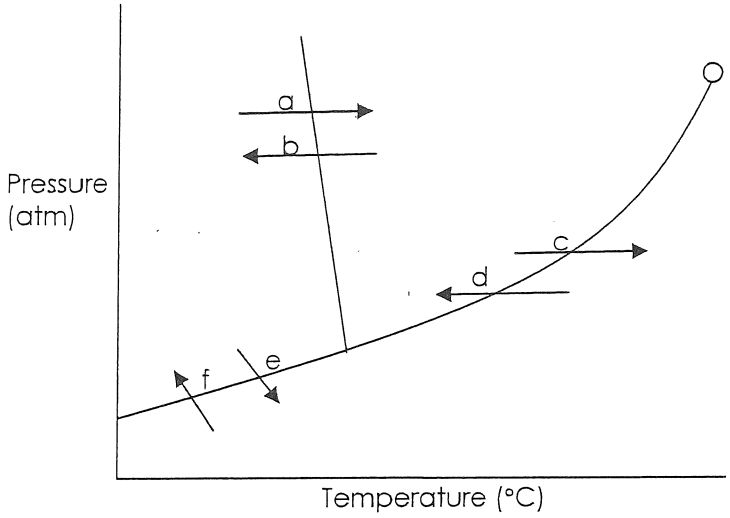
Phase Diagrams Part 1:

The dependency of state of matter on the temperature and the pressure can be shown with phase diagrams. The three phases are in equilibrium at the triple point. The gas and liquid phases are separated by a phase transition only below the temperature of the critical point. Even though the phase diagram appears to show that a gas can exist at absolute zero, only the solid phase exists at that temperature (0 K). Sometimes more than one solid phase is possible because of different crystal structures. For example, Carbon has several solid crystal structures. The most familiar are diamond and graphite. The only phase diagrams we will be studying are for pure substances but phase diagrams are also useful for mixtures. In fact, a phase diagram of chocolate can be used to describe why chocolate must be tempered (heated in a specific way to make it have the right texture).

Directions: Label and color in the areas that represent solid, liquid and gas. Then describe the phase change occurring at a – f.



a _____

b. _____

c. _____

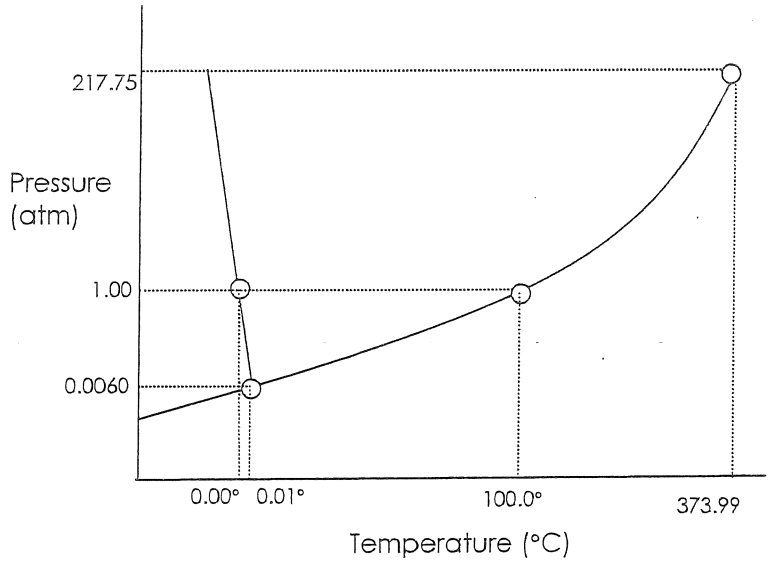
d. _____

e. _____

f. deposition

Part 2:

Directions: Using the definition given, label the following and give the temperature and pressure for each point



1. Triple Point: All three phases can exist in equilibrium at this temperature and pressure. This is the point on the diagram where the solid-liquid line and the liquid-vapor line meet.

   Temperature _____ Pressure _____

2. Normal boiling point: The temperature at which the vapor pressure of a liquid is equal to standard atmospheric pressure. This is the point on the diagram where the standard atmospheric pressure line crosses the liquid-vapor line

   Temperature _____ Pressure _____

3. Normal Melting Point: The temperature at which the vapor pressure of the solid and the vapor pressure of the liquid are equal. This is the point on the diagram where the standard atmospheric pressure line crosses the solid-liquid line.

   Temperature _____ Pressure _____

4. Critical temperature: The temperature above which no amount of pressure will liquefy a vapor. This is the point on the diagram where the liquid-vapor line becomes vertical.

   Temperature _____

5. Critical pressure: the pressure required to liquefy a gas at its critical temperature.

   Pressure _____

6. In the Bell Jar Demonstration, I was able to make water boil at room temperature. Using the definition of normal boiling point from above, explain how this was possible.