CHM 130 **Chapter 12 Homework** Key

1. _____ bonds are the electrostatic attraction between cations and anions.

   a. Ionic b. Covalent c. Hydrogen d. Metallic e. Dipole

2. _____ 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

3. _____ 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

4. Select all the statements that are correct:

   a. The bond energy is the energy released when a bond is broken.
   b. The bond length is less than the sum of the individual radii of atoms bonded together.
   c. Because ionic compounds exist as a network of ions, they are liquids at room temperature.
   d. The octet rule states that all atoms donate eight electrons when they bond to form molecules.
   e. A molecule can contain polar bonds and still be a nonpolar molecule.

5. Select all the examples below that indicate correctly which atom or ion has the **larger radius:**

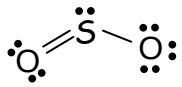
   a. $Ca > Ca^{2+}$ b. $O > O^{2-}$ c. $F > F^{-}$ d. $P < P^{3-}$ e. $Al > Al^{3+}$

6. Select all the examples below that indicate correctly which atom or ion has the **larger radius:**

   a. $Na < Na^{+}$ b. $Br < Br^{-}$ c. $S < S^{2-}$ d. $N < N^{3-}$ e. $K < K^{+}$

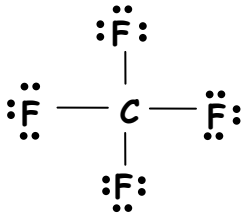
7. What is the **total number of valence electrons** for the sulfur dioxide molecule, **$\underline{S}O_2$**? 18

8. Draw the **electron dot formula** for sulfur dioxide, **$\underline{S}O_2$**, where S is the central atom.



9. What is **total number of valence electrons** for the carbon tetrafluoride molecule, **CF_4**? 32

10. Draw the **electron dot formula** for carbon tetrafluoride, **$\underline{C}F_4$**, where C is the central atom.



11. What is the **molecular shape** for carbon tetrafluoride, **CF_4**?

    a. linear b. trigonal planar c. tetrahedral d. trigonal pyramidal e. bent

12. What is the correct **bond angle** for carbon tetrafluoride, **CF_4**?

    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:

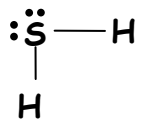
    a. The C-F bond is a polar covalent bond.

b. The C-F bond is a nonpolar covalent bond.
c. Because C is more electronegative than F, C gets the δ^- and F gets the δ^+.
d. Because F is more electronegative than C, F gets the δ^- and C gets the δ^+.
e. Because C and F have equal electronegativity values, neither gets the δ^- or the δ^+.

14. CF_4 is a(n) _____ molecule.
a. polar b. nonpolar c. ionic d. covalent

15. What is the **total number of valence electrons** for hydrogen sulfide, **H_2S**? _8__

16. Draw the **electron dot formula** for hydrogen sulfide, **H_2S**, where S is the central atom.



17. What is the **molecular shape** for hydrogen sulfide, **H_2S**?
a. linear b. trigonal planar c. tetrahedral d. trigonal pyramidal e. bent

18. What is the **bond angle** for hydrogen sulfide, H_2S?
a. 180˚ b. 120˚ c. 109˚ d. <109˚ e. 90˚

19. Select all the statements below that are correct regarding the **H-S** bond.
a. The H-S bond is a polar covalent bond.
b. The H-S bond is a nonpolar covalent bond.
c. Because H is more electronegative than S, H gets the δ^- and S gets the δ^+.
d. Because S is more electronegative than H, S gets the δ^- and H gets the δ^+.
e. Because H and S have equal electronegativity values, neither gets the δ^- or the δ^+.

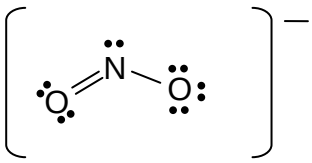
20. **H_2S** is a(n) _____ molecule.
a. polar b. nonpolar c. ionic d. covalent

21. Write the electron dot formula for **HCN** (where C is the central atom), and determine the **molecular shape** for **HCN**.
a. linear b. trigonal planar c. tetrahedral d. trigonal pyramidal e. bent

22. What is the **bond angle** for **HCN**?
a. 180˚ b. 120˚ c. 109˚ d. <109˚ e. 90˚

23. What is the total number of valence electrons for the nitrate ion, **NO_2^-**? 18

24. Write the electron dot formula for the nitrate ion, **NO_2^-**, where N is the central atom.



25. Select all of the molecules below that are **nonpolar molecules**:
a. H_2 b. HCl c. CF_4 d. N_2 e. CH_4 f. HF g. H_2O h. Cl_2 i. NH_3 j. $CHCl_3$