

AP Chemistry: Intermolecular Forces WS #1

Identify the correct intermolecular force for each of the following descriptions.

1. Weak attraction between instantaneous dipoles.

2. Exists in all polar molecules.

3. Exists in all atoms and molecules.

4. The strongest intermolecular force.

5. Increases in strength as molar mass increases.

6. Indicate which intermolecular forces are present in the following substances by checking the appropriate boxes. You need to determine whether each molecule is polar or nonpolar.

Substance	Dispersion Forces	Dipole-Dipole Forces	Hydrogen Bonding
Br ₂			
PCl ₃			
BF ₃			
C ₂ H ₅ OH			

7. Compare and contrast intermolecular forces and intramolecular forces. Which are stronger?
8. Compare and contrast the properties of liquids and solids.
9. What property causes water to bead up on the hood of a freshly waxed car? _____
10. What property causes oil to travel up the wick of an oil lamp? _____
11. Describe the intermolecular forces that must be overcome to convert each of the following from a liquid to a gas:
 - a. Br₂
 - b. CH₃OH
 - c. H₂S

Identify the correct type of crystal for each of the following descriptions.

12. All atoms are covalently bonded together.
13. Molecules are held together by intermolecular forces.
14. Charged particles are arranged in a geometric pattern.

15. Atoms are surrounded by a sea of electrons.

16. Results in the highest melting point.

17. Compare and contrast crystalline and amorphous solids

18a. What is meant by the term polarizability?

b. Which of the following atoms would you expect to be most polarizable: O, S, Se, or Te? Explain

c. Put the following molecules in order of increasing polarizability: GeCl_4 , CH_4 , SiCl_4 , SiH_4 , GeBr_4

d. Predict the order of boiling points of the substances in part (c).

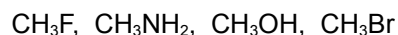
19. Which member of the following pairs has the larger London dispersion forces? Why?

a. H_2O or H_2S

b. N_2 or O_2

c. CH_4 or CCl_4

20. Which of the following molecules can form hydrogen bonds with other molecules of the same kind?



21. Identify the types of intermolecular forces that are present in each of the following substances and select the substance in each pair that has the higher boiling point.

a. C_6H_{14} or C_8H_{18}

b. C_3H_8 or CH_3OCH_3

c. CH_3OH or CH_3SH

d. NH_2NH_2 or CH_3CH_3