Melting and boiling points

Introduction

These questions are designed to help you connect your understanding of melting and boiling points, changes of state and the particle model.

Macroscopic: what we can see. Think about the properties that we can observe, measure and record.

Sub-microscopic: smaller than we can see. Think about the particle or atomic level.

Symbolic: representations. Think about how we represent chemical ideas including symbols and diagrams.

Questions

1. A jeweller melts some silver. The silver does not melt at a single sharp temperature. It melts over a temperature range.
Select the statement (or statements) that explain this observation.

A The silver needed to be heated higher than its melting point for it all to melt.

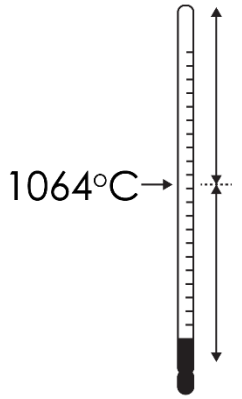
B The silver was impure.

C The sliver had another metal mixed in with it.

D The silver started to melt before it reached its melting point.

2. All metals have a melting point.

The thermometer diagram shows the melting point of gold. Complete the labels to give the state of gold above and below this melting point.



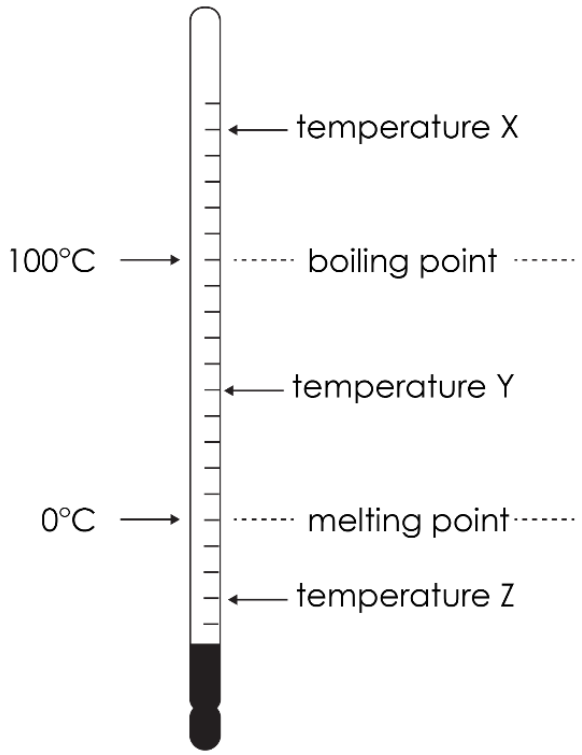
(a) Above the melting point gold is in the _____ state.

(b) Below the melting point gold is in the _____ state.

(c) The table lists four metals and their melting points. Complete the table to show the state of each metal at 1000°C.

Metal	Melting point (°C)	State at 1000°C
Copper	1084	
Aluminium	660	
Silver	961	
Titanium	1670	

3. Water exists in the solid, liquid and gas state. The thermometer diagram shows the melting point and boiling point of water.



Give the state of water at:

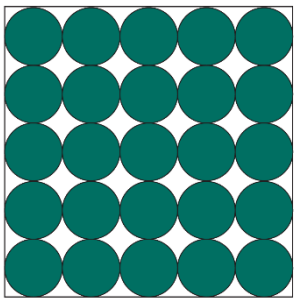
(a) temperature X _____

(b) temperature Y _____

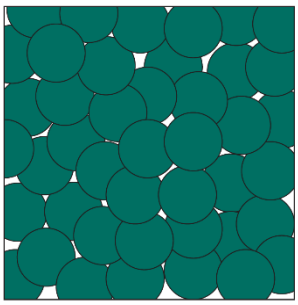
(c) temperature Z _____

4. Some iron is heated until it melts. The iron changes from the solid state to the liquid state.

The diagrams below shows a particle diagram for iron in the solid and liquid state.



solid state



liquid state

(a) State two similarities between the particle model for the solid and liquid states.

_____

_____

_____

_____

(b) State two differences between the particle model for the solid and liquid states.

_____

_____

_____

_____

(c) The basic particle model can be used to explain why copper and silver have a fixed shape when they are in the solid state.

The diagram below shows particle diagrams for copper and silver.

copper **silver**

This basic particle model does not include forces between the particles.

Explain why the basic particle model cannot demonstrate why copper and silver have different melting points.

(d) The more advanced version of the particle model does include forces of attraction between particles.

Explain why you need this to demonstrate why copper has a higher melting point than silver.