

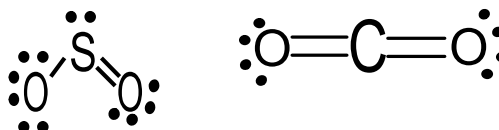
# Forces and States Practice

Name: \_\_\_\_\_

Date: \_\_\_\_\_

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

2. Consider the following molecules,  $SO_2$  and  $CO_2$ :



- What kind of intermolecular force exists between each type of molecule?
  - Which one would you expect to have the highest boiling point?
  - Which one would you expect to have the lowest freezing point?
  - Which one would you expect to be more soluble in water?
  - If both were liquid at a certain temperature, which would you expect to have the greatest surface tension based on intermolecular forces?
3. Substance A boils at  $78.5^\circ\text{C}$ . Substance B boils at  $64.2^\circ\text{C}$ . Substance C boils at  $87.9^\circ\text{C}$ . Rank the three substances in order from strongest to weakest intermolecular forces.
4. Is it more difficult to liquefy (change from gas to liquid) polar molecules or nonpolar molecules? Explain why.
5. Liquid  $N_2$  boils at a lower temperature than liquid  $O_2$ .
- What type of force exists between  $N_2$  molecules? Between  $O_2$  molecules?
  - Which forces are stronger—those between  $N_2$  molecules or those between  $O_2$  molecules?
6. Substance X has a molar mass of  $145\text{ g/mol}$ . Substance Y has a molar mass of  $210\text{ g/mol}$ . Substance Z has a molar mass of  $125\text{ g/mol}$ . 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.