

Section 9.5 Electronegativity and Polarity

In your textbook, read about electronegativity.

Use the table of electronegativities below to answer the following questions.

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| 1 H 2.20 | | | | | | | | | | | 5 B 2.04 | 6 C 2.55 | 7 N 3.04 | 8 O 3.44 | 9 F 3.98 | | | |
| 3 Li 0.98 | 4 Be 1.57 | | | | | | | | | | | 13 Al 1.61 | 14 Si 1.90 | 15 P 2.19 | 16 S 2.58 | 17 Cl 3.16 | | |
| 11 Na 0.93 | 12 Mg 1.31 | 21 Sc 1.36 | 22 Ti 1.54 | 23 V 1.63 | 24 Cr 1.66 | 25 Mn 1.55 | 26 Fe 1.83 | 27 Co 1.88 | 28 Ni 1.91 | 29 Cu 1.90 | 30 Zn 1.65 | 31 Ga 1.81 | 32 Ge 2.01 | 33 As 2.18 | 34 Se 2.55 | 35 Br 2.96 | | |
| 19 K 0.82 | 20 Ca 1.00 | 37 Rb 0.82 | 38 Sr 0.95 | 39 Y 1.22 | 40 Zr 1.33 | 41 Nb 1.6 | 42 Mo 2.16 | 43 Tc 2.10 | 44 Ru 2.2 | 45 Rh 2.28 | 46 Pd 2.20 | 47 Ag 1.93 | 48 Cd 1.69 | 49 In 1.78 | 50 Sn 1.96 | 51 Sb 2.05 | 52 Te 2.1 | 53 I 2.66 |
| 55 Cs 0.79 | 56 Ba 0.89 | 57 La 1.10 | 72 Hf 1.3 | 73 Ta 1.5 | 74 W 1.7 | 75 Re 1.9 | 76 Os 2.2 | 77 Ir 2.2 | 78 Pt 2.2 | 79 Au 2.4 | 80 Hg 1.9 | 81 Tl 1.8 | 82 Pb 1.8 | 83 Bi 1.9 | 84 Po 2.0 | 85 At 2.2 | | |
| 87 Fr 0.7 | 88 Ra 0.9 | 89 Ac 1.1 | | | | | | | | | | | | | | | | |

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| | Metal |
| | Metalloid |
| | Nonmetal |

1. What is the meaning of the term *electronegativity*?

2. Which element has the highest electronegativity? What is the numerical value? What are the name and group number of the chemical family that has the highest overall electronegativities?

3. Which element has the lowest electronegativity? What is the numerical value? What are the name and group number of the chemical family that has the lowest overall electronegativities?

4. What general trend in electronegativity do you note going down a group? Across a period?

5. How are the electronegativity values used to determine the type of bond that exists between two atoms?

In your textbook, read about the properties of covalent compounds.

For each statement below, write *true* or *false*.

_____ 6. Ionic compounds are usually soluble in polar substances.

_____ 7. In a covalent molecular compound, the attraction between molecules tends to be strong.

Section 9.5 *continued*

In your textbook, read about bond polarity.

Using the table of electronegativities on the preceding page, circle the letter of the choice that best completes the statement or answers the question.

8. Unequal sharing of electrons between two bonded atoms always indicates
- a. a nonpolar covalent bond.
 - b. an ionic bond.
 - c. a polar covalent bond.
 - d. a polar molecule.
9. When electronegativities of two bonded atoms differ greatly, the bond is
- a. polar covalent.
 - b. coordinate covalent.
 - c. polar covalent.
 - d. ionic.
10. What is the electronegativity difference that usually is the dividing line between covalent and ionic bonds?
- a. 1.0
 - b. 1.7
 - c. 2.7
 - d. 4.0
11. The symbol δ^+ is placed next to which of the following?
- a. the less electronegative atom in a polar covalent bond
 - b. the more electronegative atom in a polar covalent bond
 - c. a positive ion
 - d. the nucleus
12. A nonpolar covalent bond is one in which
- a. electrons are transferred.
 - b. electrons are shared unequally.
 - c. electrons are shared equally.
 - d. both electrons are provided by the same atom.
13. Molecules containing only polar covalent bonds
- a. are always polar.
 - b. may or may not be polar.
 - c. are always ionic.
 - d. are always nonpolar.
14. What factor other than electronegativity determines whether a molecule as a whole is polar or not?
- a. temperature
 - b. its geometry
 - c. its physical state
 - d. its mass
15. Which of the following correctly describes the compound water, H_2O ?
- a. ionic
 - b. nonpolar overall, with polar covalent bonds
 - c. polar overall, with nonpolar covalent bonds
 - d. polar overall, with polar covalent bonds
16. Which of the following correctly describes the compound carbon tetrachloride, CCl_4 ?
- a. ionic
 - b. nonpolar overall, with polar covalent bonds
 - c. polar overall, with nonpolar covalent bonds
 - d. polar overall, with polar covalent bonds
17. A molecule of ammonia, NH_3 , is
- a. nonpolar because it is linear.
 - b. polar because it is linear.
 - c. nonpolar because there is no electronegativity difference.
 - d. polar because there is an electronegativity difference and the molecule is trigonal pyramidal.