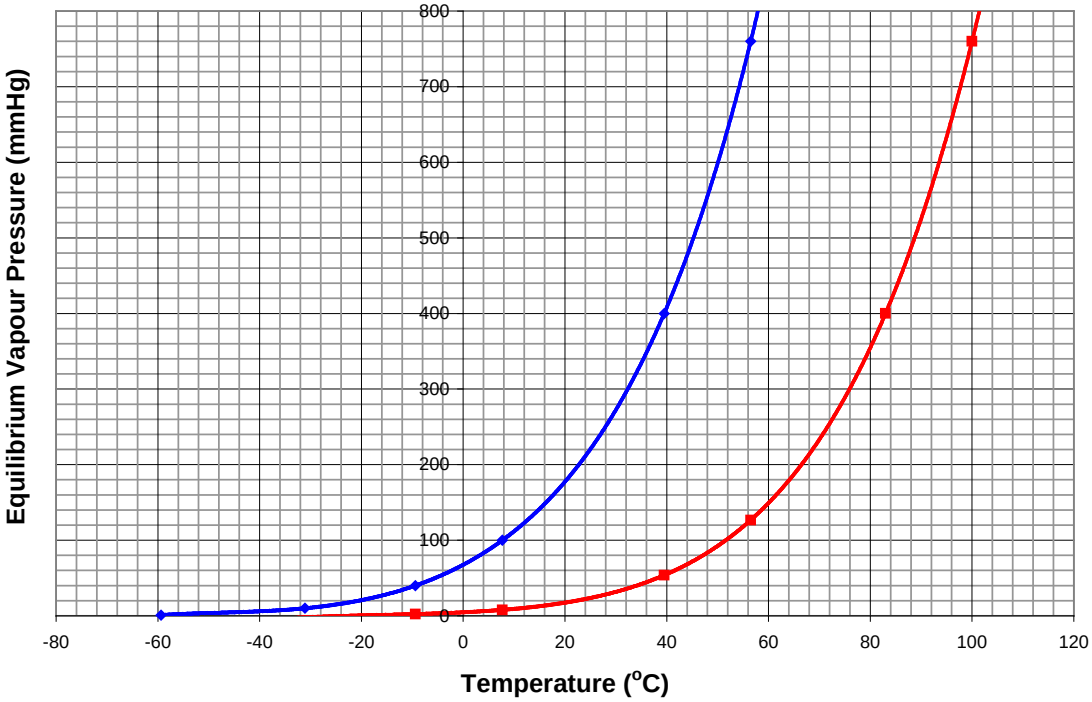
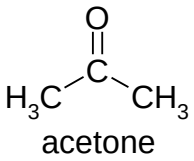
Exercise 8.1
Vapour Pressure Curves and Phase Diagrams

1. In lab, we often rinse wet glassware with acetone to remove the water then use a stream of air to evaporate off the acetone. The structure of acetone and vapour pressure curves for acetone and water are shown below. *(1 atm = 1.01325 bar = 760 mmHg)*

Vapour Pressure Curves for Acetone and Water





(a) What type(s) of intermolecular forces are responsible for water's solubility in acetone?

(b) What are the normal boiling points of acetone and water? *(1 bar = 750 mmHg)*

(c) What are the vapour pressures of acetone and water at room temperature (20 °C)?

1. *continued…*

(d) *Briefly*, justify the relative boiling points and vapour pressures of water and acetone.

(e) Why does blowing a stream of air over acetone-wet glassware accelerate evaporation?

(f) Why is blowing a stream of air over water-wet glassware much less effective?

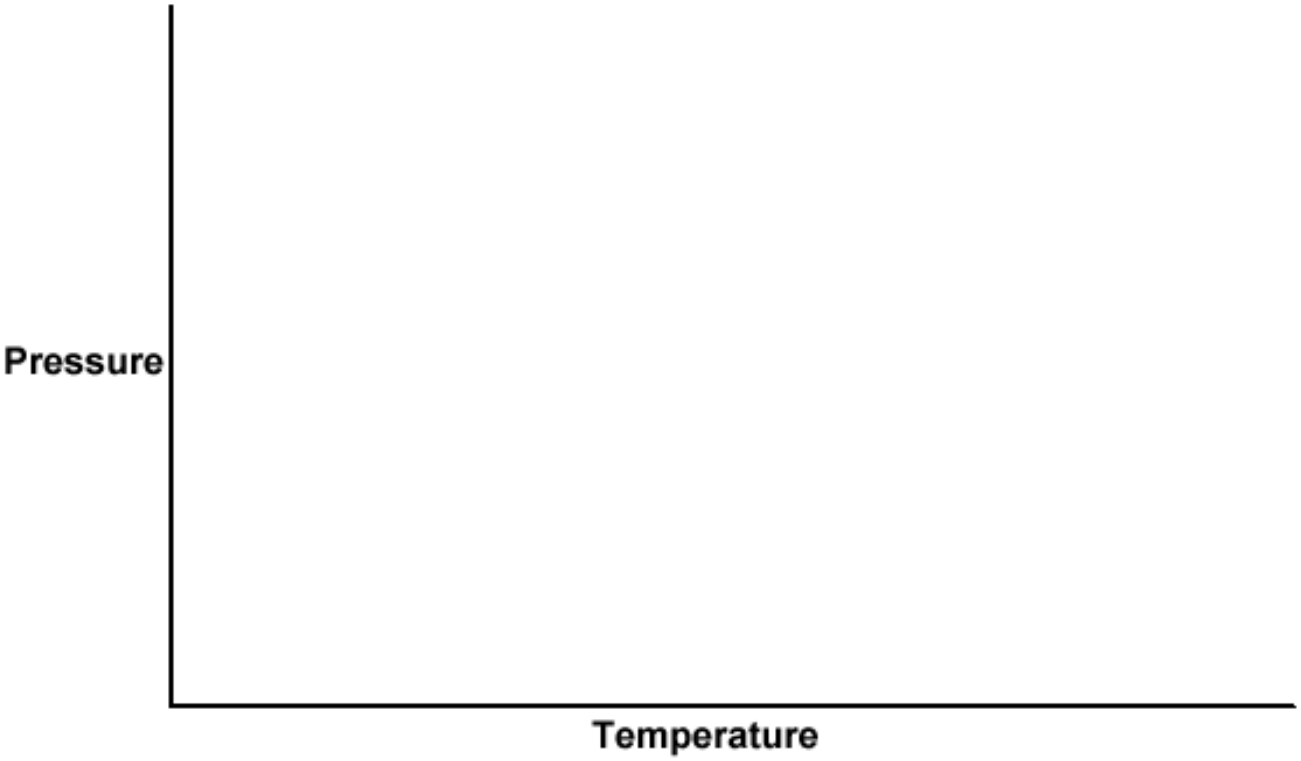
(g) If you need dry glassware for the following week's lab, is this method of drying necessary? Why or why not?

2.

(a) Explain what is meant by the term “supercritical fluid”. How/when is one formed?

(b) Sketch a phase diagram and clearly label the region where a supercritical fluid is found. *Make sure to label the axes on your sketch.*

(c) Label the triple point and the critical point on your phase diagram.



3. Why are triple points used to calibrate thermometers?