

LATENT HEAT - INTRODUCTION TO COLLEGE CHEMISTRY FORMATIVE ASSESSMENT - KEY



STUDENT CHECK FOR UNDERSTANDING

Concepts:
Types of Phase Change, Melting/Freezing Point, Boiling/Condensation Point, Relative Energy of Phase Change, Breaking/Forming IMFs

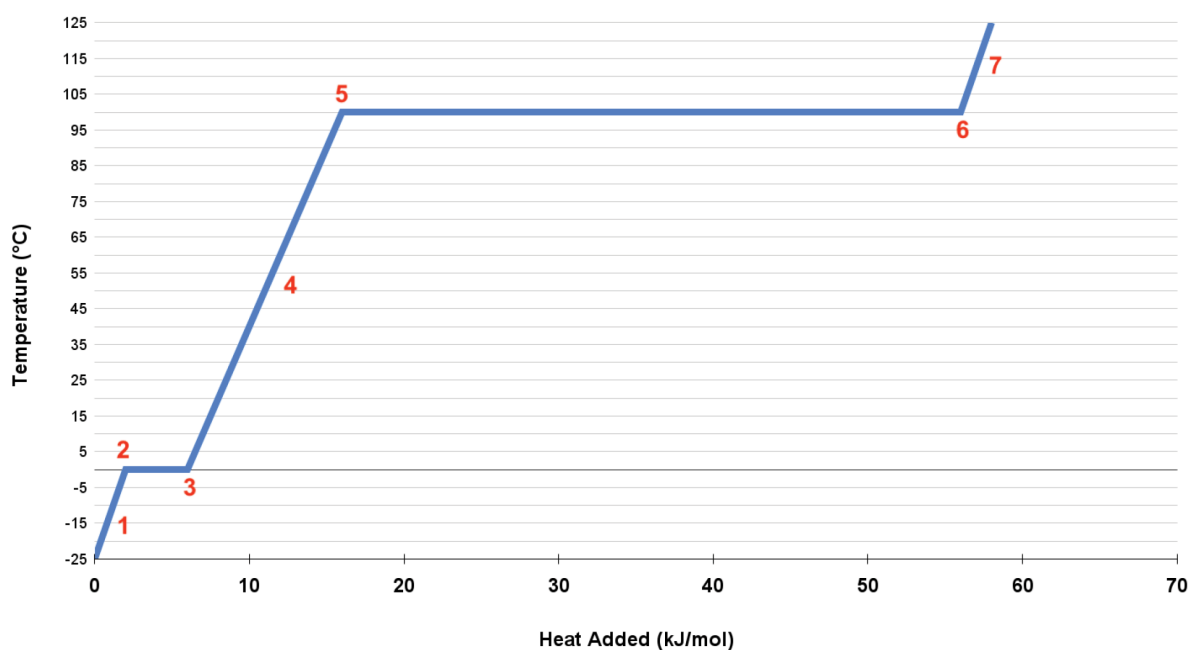
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DIRECTIONS:

Below is a simplified heating curve made for a substance **at a pressure of 1 atmosphere**.

It shows the temperature changes that occur in a quantity of the substance as it is heated. Use the graph to answer the questions on the next page.

Heating Curve of an Unidentified Substance



1. At which point is the average kinetic energy of the molecules the greatest? Explain your answer.

The average kinetic energy of the molecules is greatest at point 7. Temperature is a measure of the average kinetic energy of particles in a substance. Since the molecules have received a lot of heat by point 7, they will be moving more rapidly and thus have a greater kinetic energy than at any other point. This is best reflected in their higher temperature at point 7.

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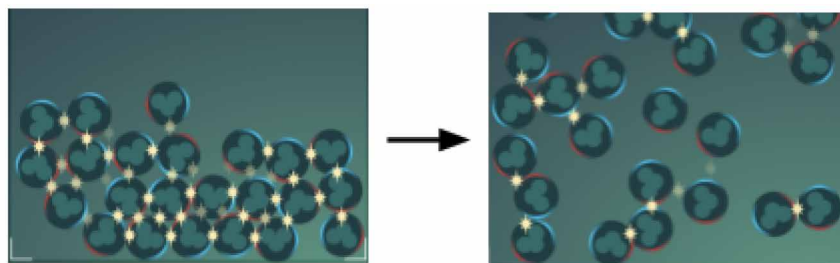
2. What is the condensation point of this substance at 1 atmosphere of pressure? How do you know?

The condensation point of this substance is at 100°C . One can tell by determining that the segment of the graph between point 5 and point 6 is the heat of vaporization—the energy required to convert the substance from a liquid to a gas. Accordingly, the temperature at which we see the heat of vaporization in this graph is the boiling point, which is the same as the condensation point.

3. In some instances, ALL added heat energy is going into the disruption of the intermolecular forces between particles. Identify two such areas in the heating curve (using adjacent points), and explain the visible evidence for your answer.

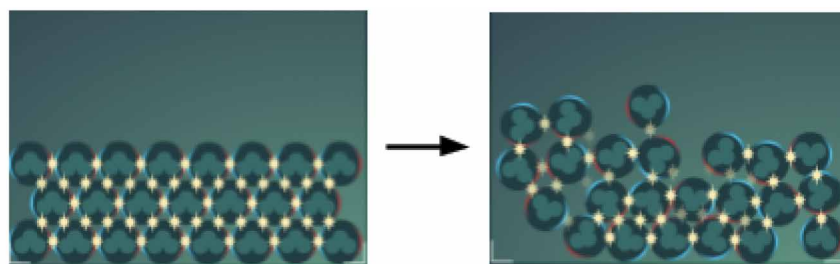
The graph between point 2 and point 3 and then again between point 5 and point 6 represents the energy needed to disrupt the intermolecular forces between particles. We know this because even though heat is being added, there is no change in temperature. The added heat is not increasing the average kinetic energy of the molecules (the temperature) because it is disrupting the intermolecular forces that keep the substance in a particular state of matter.

4. The image below represents a phase change occurring between two adjacent points on the heating curve. Identify the points at which this phase change occurs, and name the type of phase change.



Between Point 5 and Point 6 → boiling

5. The image below represents a phase change occurring between two adjacent points on the heating curve. Identify the points at which this phase change occurs, and name the type of phase change.



Between Point 2 and Point 3 → melting