

- \_\_\_\_\_ bonds are the electrostatic attraction between cations and anions.  
a. Ionic      b. Covalent      c. Hydrogen      d. Metallic      e. Dipole
- \_\_\_\_\_ bonds are the equal sharing of a pair of electrons by two nonmetal atoms with equal electronegativity values.  
a. Ionic      b. Polar covalent      c. Nonpolar covalent      d. Hydrogen      e. Dipole
- \_\_\_\_\_ bonds are the unequal sharing of a pair of electrons by two nonmetal atoms with different electronegativity values resulting in a dipole (i.e., a partial positive and partial negative end).  
a. Ionic      b. Polar covalent      c. Nonpolar covalent      d. Hydrogen      e. Dipole
- Select all the statements that are correct:
  - The bond energy is the energy released when a bond is broken.
  - The bond length is less than the sum of the individual radii of atoms bonded together.
  - Because ionic compounds exist as a network of ions, they are liquids at room temperature.
  - The octet rule states that all atoms donate eight electrons when they bond to form molecules.
  - A molecule can contain polar bonds and still be a nonpolar molecule.
- Select all the examples below that indicate correctly which atom or ion has the **larger radius**:
  - $\text{Ca} > \text{Ca}^{2+}$
  - $\text{O} > \text{O}^{2-}$
  - $\text{F} > \text{F}^-$
  - $\text{P} < \text{P}^{3-}$
  - $\text{Al} > \text{Al}^{3+}$
- Select all the examples below that indicate correctly which atom or ion has the **larger radius**:
  - $\text{Na} < \text{Na}^+$
  - $\text{Br} < \text{Br}^-$
  - $\text{S} < \text{S}^{2-}$
  - $\text{N} < \text{N}^{3-}$
  - $\text{K} < \text{K}^+$
- What is the **total number of valence electrons** for the sulfur dioxide molecule, **SO<sub>2</sub>**? \_\_\_\_
- Draw the **electron dot formula** for sulfur dioxide, **SO<sub>2</sub>**, where S is the central atom.
  
- What is **total number of valence electrons** for the carbon tetrafluoride molecule, **CF<sub>4</sub>**? \_\_\_\_
- Draw the **electron dot formula** for carbon tetrafluoride, **CF<sub>4</sub>**, where C is the central atom.
  
- What is the **molecular shape** for carbon tetrafluoride, **CF<sub>4</sub>**?  
a. linear      b. trigonal planar      c. tetrahedral      d. trigonal pyramidal      e. bent
- What is the correct **bond angle** for carbon tetrafluoride, **CF<sub>4</sub>**?  
a. 180°      b. 120°      c. 109°      d. <109°      e. 90°

13. Select all of the statements below that are correct regarding the C-F bond:
- The C-F bond is a polar covalent bond.
  - The C-F bond is a nonpolar covalent bond.
  - Because C is more electronegative than F, C gets the  $\delta^-$  and F gets the  $\delta^+$ .
  - Because F is more electronegative than C, F gets the  $\delta^-$  and C gets the  $\delta^+$ .
  - Because C and F have equal electronegativity values, neither gets the  $\delta^-$  or the  $\delta^+$ .
14. CF<sub>4</sub> is a(n) \_\_\_\_\_ molecule.
- polar
  - nonpolar
  - ionic
  - covalent
15. What is the **total number of valence electrons** for hydrogen sulfide, **H<sub>2</sub>S**? \_\_\_\_\_
16. Draw the **electron dot formula** for hydrogen sulfide, **H<sub>2</sub>S**, where S is the central atom.
17. What is the **molecular shape** for hydrogen sulfide, **H<sub>2</sub>S**?
- linear
  - trigonal planar
  - tetrahedral
  - trigonal pyramidal
  - bent
18. What is the **bond angle** for hydrogen sulfide, H<sub>2</sub>S?
- 180°
  - 120°
  - 109°
  - <109°
  - 90°
19. Select all the statements below that are correct regarding the **H-S** bond.
- The H-S bond is a polar covalent bond.
  - The H-S bond is a nonpolar covalent bond.
  - Because H is more electronegative than S, H gets the  $\delta^-$  and S gets the  $\delta^+$ .
  - Because S is more electronegative than H, S gets the  $\delta^-$  and H gets the  $\delta^+$ .
  - Because H and S have equal electronegativity values, neither gets the  $\delta^-$  or the  $\delta^+$ .
20. **H<sub>2</sub>S** is a(n) \_\_\_\_\_ molecule.
- polar
  - nonpolar
  - ionic
  - covalent
21. Write the electron dot formula for **HCN** (where C is the central atom), and determine the **molecular shape** for **HCN**.
- linear
  - trigonal planar
  - tetrahedral
  - trigonal pyramidal
  - bent
22. What is the **bond angle** for **HCN**?
- 180°
  - 120°
  - 109°
  - <109°
  - 90°
23. What is the total number of valence electrons for the nitrate ion, **NO<sub>2</sub><sup>-</sup>**? \_\_\_\_\_
24. Write the electron dot formula for the nitrate ion, **NO<sub>2</sub><sup>-</sup>**, where N is the central atom.
25. Select all of the molecules below that are **nonpolar molecules**:
- H<sub>2</sub>
  - HCl
  - CF<sub>4</sub>
  - N<sub>2</sub>
  - CH<sub>4</sub>
  - HF
  - H<sub>2</sub>O
  - Cl<sub>2</sub>
  - NH<sub>3</sub>
  - CHCl<sub>3</sub>