

1. Base your answer to the following question on the properties of propanone.

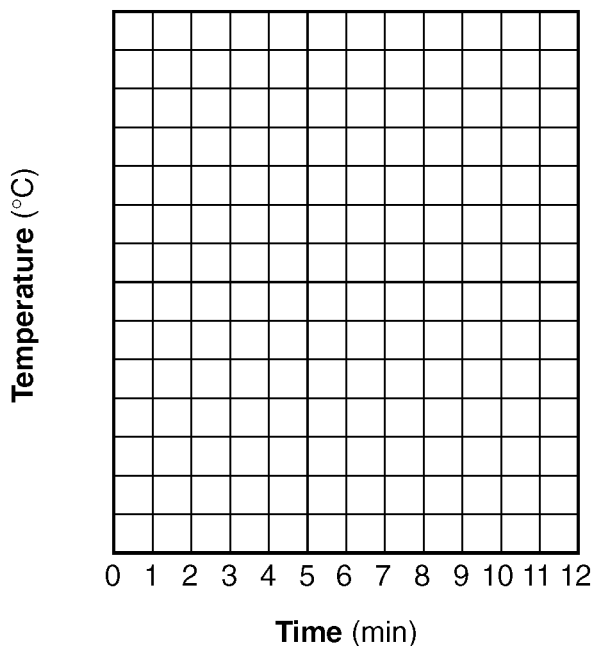
A liquid's boiling point is the temperature at which its vapor pressure is equal to the atmospheric pressure. Using Reference Table *H*, what is the boiling point of propanone at an atmospheric pressure of 70 kPa?

Base your answers to questions 2 through 6 on the information below.

A substance is a solid at 15°C. A student heated a sample of the solid substance and recorded the temperature at one-minute intervals in the data table below.

Time (min)	0	1	2	3	4	5	6	7	8	9	10	11	12
Temperature (°C)	15	32	46	53	53	53	53	53	53	53	53	60	65

Heating Curve



2. On the grid above, mark an appropriate scale on the axis labeled “Temperature (°C).” An appropriate scale is one that allows a trend to be seen.

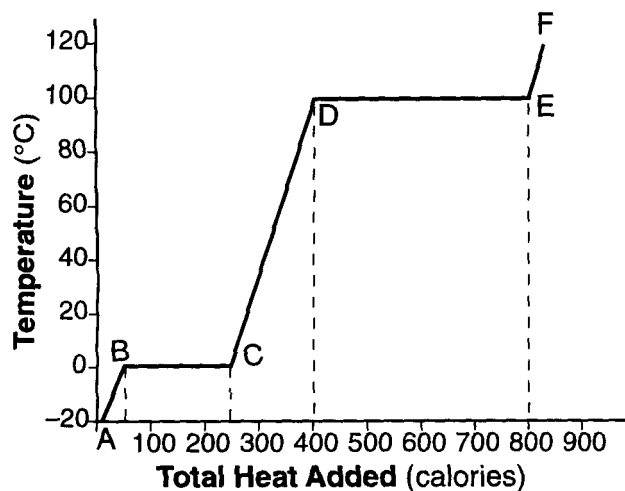
3. Plot the data from the data table. Circle and connect the points.

4. Based on the data table, what is the melting point of this substance?

5. What is the evidence that the average kinetic energy of the particles of this substance is increasing during the first three minutes?

6. The heat of fusion for this substance is 122 joules per gram. How many joules of heat are needed to melt 7.50 grams of this substance at its melting point?

7. As a solid is heated, its temperature increases from 10°C to 25°C, remains at 25°C for 5 minutes, and then increases to beyond 45°C. Based on this information, what conclusion can be drawn about the substance?
- 1) Its melting point is 45°C.
 - 2) Its boiling point is 45°C.
 - 3) Its melting point is 25°C.
 - 4) Its boiling point is 25°C.
8. The graph below shows the heating curve of 1.0 gram of a solid as it is heated at a constant rate, starting at a temperature below its melting point.



Based on this graph, what is the heat of vaporization?

- 1) 200 calories, as measured along line BC
 - 2) 250 calories, as measured along line BC
 - 3) 400 calories, as measured along line DE
 - 4) 800 calories, as measured along line DE
9. The table below shows the data collected by a student as heat was applied at a constant rate to a solid below its freezing point.

Time (min)	Temperature (°C)	Time (min)	Temperature (°C)
0	20	18	44
2	24	20	47
4	28	22	51
6	32	24	54
8	32	26	54
10	32	28	54
12	35	30	54
14	38	32	58
16	41	34	62

What is the boiling point of this substance?

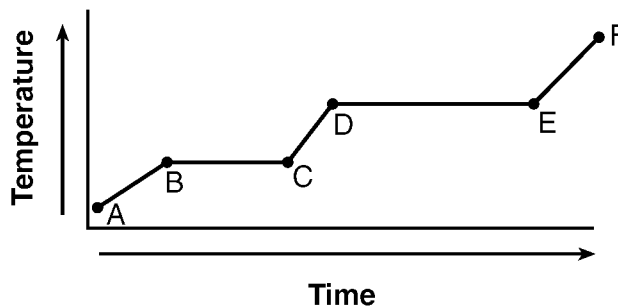
- 1) 32°C
- 2) 54°C
- 3) 62°C
- 4) 100°C

10. A student obtained the following data while cooling a substance. The substance was originally in the liquid phase at a temperature below its boiling point.

Time (minutes)	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Temperature (°C)	70.	63	57	54	53	53	53	53	53	52	51	48

What is the freezing point of the substance?

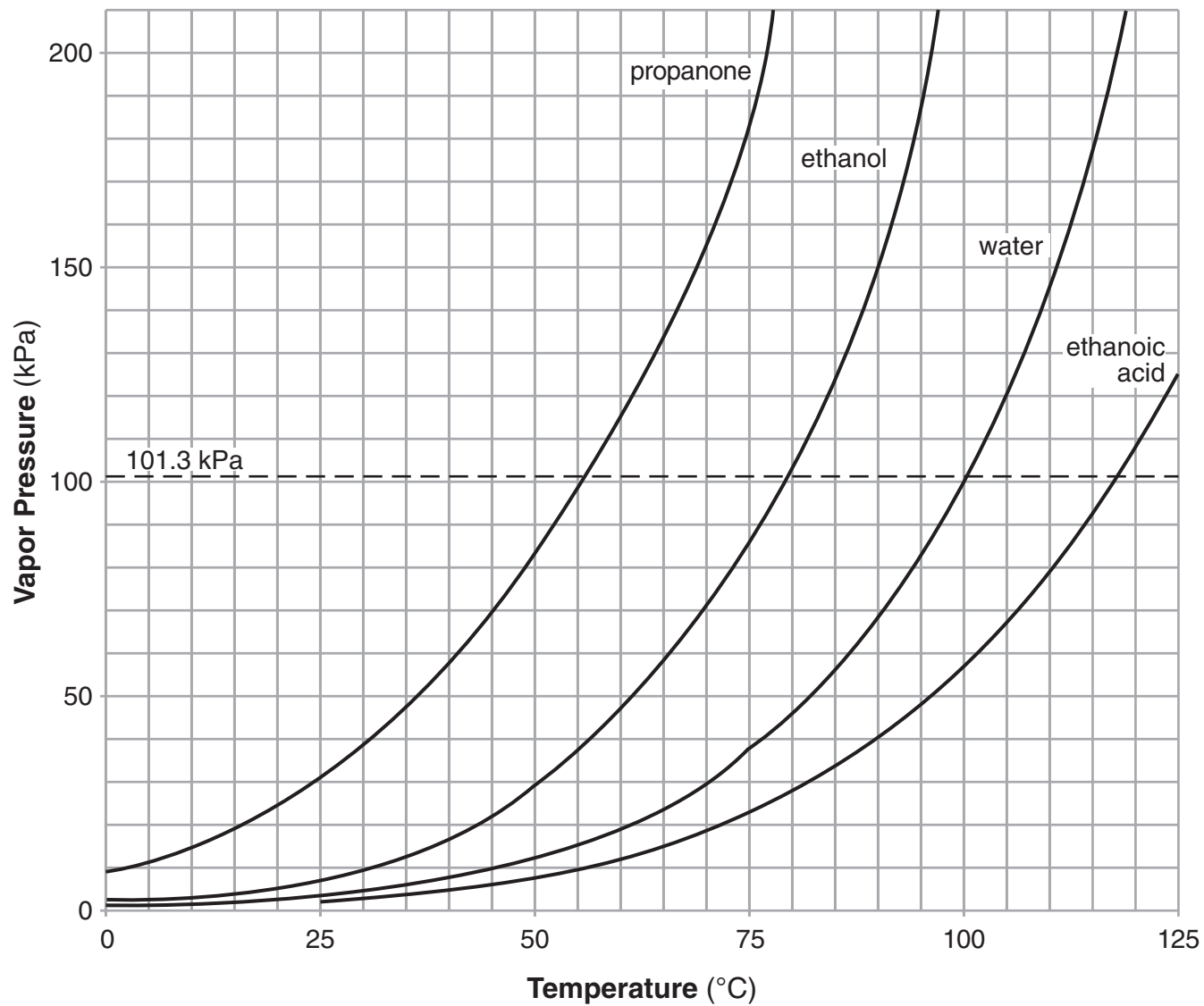
- 1) 70.°C
 - 2) 59°C
 - 3) 53°C
 - 4) 48°C
11. The temperature of a sample of water changes from 10.°C to 20.°C when the water absorbs 420 Joules of heat. What is the mass of the sample?
- 1) 1.0 g
 - 2) 10. g
 - 3) 100 g
 - 4) 1000 g
12. What is the total number of Joules of heat energy absorbed by 15 grams of water when it is heated from 30.°C to 40.°C?
- 1) 42 J
 - 2) 63 J
 - 3) 130 J
 - 4) 630 J
13. What is the total number of joules released when a 5.00-gram sample of water changes from liquid to solid at 0°C?
- 1) 334 J
 - 2) 1670 J
 - 3) 2260 J
 - 4) 11 300 J
14. Which of these physical changes are absorb energy?
- 1) melting and freezing
 - 2) melting and evaporating
 - 3) condensation and sublimation
 - 4) condensation and deposition
15. The graph below represents the uniform heating of a substance, starting with the substance as a solid below its melting point.



Which line segment represents a phase change?

- 1) \overline{AB}
- 2) \overline{BC}
- 3) \overline{CD}
- 4) \overline{EF}

Table H
Vapor Pressure of Four Liquids



Answer Key

1. 45°C (± 2).
 2. Essay
 3. Essay
 4. 53°C
 5. The temperature of the substance is increasing.
 6. 915 J
 7. 3
 8. 3
 9. 2
 10. 3
 11. 2
 12. 4
 13. 2
 14. 2
 15. 2
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