

9 • Bonding & Molecular Structure

ELECTRONEGATIVITY

| | | | | | | | | | | | | | | | | |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1 H 2.1 | | | | | | | | | | | | | | | | |
| 3 Li 1.0 | 4 Be 1.5 | | | | | | | | | | | 5 B 2.0 | 6 C 2.5 | 7 N 3.0 | 8 O 3.5 | 9 F 4.0 |
| 11 Na 1.0 | 12 Mg 1.2 | | | | | | | | | | | 13 Al 1.5 | 14 Si 1.8 | 15 P 2.1 | 16 S 2.5 | 17 Cl 3.0 |
| 19 K 0.9 | 20 Ca 1.0 | 21 Sc 1.3 | 22 Ti 1.4 | 23 V 1.5 | 24 Cr 1.6 | 25 Mn 1.6 | 26 Fe 1.7 | 27 Co 1.7 | 28 Ni 1.8 | 29 Cu 1.8 | 30 Zn 1.6 | 31 Ga 1.7 | 32 Ge 1.9 | 33 As 2.1 | 34 Se 2.4 | 35 Br 2.8 |
| 37 Rb 0.9 | 38 Sr 1.0 | 39 Y 1.2 | 40 Zr 1.3 | 41 Nb 1.5 | 42 Mo 1.6 | 43 Tc 1.7 | 44 Ru 1.8 | 45 Rh 1.8 | 46 Pd 1.8 | 47 Ag 1.6 | 48 Cd 1.6 | 49 In 1.6 | 50 Sn 1.8 | 51 Sb 1.9 | 52 Te 2.1 | 53 I 2.5 |
| 55 Cs 0.8 | 56 Ba 1.0 | 57 La 1.1 | 72 Hf 1.3 | 73 Ta 1.4 | 74 W 1.5 | 75 Re 1.7 | 76 Os 1.9 | 77 Ir 1.9 | 78 Pt 1.8 | 79 Au 1.9 | 80 Hg 1.7 | 81 Tl 1.6 | 82 Pb 1.7 | 83 Bi 1.8 | 84 Po 1.9 | 85 At 2.1 |
| 87 Fr 0.8 | 88 Ra 1.0 | 89 Ac 1.1 | | | | | | | | | | | | | | |

- In each pair of bonds, indicate the more polar bond and use an arrow to show the direction of polarity in each bond.
 - C—O and C—N
 - P—Br and P—Cl
 - B—O and B—S
 - B—F and B—I
- For each of the bonds listed below, tell which atom is the more negatively charged.
 - C—N
 - C—H
 - C—Br
 - S—O

It is somewhat artificial to classify bonds based on the differences in the electronegativities (Δ_X) of the two atoms. However, we will use these ranges to do so:

| | | |
|----------------|-----------------------------|--|
| Ionic | $\Delta_X > 1.7$ | (symbolized as A^+ and Z^-) |
| Polar Covalent | $1.7 \geq \Delta_X \geq .5$ | (symbolized as $A^{\delta+}$ and $Z^{\delta-}$) |
| Pure Covalent | $\Delta_X < .5$ | (no charges) |

- For each of the bonds listed below, classify each bond and indicate full or partial charges, if any.
 - Na—Cl
 - C—O
 - Cu—O
 - C—H
 - Mg—H
 - Cs—F
 - Cl—Cl
 - Al—Cl