Skill Practice 25

Forces and States Practice

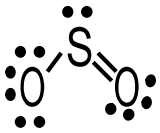
Name: _____

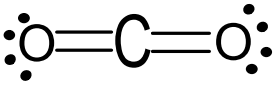
Date: _____

1. Which of the following molecules would you expect to have the strongest intermolecular forces—O_2 or S_2? Explain why.

   Both dispersion, but because S_2 is heaviest it will have the strongest forces

2. Consider the following molecules, SO_2 and CO_2:





   a) What kind of intermolecular force exists between each type of molecule?
      SO_2 = dipolar CO_2 = dispersion
   b) Which one would you expect to have the highest boiling point?
      SO_2
   c) Which one would you expect to have the lowest freezing point?
      CO_2
   d) Which one would you expect to be more soluble in water?
      SO_2
   e) If both were liquid at a certain temperature, which would you expect to have the greatest surface tension based on intermolecular forces?
      SO_2

3. Substance A boils at 78.5°C. Substance B boils at 64.2°C. Substance C boils at 87.9°C. Rank the three substances in order from strongest to weakest intermolecular forces.
   C, A, B

4. Is it more difficult to liquefy (change from gas to liquid) polar molecules or nonpolar molecules? Explain why.
   Nonpolar, because their forces are generally weaker.

5. Liquid N_2 boils at a lower temperature than liquid O_2.
   a) What type of force exists between N_2 molecules? Between O_2 molecules?
      Dispersion for both
   b) Which forces are stronger—those between N_2 molecules or those between O_2 molecules?
      Oxygen since it boils at a higher temperature

6. Substance X has a molar mass of 145 g/mol. Substance Y has a molar mass of 210 g/mol. Substance Z has a molar mass of 125 g/mol. Assuming that X, Y, and Z are all composed of only carbon and hydrogen, rank them in order from strongest to weakest intermolecular forces. And then name the force that exists between the molecules.
   All dispersion; Y, X, Z