (Rough Draft)</u> <u>Add Bond Dipoles</u>
PCl ₃	0.9	PC	Cl	
NH ₃	0.9	PC	N	
H ₂ O	1.4	PC	O	
Br ₂	0	NPC	—	
NI ₃	0.5	NPC	N	

What questions do you still have about bond polarity?