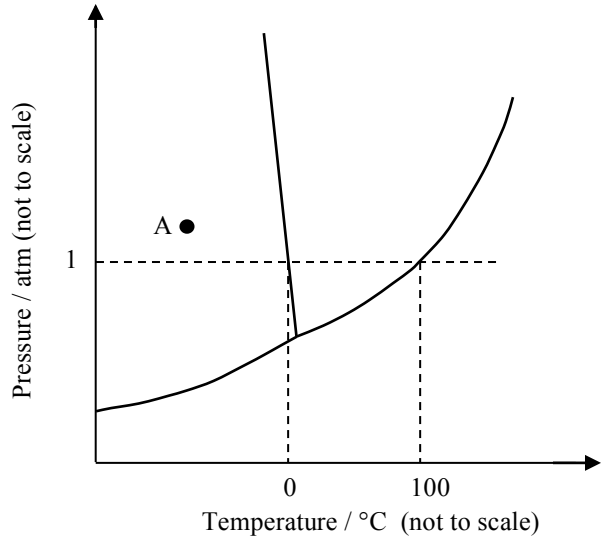
Marks
6

- Consider the pressure/temperature phase diagram of H_2O shown below.



Which phase exists at the point labelled A?

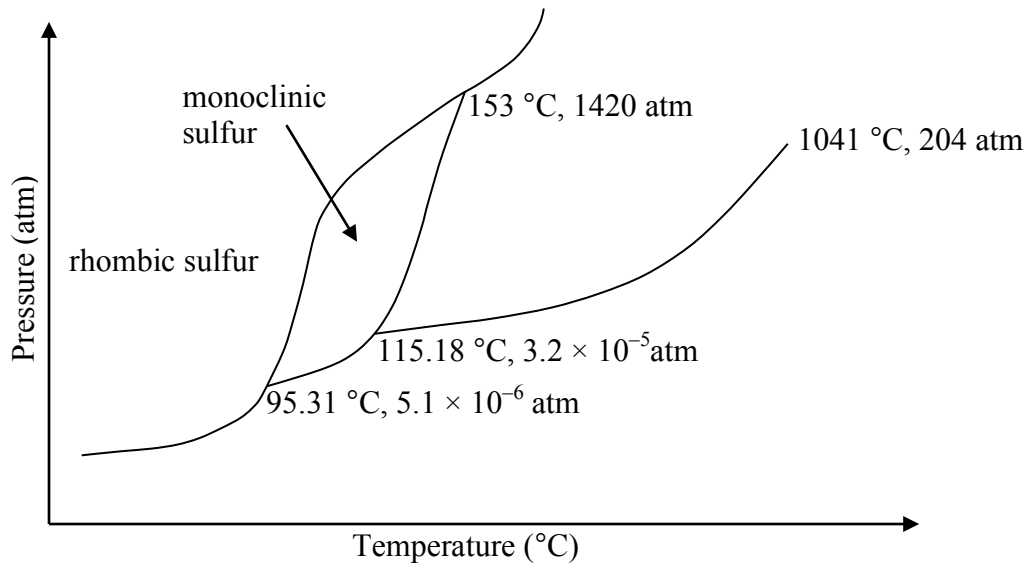
What are the temperature and pressure for the normal boiling point of water?

Use the phase diagram to explain why it takes longer to hard boil eggs on the top of a 4000 m high mountain rather than at sea level.

Use the phase diagram to explain why ice cubes float in water.

Marks 9

- Solid sulfur can exist in two forms, rhombic sulfur and monoclinic sulfur. A portion of the phase diagram for sulfur is reproduced schematically below. Complete the diagram by adding the labels "vapour" and "liquid" to the appropriate regions.



Which form of solid sulfur is stable at 25 °C and 1 atm?

Describe what happens when sulfur at 25 °C is slowly heated to 200 °C at a constant pressure of 1 atm.

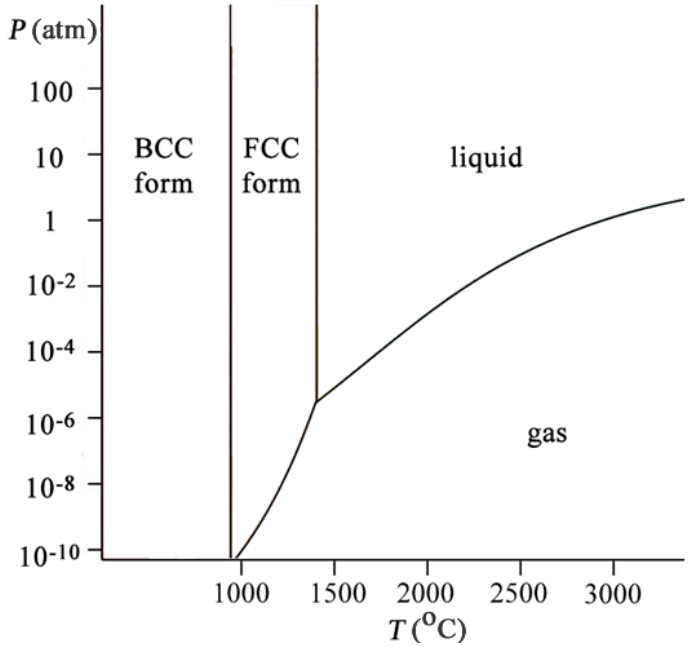
How many triple points are there in the phase diagram?

What phases are in equilibrium at each of the triple points?

Which solid form of sulfur is more dense? Explain your reasoning.

Marks 5

- xA simplified phase diagram for iron is shown below.



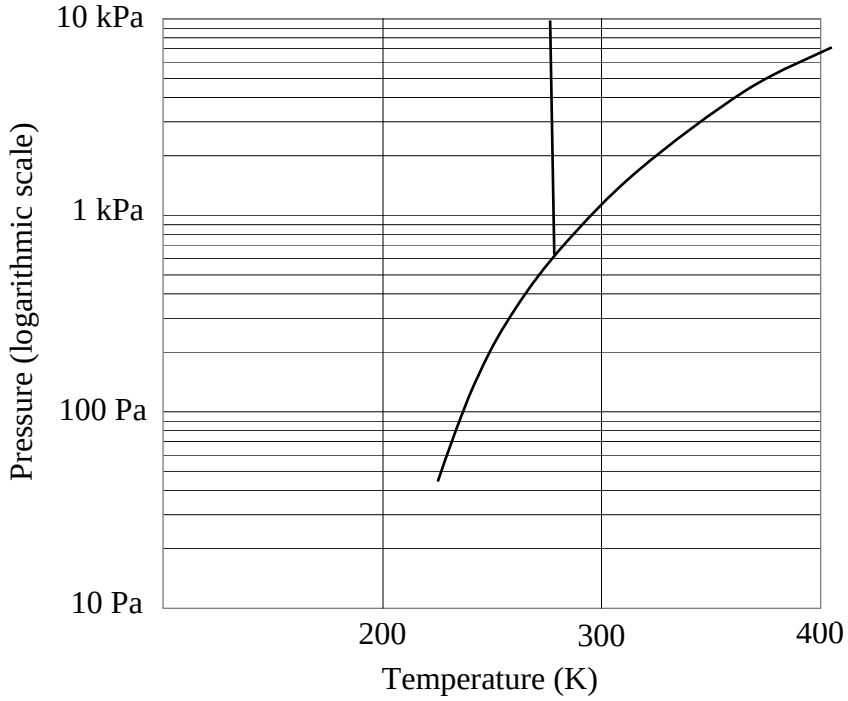
Which form of iron is stable at room temperature and pressure?

If molten iron is cooled slowly to around 1200 °C and then cooled rapidly to room temperature, the FCC form is obtained. Draw arrows on the phase diagram to indicate this process and explain why it leads to the FCC form.

The line dividing the BCC and FCC forms is almost, but not quite vertical. Given that the FCC form is more efficiently packed, predict which way this line slopes. Explain your answer.

Marks 5

- The diagram below shows part of the phase diagram of water.



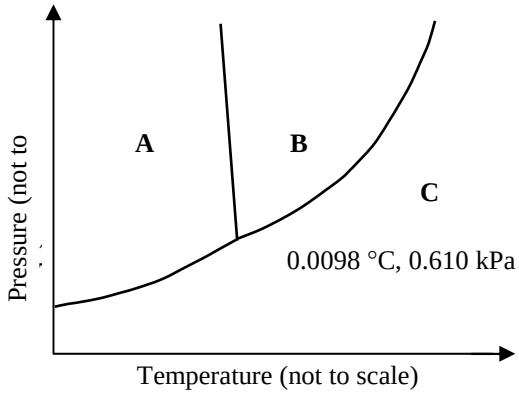
The average pressure on the surface of Mars is around 0.6 kPa. If the night time temperature is –60 °C and a summer day temperature is 20 °C, describe what happens to any water on the surface of Mars as the sun rises.

The highest surface pressure on Mars is thought to occur at the Hellas Basin, a low-lying area created by the impact of a large asteroid. If the pressure in this region is 1.2 kPa, use the phase diagram to estimate the temperature range in which liquid water will occur. Show your working on the phase diagram.

Page Total:

Marks 6

- Consider the pressure/temperature phase diagram of H_2O shown below.



Which phase exists in the fields labelled **A**, **B** and **C**?

A:	**B**:	**C**:

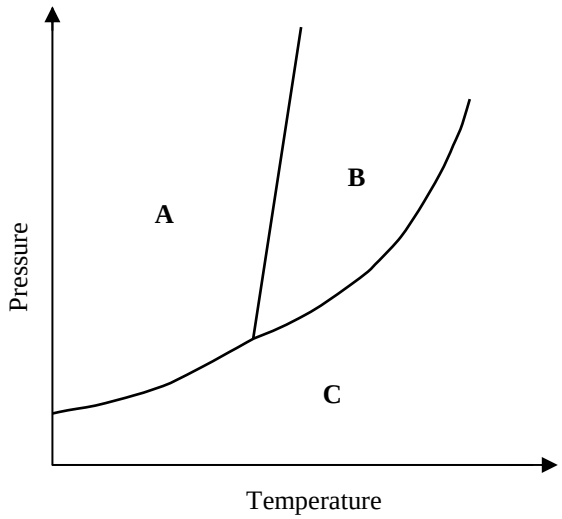
What are the temperature and pressure for the normal boiling point of water?

Use the phase diagram to explain why it takes longer to hard boil eggs on the top of a 6000 m high mountain rather than at sea level.

The unusual property of water, with the solid being less dense than the liquid, can be deduced from the phase diagram. How?

Marks 6

- Examine the following pressure/temperature phase diagram for a one component system.



Which phase exists in the fields labelled **A**, **B** and **C**?

A:	**B**:	**C**:

Explain your assignment of these phases.

What do the lines in the diagram represent?

What happens when you move across a line either by changing temperature or pressure?

For a compound with this phase diagram, would the solid be denser than the liquid or vice versa? Explain your answer.