1. For the molecules HCN and CH_3NH_2

a. Draw the Lewis structure of each.

b. Give the hybridization for each atom bonded to more than one other atom.

c. What is the electron pair geometry and bond angle for each atom bonded to more than one other atom?

d. What is the molecular shape and bond angle for each atom bonded to more than one other atom?

2. a. Draw a Lewis structure for C_3H_8, and another for $CH_3CH_2NH_2$.

    b. What intermolecular forces are present in each compound?

    c. Which one will have the highest boiling point? Why?

    d. Draw three molecules of $CH_3CH_2NH_2$ showing how the **strongest** type of intermolecular forces act between the molecules.

3a. Draw a graph showing the distribution of velocities of He atoms at 200K. Using a dotted line show the distribution of velocities for the same atoms at 300K.

Number of particles

Velocity (m/s)
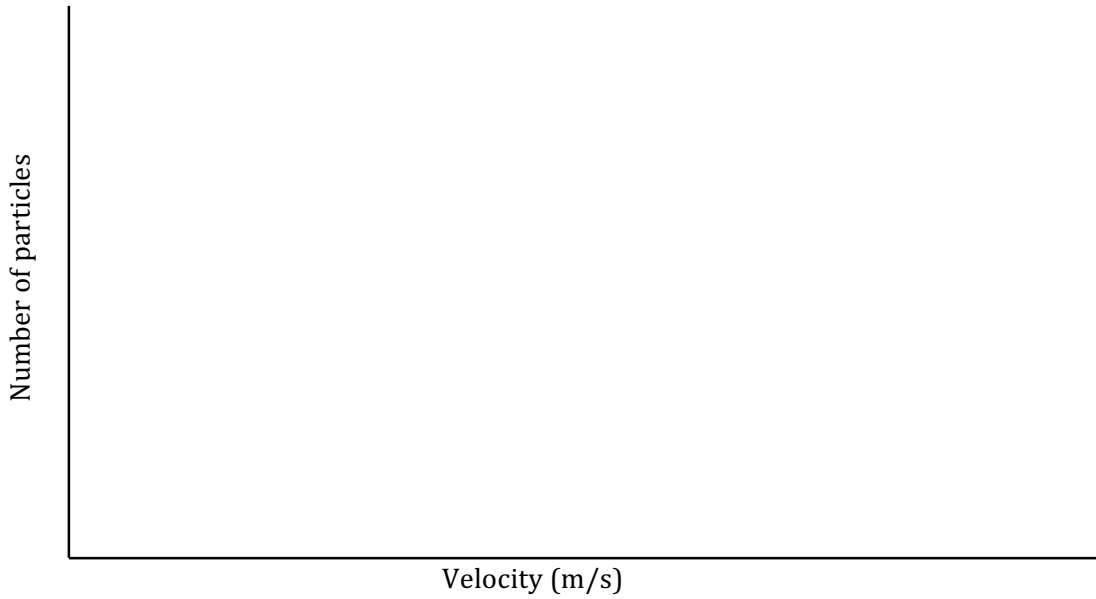
b. On the graph below now redraw the distribution of velocities of He atoms at 300K. Using a dotted line, now show the distribution of velocities for Ar at 300K.

Number of particles

Velocity (m/s)
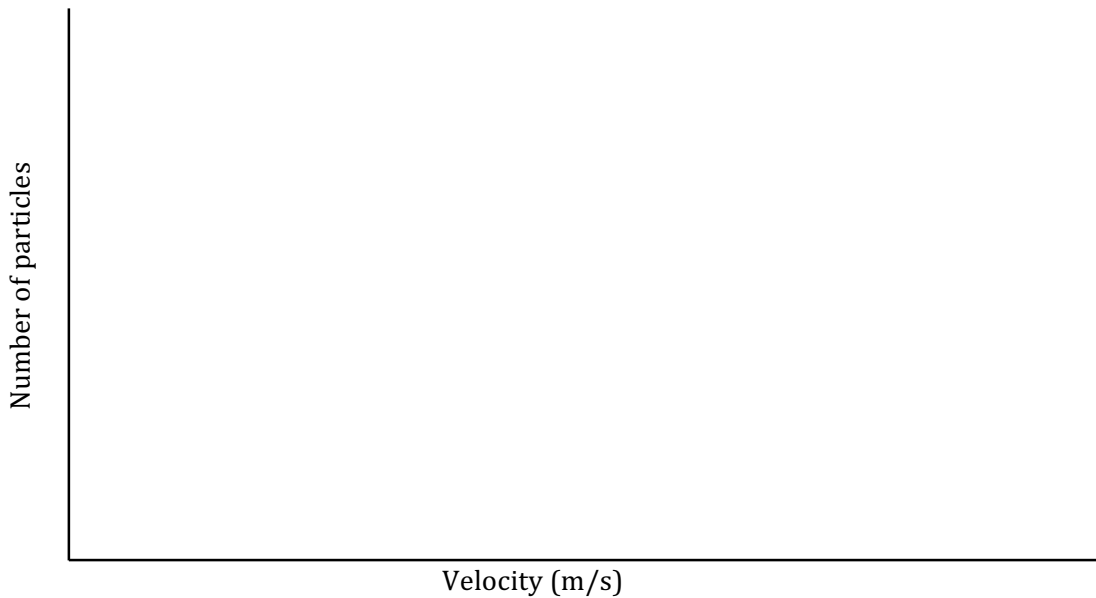
4. If thermal energy is added at a constant rate to 100g of ice at -20 °C until it reaches 150 °C

a. Draw a graph of temperature vs. time for this process. Clearly label which phase is present in each section of the graph.
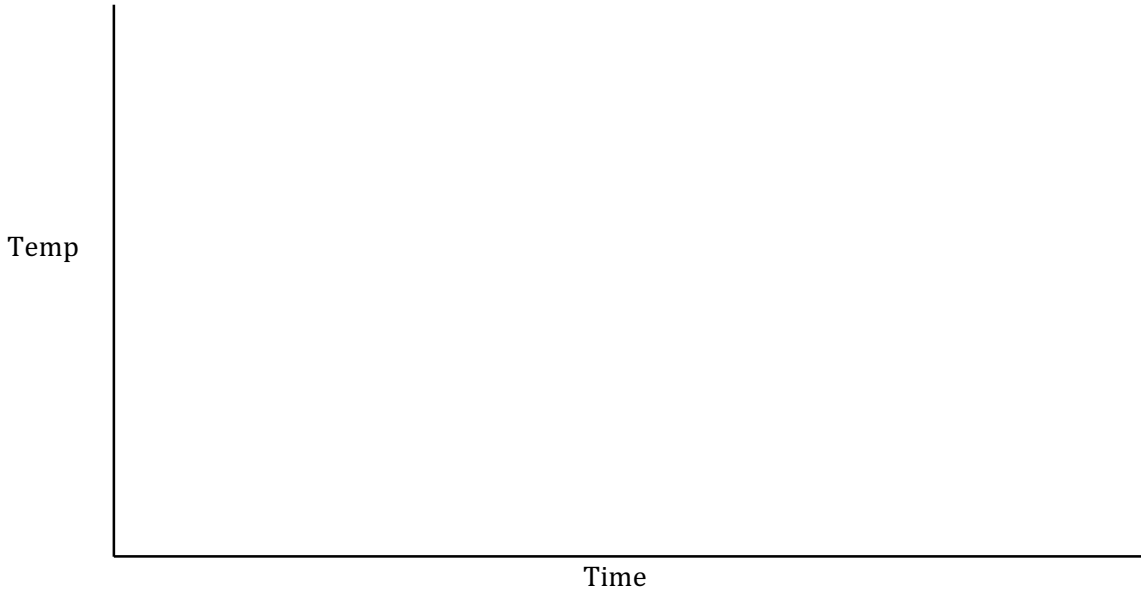
Temp

Time

b. Now draw graphs of temperature vs. time (use the same set of axes) to show what happens if thermal energy is **added** at an equal rate from equal masses of water (specific heat 4.18 J/g K) and isopropyl alcohol (specific heat 2.68 J/g K). Start the graph at 20 °C and end at 50 °C for each material. Use a regular line for water and a dotted line for isopropyl alcohol. (They both exist as liquids during this temperature range.)

Temp

Time
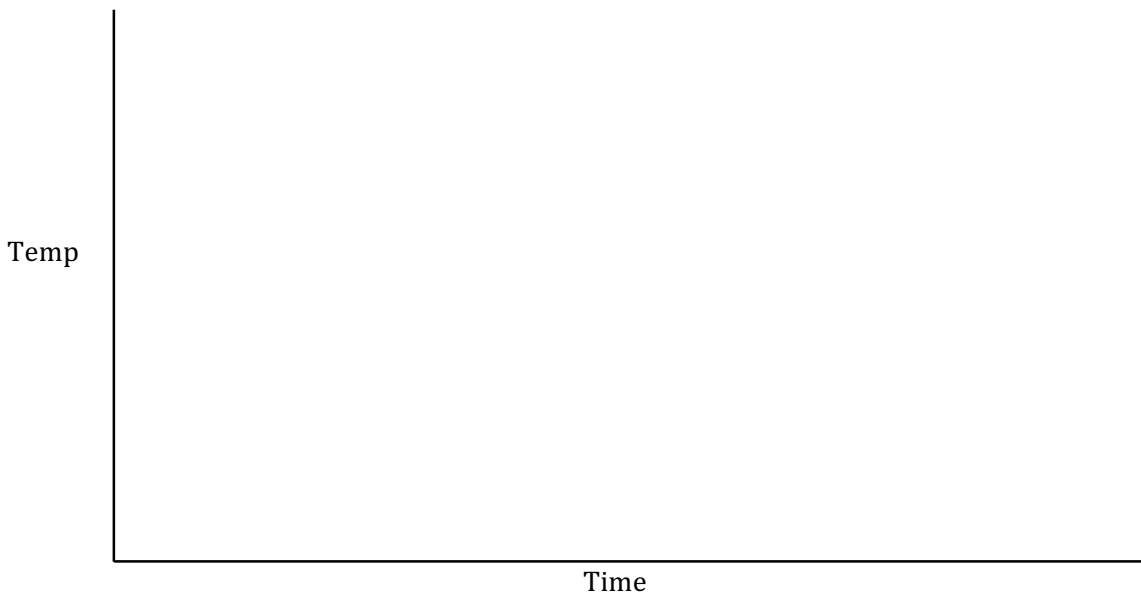
5. For NaCl, HCl and Cl_2, describe the bonding in each compound and explain the differences (if any). Rank the expected melting points, and explain your answer