

Work the following problems completely explaining your answers and showing all work, formulas, and units.

1. The following compounds, listed with their boiling points in parentheses, are all liquids at -10°C : butane (-0.5°C), ethanol (78.3°C), toluene (110.6°C). At -10°C , which of these liquids would you expect to have the highest vapor pressure? Which the lowest? Explain.

2. Using the following two phase diagrams, please answer the following questions.

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Figure 11.40: Phase Diagram of Water

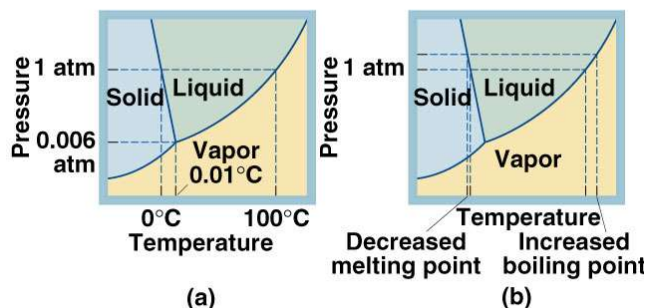
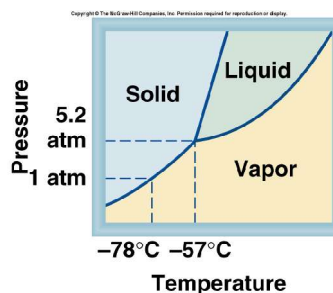


Figure 11.40: Phase Diagram of CO_2



- a) The phase diagram for H_2O shows that the melting point decreases with an increase in pressure. Describe what is physically happening during this process and explain why this process is different for H_2O compared to other substances.

- b) What are the temperature and pressure of carbon dioxide at the triple point?

c) What is the physical state of carbon dioxide at STP?

d) What is the triple point of H_2O ? Where in the universe would you have to be to see H_2O at these conditions?

3. Answer the following questions about Example 11.8 on p. 488.

a) Of the three steps, which process requires the most energy and why?

b) Describe how this problem would change if we started with 346 g of ice at 0°C instead of 346 g of water at 0°C . (Hint: Use an equation.)

c) How much heat is given off if steam at 182°C is converted to water at 0°C ?

4. Answer the following questions about the discussion on ps. 464-466.

If we were in the laboratory taking pressure and temperature measurements of water and its vapor...

a) Which equation would you use?

b) What would we need to do to determine its enthalpy of vaporization (ΔH_{vap})? (Hint: A diagram or graph with an explanation is needed.)