

**Chapter 8 Review Sheet**

1. What are covalent bonds?

A bond that forms when atoms are held together by sharing electrons.

2. Covalent bonds typically occur between 2 nonmetal/metalloid.

3. A molecule is a neutral group of atoms joined together by covalent bonds.

4. Monoatomic atoms contain 1 atom while diatomic atoms contain 2 atoms.

5. What are the seven diatomic molecules?

H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub>, I<sub>2</sub>

6. What is a molecular compound?

A compound composed of molecules and held together through covalent bonds.

7. A molecular formula reflects the actual number of atoms in each molecule.

8. True or **False**: A molecular formula tells you about a molecule's structure.

9. What representative units define molecular compounds and ionic compounds?

Molecular compounds = molecules; while ionic compounds = formula units

**10. List three differences between ionic and covalent bonds.**

1. ionic bonds transfer electrons; covalent bonds share electrons
2. ionic bonds include metal & nonmetal; covalent bonds between 2 nonmetals/metalloids
3. ionic bonds given in formula units; covalent bond given in molecules
4. ionic bonds the formula is simplified lowest whole number ratio; covalent bonds are not simplified and reflect the actual number of electrons/atoms.
5. ionic bond usually in solids; covalent bonds in solid, liquid, or gas
6. Ionic bonds are good conductors; while covalent bonds are poor to nonconducting

11. In covalent bonds, electron sharing usually occurs so that atoms attain the electron configuration of Noble gas.

**12. How many electrons does a single covalent bond share? Double? Triple?**

Single bond = 2 electrons; double bond = 4 electrons; triple bond = 6 electrons

13. A polyatomic ion is a group of covalently bonded atoms with a positive or negative charge that acts as a single unit. Give an example.

14. **True** or false: Compounds containing polyatomic ions include both ionic and covalent bonding.

15. What are exceptions to the octet rule?

- When total number of valence electrons is an odd number
- When the molecule has atoms with less than a complete octet of valence electrons
- When the molecule has atoms with more than a complete octet of valence electrons

16. resonance structures are two or more valid electron dot structures that can be written for the same molecule.

**17. What is bond dissociation energy?**

The energy required to break the bond between two covalently bonded atoms is known as the bond dissociation energy

18. Which type of covalent bond is the strongest? Weakest?

Strongest = triple bond; weakest = single bond

**19. How is the strength of a covalent bond related to its bond dissociation energy?**

The stronger the bond, the more the bond dissociation energy needed to break the bond.

20. The **VSEPR** theory states repulsion between electrons causes molecules adjust their shapes so that the valence electron pairs are as far apart as possible.

21. BE ABLE TO DETERMINE NUMBER OF BONDING GROUPS, LONE PAIRS, AND THEN MOLECULAR/ELECTRON SHAPE OF A MOLECULE.

22. What are molecular orbitals?

Formed when the atomic orbitals of two atoms overlap; orbitals that applies to the entire molecule

23. BE ABLE TO TELL HOW MANY SIGMA AND PI BONDS ARE IN A MOLECULE.

24. **hybridization** is the mixing of several atomic orbitals to form the same number of equivalent orbitals.

25. BE ABLE TO TELL ME HOW SPECIFIC HYBRIDS ARE FORMED. (Ex:  $sp^2$  orbitals are formed from 1 s orbital and 2 p orbitals)

26. BE ABLE TO TELL A COMPOUNDS HYBRIDIZATION BASED ON ELECTRON GEOMETRY.

27. What is the difference between nonpolar and polar covalent bonds?

Nonpolar = when atoms in a bond pull equally

Polar = when atoms are shared unequally

28. What is electronegativity?

Electronegativity is the ability of an atom of an element to attract electrons when the atom is in a compound.

29. The more **electronegative** atom attract electrons more strongly and gains a slight **negative** charge. The less electronegative atom has a slight **positive** charge.

30. BE ABLE TO TELL ME IF A MOLECULAR IS POLAR OR NONPOLAR BASED ON ELECTRONEGATIVITY VALUES.

31. How do the strengths of intermolecular attractions compare with ionic and covalent bonds?

Intermolecular attractions are weaker than ionic and covalent.

32. Van der Waals is composed of two intermolecular forces.

a) dipole interactions: Occurs when the slightly **negative** region of a **polar** molecule is weakly attracted to the slight **positive** region of another polar molecule.

b) dispersion forces: Occur between **nonpolar** molecules and caused by motion of **electrons**.

33. Which intermolecular forces is the weakest? Which is the strongest?

The weakest is dispersion forces; the strongest is hydrogen bonds.

34. **Hydrogen** bonds are attractive forces in which a hydrogen covalently bonded to a very electronegative atom that is also weakly bonded to an unshared electron pair of another electronegative atoms. The strong electronegative atom could include **nitrogen, oxygen, and fluorine**.

35. **Network solids** are solids in which all the atoms are covalently bonded to each other. An example is **diamond**.