

Vapor Pressure!

Thermodynamics

Winter 2025

College of the Atlantic.

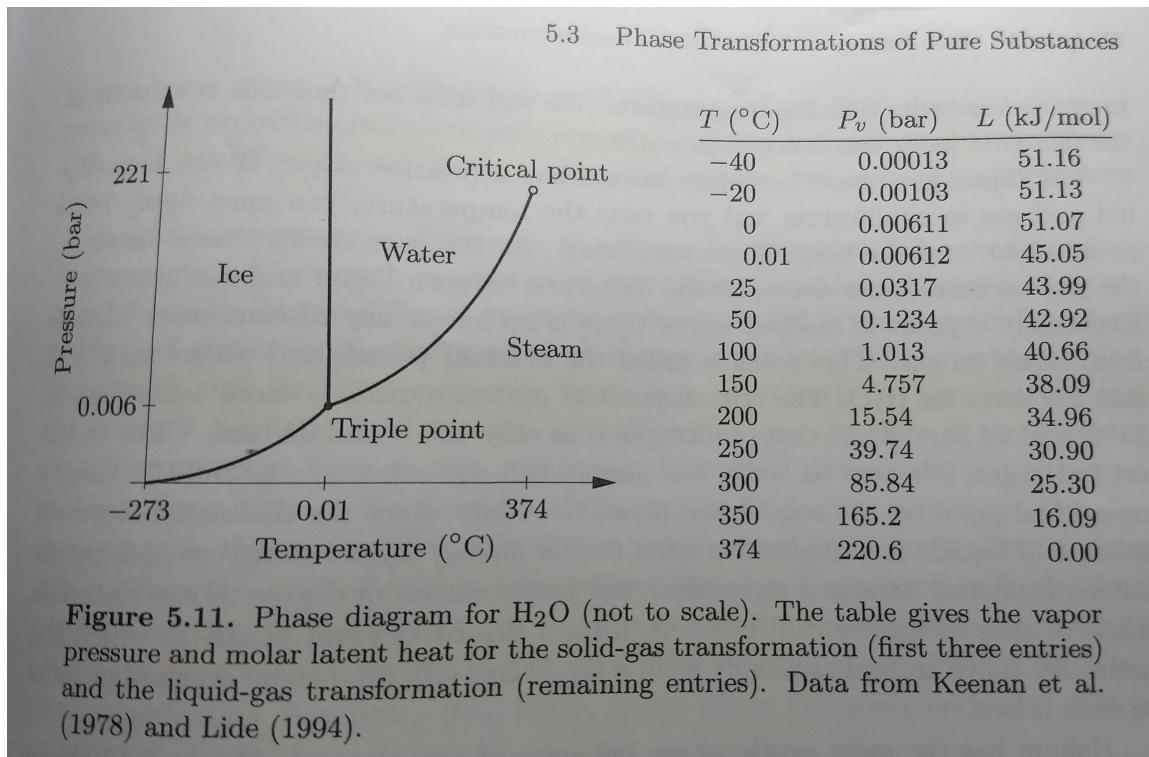


Figure 1: Figure from Daniel V. Schroeder, *Thermal Physics*, Addison Wesley, 2000.

Figure 2 shows a plot of the vapor pressure for water as a function of temperature. To make this plot I used the vapor pressure equation:

$$P(t) = P_0 e^{-L/RT}. \quad (1)$$

To determine numerical values, I used data from the table in Fig. 1. I used the value for the latent heat L at 25 C , and then I used the fact that the vapor pressure of water at 25C is 0.0317 to solve for P_0 . I ended up with

$$P = 1.62 \times 10^6 e^{5290/T}. \quad (2)$$

Note that to use this equation, T must be in Kelvin. I used python to plot this equation. The result of doing so is shown in Fig. 2.

1. The temperature on a hot summer day is 30 C and the relative humidity is 90%. What is the dew point?
2. Check the dew points for the weather conditions shown in Fig. 3.

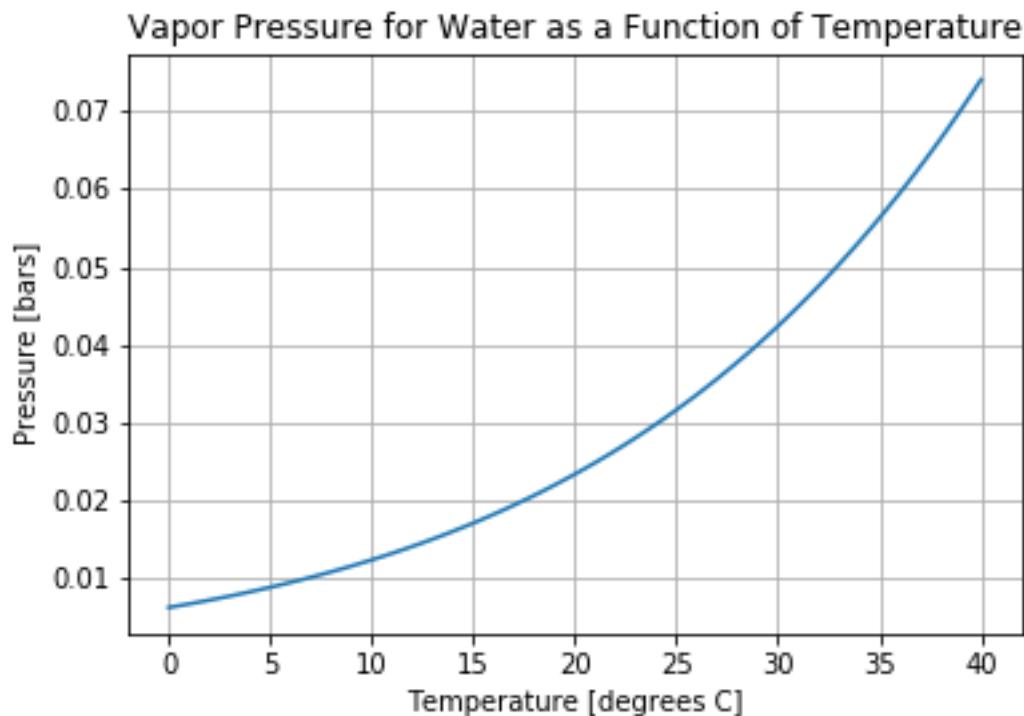


Figure 2: Plot of vapor pressure as a function of temperature.

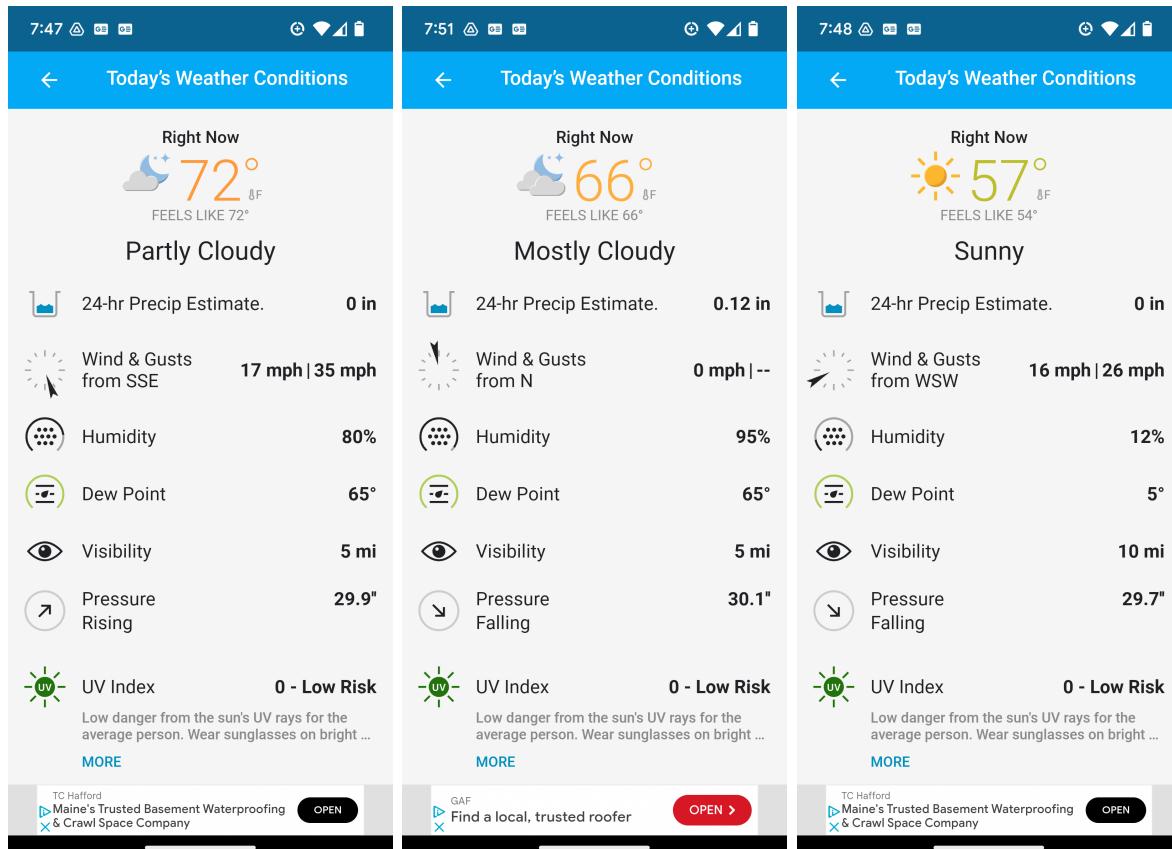


Figure 3: Current conditions in Bar Harbor, ME (left) and Santa Fe, NM (right).