

Heating and Cooling Curves

Heating Curves

If the temperature of a pure solid is measured at intervals as it is heated and changes state to a liquid and then a gas, and the temperature is plotted against time, a HEATING curve is obtained. A heating curve is shown for Figure 1 below. The curve below shows that as heating occurs the temperature of the substance increases. The graph shows two horizontal sections where the temperature remains constant over a period of time even though heating continues. This happens when there is a change in state.

Activity #1: Heating Curves

1. Use the graph in figure 1 below to answer the following questions.

At point A, the beginning of observations, the substance exists in a _____ state. Material in this phase has a _____ volume and shape. With each passing minute, _____ is added to the substance. This causes the molecules

of the substance to gain more _____ energy and hence _____ faster which we detect by a temperature rise in the substance.

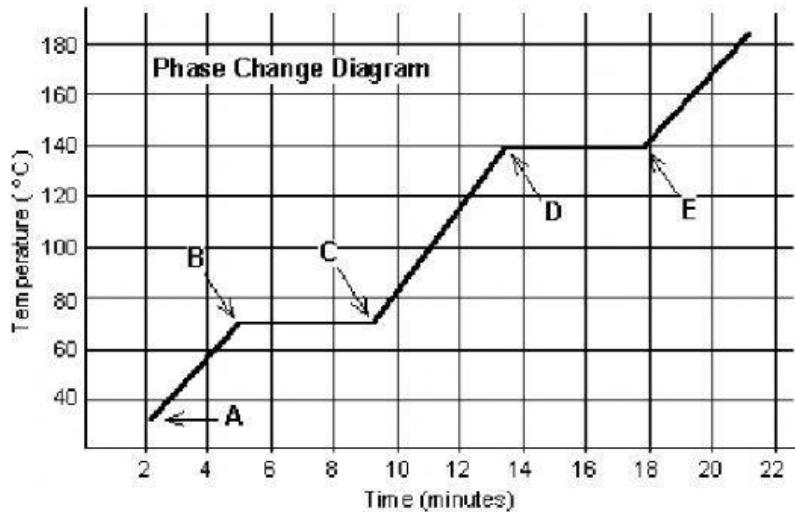


Figure SEQ Figure 1* ARABIC 1: Heating Curve

At point B, the temperature of the substance is _____ °C and at Point C the temperature is _____ °C. This first change in state is where _____ occurs as the temperature remains constant at the _____ point of the substance. The substance is now in the _____ phase. Material in this phase has _____ volume and _____ shape. The energy put to the substance between minutes 5 and 9 was used to convert the substance from a _____ to a _____.

c) Between 9 and 13 minutes, the added energy increases the temperature of the substance. During the time from **point D** to **point E**, the liquid is _____. By **point E**, the substance is completely in the _____ phase and has reached the _____ point. Material in this phase has _____ volume and _____ shape. The energy put to the substance between minutes 13 and 18 converted the substance from a _____ to a _____ state. Beyond **point E**, the substance is still in the _____ phase, but the molecules are moving faster as indicated by the increasing temperature.

In summary:

From A to B, the material is in the _____ state of matter

From B to C, the process of _____ is taking place

From C to D, the material is in the _____ state of matter

From D to E, the process of _____ is taking place

Anything after E is in the _____ state of matter.

Activity # 2: Heating Curves

2. Based on the information above label the Heating curve below in the spaces provided below using the following words:

Solid, melting point, gas, liquid, boiling point

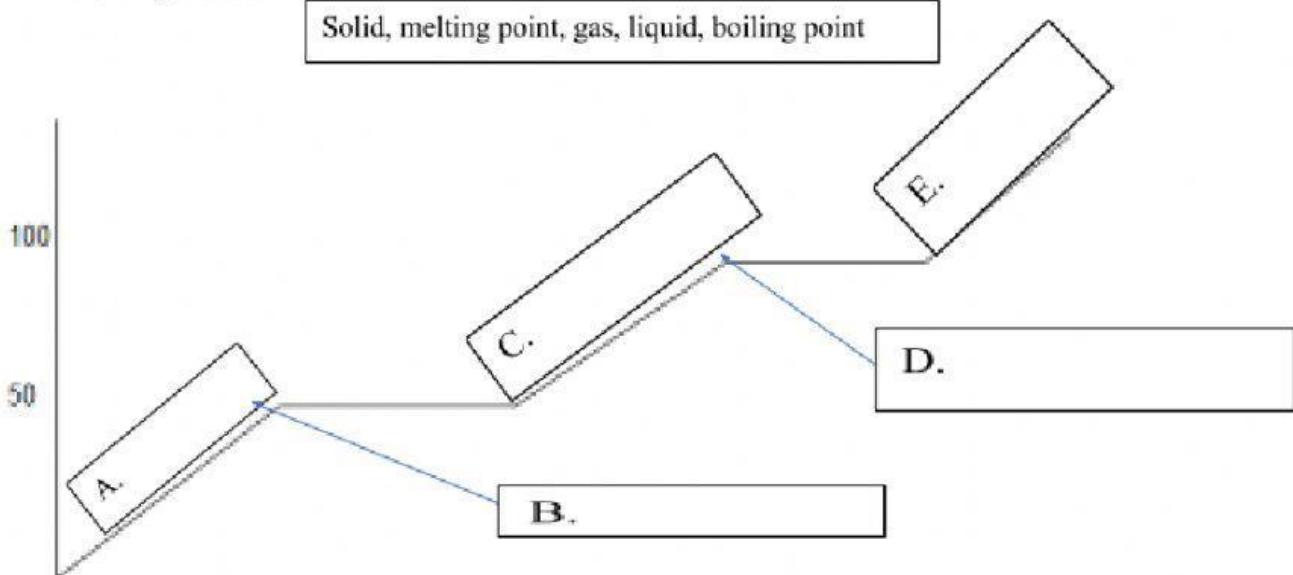


Figure 2:Blank Heating Curve

Activity #3: Interpreting Cooling Curves

Cooling Curves

If the temperature of a gas is measured at intervals as it is cooled and changes state to a liquid and then to a solid, and the temperature is plotted on a graph against time a cooling curve is obtained. Figure 3 shows the cooling curve of a water.

3. Answer the questions below based on the cooling curve in Figure 3 below.

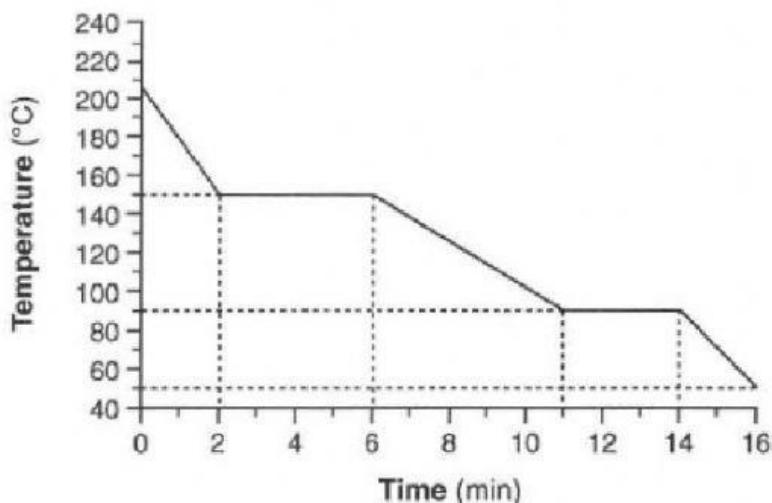


Figure 3: Cooling Curve

- a) What is the freezing point temperature of the substance? _____
- b) What is the boiling point temperature of the substance? _____
- c) What is the melting point temperature of the substance? _____
- d) On the graph above, Label the gas, liquid and Solid.
- e) State the time period where the substance is a solid. _____
- f) State the time period where the substance is a liquid. _____
- g) During which time period would the substance possess kinetic energy? _____