Evaporation, Vapor Pressure, and Boiling Point

1. Order the following substances from lowest to highest vapor pressure.

H_2O C_4H_{10} CH_3OCH_3 $CH_3CH_2CH_2CH_2Cl_3$ CH_2OHCH_2OH

C_4H_{10} < $CH_3CH_2CH_2CH_2Cl_3$ < CH_3OCH_3 < H_2O < CH_2OHCH_2OH

2. Which of the following has the lowest vapor pressure?

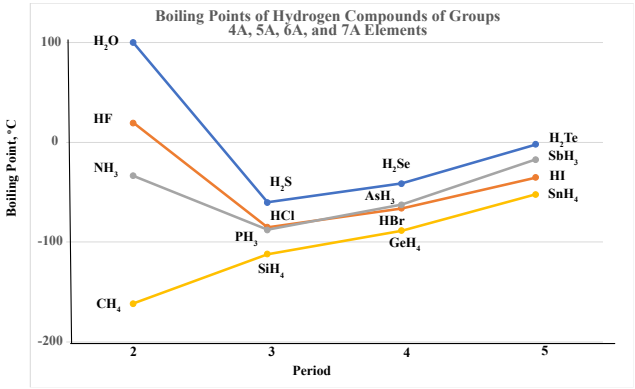
H_2O CH_4 CH_3OCH_3 C_2H_6

H_2O

3. Vapor pressure is affected by the strength of intermolecular forces and temperature. Explain.

As the temperature increases, the fraction of molecules with enough energy to escape into the gas phase also increases. The stronger the intermolecular forces, the more energy it will take to overcome those intermolecular forces of attraction. Substances with stronger intermolecular forces have lower vapor pressures.

4. Consider the following plot of boiling points vs period.



a) Which compound has the highest vapor pressure? CH_4

b) Which compound has the lowest vapor pressure? H_2O

c) Why is the effect of hydrogen bonding on boiling point much greater for water than for HF or NH_3?

Water can form 4 hydrogen bonds. HF can only form one hydrogen bond, and NH3 can only form 2 hydrogen bonds.