

Show your work for problems that require calculations.

1. (6 pts) List 3 differences between an ideal gas and a real gas.

- a.
- b.
- c.

2. (6 pts)

a. The graph at right represents a substance at  $100^{\circ}\text{C}$ . Draw the speed distribution for the same substance at  $0^{\circ}\text{C}$ .

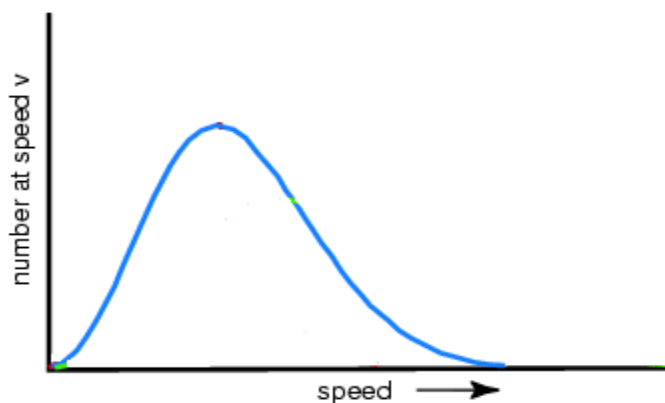
b. Circle the temperature of the substance which will have a higher kinetic energy:

- i.  $100^{\circ}\text{C}$
- ii.  $0^{\circ}\text{C}$
- iii. They have the same kinetic energy.

c. Circle the temperature at which the substance will have the fastest rate of effusion:

- i.  $100^{\circ}\text{C}$
- ii.  $0^{\circ}\text{C}$
- iii. They will effuse at the same rate.

d. Explain your answer to part c.



3. (9 pts) Label the type of crystalline solid each of the substances below forms: atomic, covalent network, ionic, metallic, molecular polar, or molecular nonpolar. Then, circle the substance in each pair that will have the lower melting point.

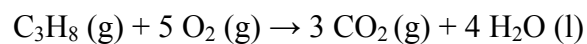
- a. Al: \_\_\_\_\_ Ge: \_\_\_\_\_
- b. LiOH: \_\_\_\_\_ HOH: \_\_\_\_\_
- c. Bromine: \_\_\_\_\_ Xenon: \_\_\_\_\_

4. (4 pts) Identify all the “intermolecular forces” present in each of the following compounds.

a. Nitrogen

b. CH<sub>3</sub>F

5. (5 pts) Propane, C<sub>3</sub>H<sub>8</sub>, is a hydrocarbon that is commonly used as fuel for cooking.



Calculate the volume of air at 65°C and 1.20 atm that is needed to burn completely 15.0 grams of propane. Assume that the mole fraction of oxygen in air is 0.210.