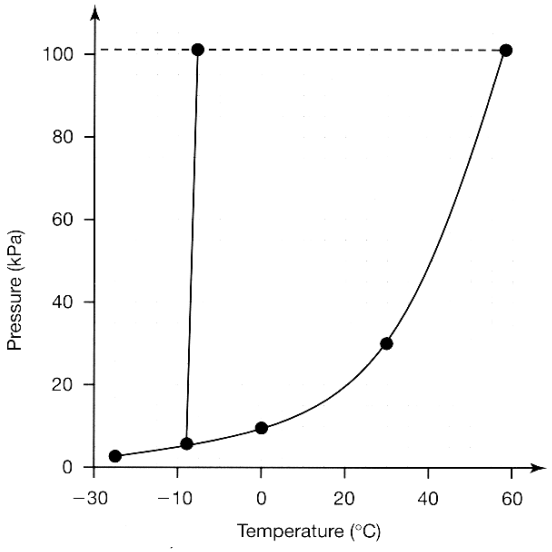
WKS
Phase Diagrams

Name _____

1) At standard temperature and pressure, bromine (Br_2) is a red liquid. Use the phase diagram for bromine is (shown at the right) to answer the following questions. *Note: 1 atm = 101.3 kPa. Thus, 101.3 kPa is the pressure for all "normal" mp and bp's.*



   a) Label each region of the graph as *solid*, *liquid*, or *gas*.
   b) Label the *triple point*, *normal melting point*, and *normal boiling point* on the graph and estimate their values in the spaces below.
      Normal Melting Point = _____
      Normal Boiling Point = _____
      Triple Point: P = _____ T = _____
   c) Explain the significance of the triple point?

   d) When external pressure is increased, what happens to bromine's melting point? **Increase or decrease**

   e) Based on the slope of the melting-point curve in the phase diagram, would you characterize the solid phase of bromine as **more dense** or **less dense** than the liquid phase of bromine? *Explain your reasoning.*

   f) What is the boiling point of bromine when the external pressure is 75 kPa?_____
   g) Bromine vapor at 15°C (**condenses, sublimes)** when the pressure is raised to 50 kPa.
   h) Bromine liquid at 70 kPa (**vaporizes, freezes)** when the temperature is decreased to –15°C.
   i) What is the vapor pressure of liquid bromine at 0°C? _____

2) a) What is sublimation?

   b) Give two examples of common substances that sublime at ordinary temperatures.

3) What is meant by the normal freezing point of a substance?

4) Use the phase diagram of water (shown at right), to answer the following questions:

a) What phase change occurs when water goes from 100°C to −50°C at 0.3 kPa? _____

b) What would happen to solid ice (originally at −5°C and 1 atm), if the external pressure is greatly increased?

c) By just looking at the phase diagram, how is one able to tell that solid water is less dense than liquid water?

d) Point "D" on the diagram is the critical point for water. Thus, the critical temperature is 374°C for water. What exists above this critical temperature?