Topic 10 Thermal Properties of Matter

PAPER 1

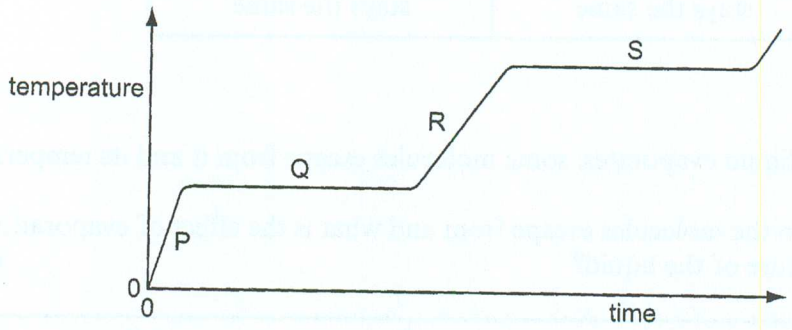
MULTIPLE-CHOICE QUESTIONS

For each question, there are four possible answers. Choose the one you consider correct and record your choice (A, B, C or D) in the brackets provided.

1. A substance is heated at a steady rate.

   It changes from a solid to a liquid, and then to a gas.

   The graph shows how its temperature changes with time.



   Which parts of the graph show a change of state taking place? (2011/P1/Q11)

   A P and R
   B P and S
   C Q and R
   D Q and S ( )

2. When water evaporates, what happens to its molecules? (2012/P1/Q13)

   A They attract each other more strongly.
   B They collide more often with each other.
   C They escape from the surface.
   D They split up into several atoms. ( )

3. A pan of water is put on an electric heater.

   Which statement is correct when the water is boiling? (2013/P1/Q11)

   A The heat stops going into the water.
   B The heat goes into the water more quickly than before.
   C The temperature of the water rises more slowly than before.
   D The temperature of the water stops rising. ( )

4. A block of ice is heated until it has all melted.

The water produced is heated until it boils.

Which row states what happens to the temperature of the ice while melting, and the temperature of the water while boiling? (2014/P1/Q12)

	temperature of ice while melting	temperature of water while boiling
A	increases	increases
B	increases	stays the same
C	stays the same	increases
D	stays the same	stays the same

( )

5. When a liquid evaporates, some molecules escape from it and its temperature changes.

Where do the molecules escape from and what is the effect of evaporation on the temperature of the liquid? (2015/P1/Q13)

	molecules escape from	temperature of liquid
A	all parts of the liquid	decreases
B	all parts of the liquid	increases
C	only the liquid surface	decreases
D	only the liquid surface	increases

( )

6. A heater supplies 80 J of energy to a block of metal. The temperature of the block rises by 20°C.

What happens to the internal energy of the block when its temperature falls by 10°C? (2016/P1/Q12)

A decreases by 40 J
B decreases by 160 J
C increases by 40 J
D increases by 160 J

( )

7. A hot drink is left in a room that is at a temperature of 20°C.

   What happens to the drink in ten minutes? (2017/P1/Q13)

   A Its density becomes lower.
   B Its internal energy becomes lower.
   C Its particles move more quickly.
   D The energy of the particles become equal. ( )

8. Ice at 0°C is placed in warm water. The ice melts.

   Which statement is correct? (2018/P1/Q13)

   A The internal energy of the ice decreases.
   B The internal energy of the water decreases.
   C The temperature of the ice increases.
   D The temperature of the water increases. ( )

9. Which row describes a liquid at room temperature and pressure? (2019/P1/Q12)

	fixed shape	fixed volume
A	no	no
B	no	yes
C	yes	no
D	yes	yes

( )

PAPER 2

STRUCTURED QUESTIONS

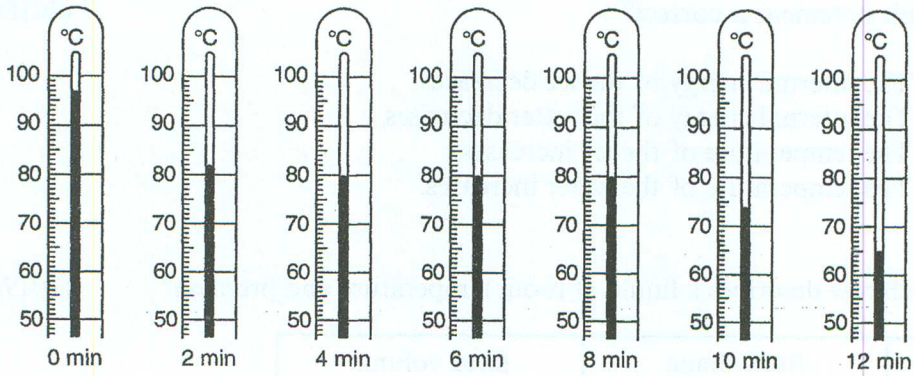
Section A

Answer the following questions.

1. Some melted crystals are allowed to cool.

   The temperature is measured and recorded every 2 minutes.

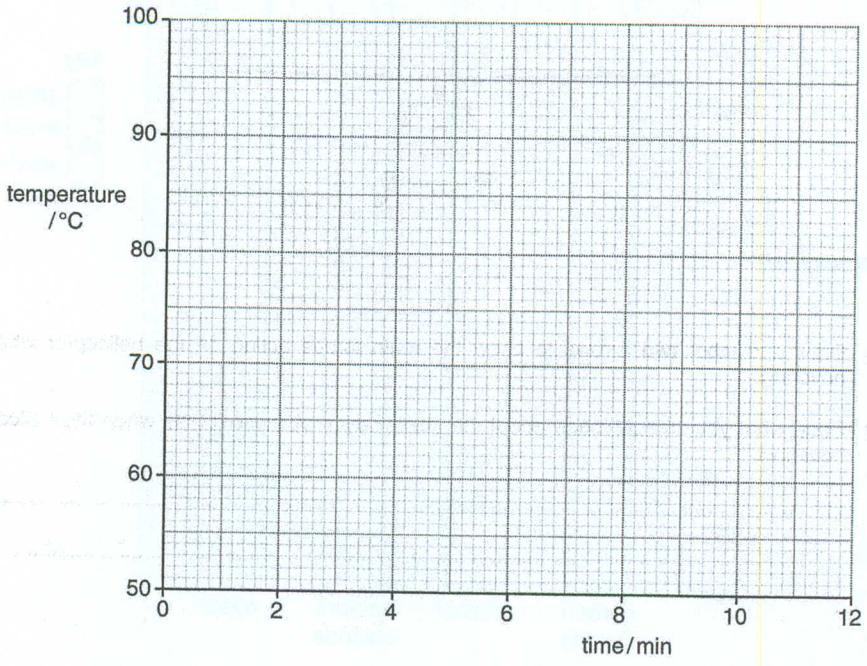
   The diagram shows part of the thermometer stem recording the temperature.



   (a) In the space below, construct a table to record all seven sets of results.

   Enter the results shown in your table. Record each temperature to the nearest whole degree. [2]

(b) (i) On the grid below, plot these results, marking each point with a cross (×). Draw a **cooling curve** taking into account all your plotted points.

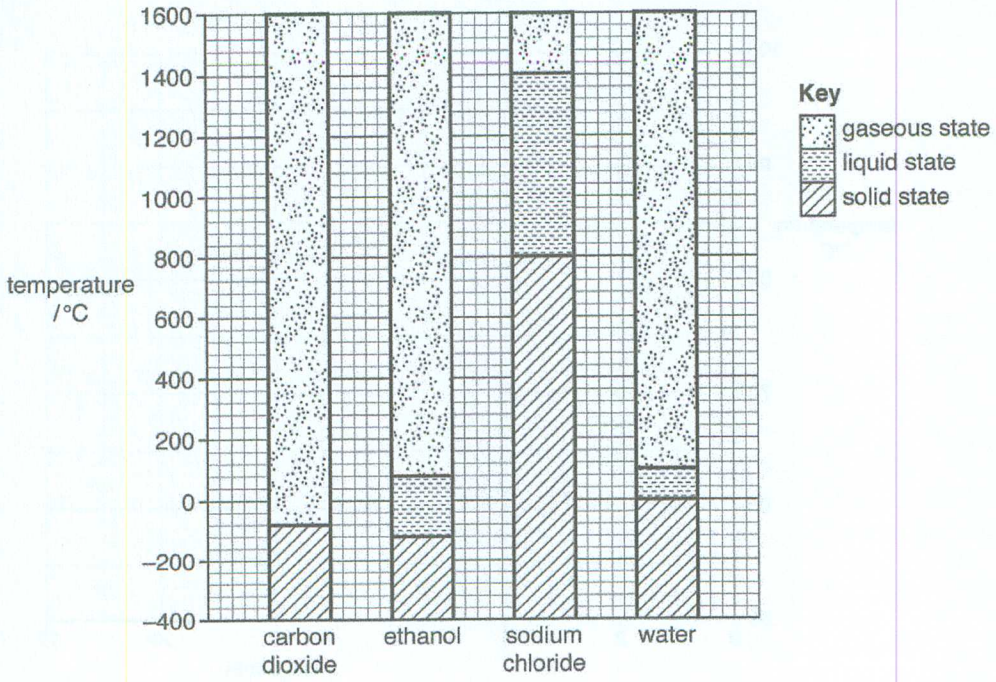


[2]

(ii) At what temperature do the melted crystals solidify? [1]

(2015/P2/A4)

2. The bar graph shows the temperatures at which some substances change state.



(a) Which substance has no liquid state? [1]

(b) State the temperature at which liquid sodium chloride freezes. [1]

(2018/P2/A4)

3. A sample of solid wax is gently heated for 10 minutes. The temperature of the wax is recorded every minute.

The results obtained are shown below.

time/min	0	1	2	3	4	5	6	7	8	9	10
temperature/°C	30	37	42	47	50	50	50	50	50	54	59

Use the results to describe and explain what is happening to the wax during the period of 4 minutes to 8 minutes. [2]

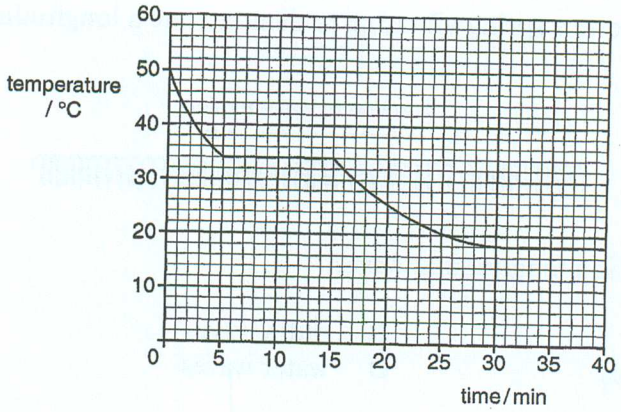
(2019/P2/A5b)

Section B

Answer the following question.

1. A liquid at 50°C is allowed to cool in a laboratory. Its temperature is recorded every minute.

   The results are shown on the graph.

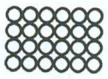


   (a) At what temperature does the liquid freeze? [1]

   (b) What is the temperature of the laboratory? [1]

   (c) Give a reason for your answer in (b). [1]

   (d) The molecular arrangement of a solid can be represented as shown below.



   In the space below, draw the molecular arrangement of a liquid. [1]

   (2012/P2/B5b)