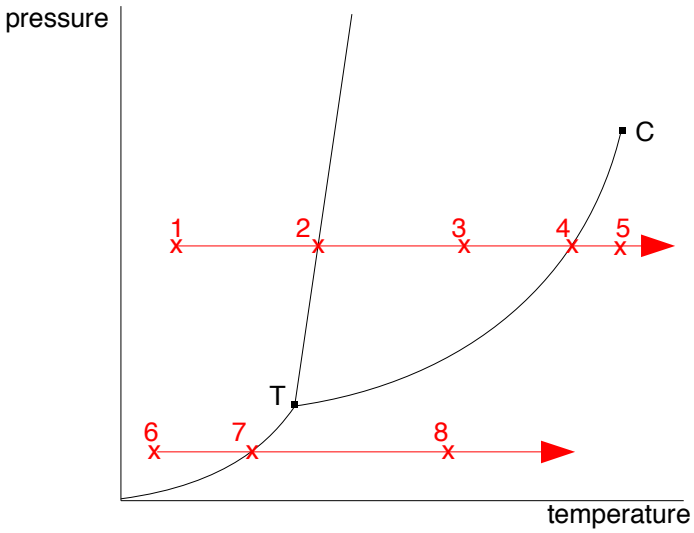
# PHASE DIAGRAMS FOR PURE SUBSTANCES

1. Suppose you had the following phase diagram for a simple pure substance:



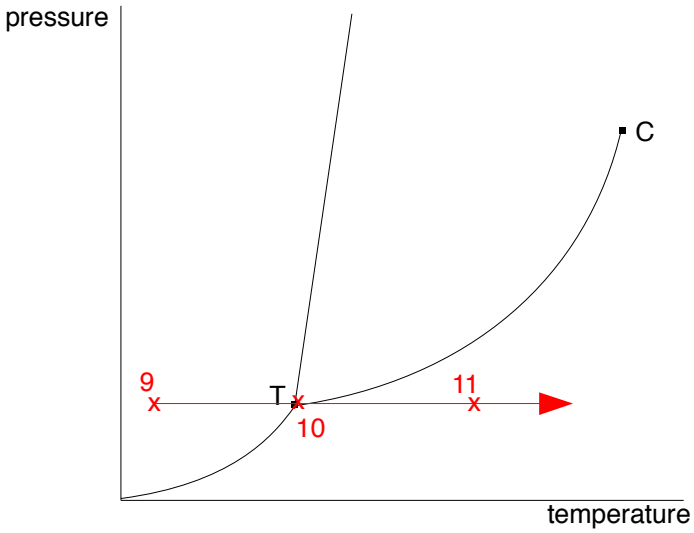

a) What physical state would the substance be in under the conditions at point 1?

b) Suppose the temperature was then increased on this substance at constant pressure. What state(s) would the substance be in at each of points 2 to 5?

c) Suppose the constant pressure was 1 atmosphere. What useful information can you get from the diagram about the simple physical properties of the substance?

d) Suppose at a much lower pressure, the substance was under the conditions at point 6. Describe what happens to the substance as you increase the temperature from point 6 to point 8.

In a similar phase diagram:

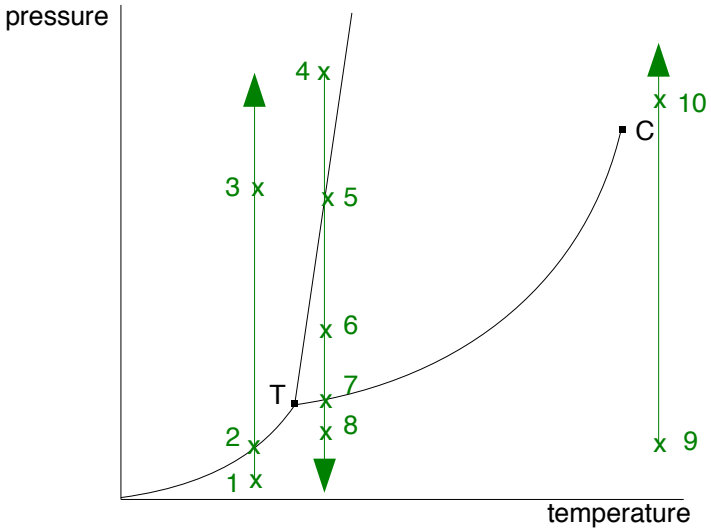


e) What would be the state of the substance at point 9?

f) If the temperature was then increased at constant pressure, what state(s) would the substance be in at points 10, and 11?

g) Name, and explain the significance of, the point labelled T on these diagrams?

2. The next phase diagram looks at the effect of changing pressure at constant temperature.




a) Give the state(s) at each of the points 1 to 3.

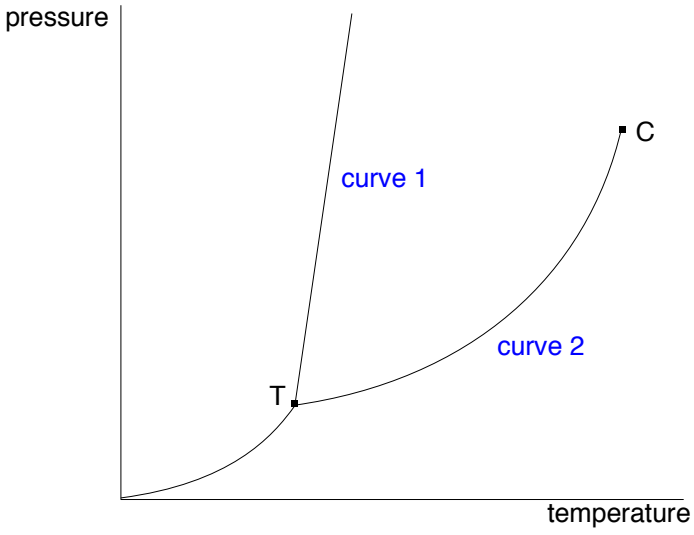
b) Give the state(s) at each of the points 4 to 8.

c) Give the state(s) at points 9 and 10.

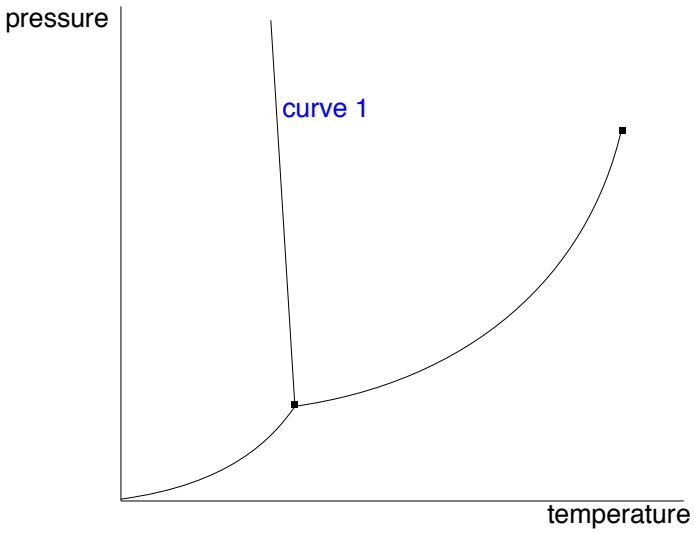
d) Name, and explain the significance of, the point C.

3. a) Curve 1 can be thought of as showing the effect of pressure on melting point. Explain why most solids have a very steep curve, sloping slightly forwards as pressure increases.

b) Curve 2 can be thought of as showing the effect of pressure on boiling point. Explain why boiling point increases with pressure.



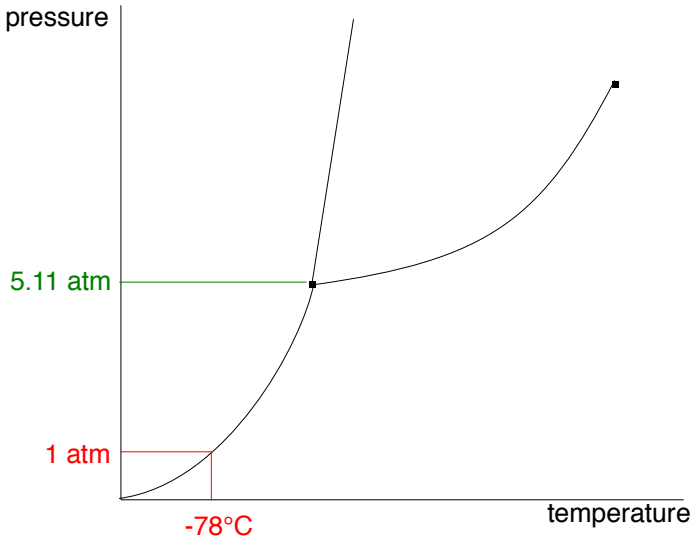
4. The next phase diagram is for water:




a) Mark on the diagram the areas corresponding to ice, liquid water, and water vapour.

b) Explain what curve 1 represents, and why it slopes backwards unlike the corresponding curve 1 in the last diagram.

5. This is the phase diagram for carbon dioxide with some values marked on it:




Solid carbon dioxide is commonly known as “dry ice”. Use the diagram to explain how that term arises.