

Key

Name _____

1. Boiling point is a good measure of the force of attraction between *see page 203 "Intermolecular Forces"*
- a. the molecules of a liquid
 - b. the protons and neutrons within the nucleus
 - c. the atoms within a molecule
 - d. the protons and electrons of the same atom

2. Which of the following will have the highest boiling point?

- a. Cl_2
- b. H_2O
- c. MgF_2 *ionic*
- d. HF

3. In the box below, draw the symbol for a dipole in the correct orientation for the molecule shown:
(Don't draw individual bond dipoles. Draw one dipole in the box for the entire molecule.)



ammonia
 NH_3



4. Why does Br_2 have a lower boiling point than ICl (iodine monochloride)?

Br_2 is non-polar
 ICl is polar

Choose from the following four types of bonding to answer the next three questions.

covalent bonding dipole-dipole attractions hydrogen bonding London dispersion forces

5. Which type of bonding is the strongest? *covalent*
6. Which type of bonding is the weakest? *London*
7. Which type of bonding is just a particularly strong type of dipole-dipole force? *H-bond*
8. Which of the following would have the highest boiling point?
- a. F_2
 - b. H_2S
 - c. NH_3 *H-bonding*
 - d. PH_3
9. Explain how a non-polar molecule such as O_2 can have a temporary dipole? *see London Forces on page 207*
10. In which two of the following gases would London dispersion forces be the only intermolecular force of attraction?
- a. F_2
 - b. H_2S
 - c. H_2O gas
 - d. NH_3
 - e. He
 - f. HF
11. Which of the following should have the highest boiling point?
- a. He
 - b. H_2
 - c. O_2
 - d. Cl_2 *← due to mass*
12. Carbon has an electronegativity of 2.5. Oxygen has an electronegativity of 3.5. The difference in electronegativity (1.0) makes the C—O bond very polar. So why is carbon dioxide (CO_2) actually a non-polar molecule.

