General Chemistry
Mr. MacGillivray
Quiz #29:
Heating and Cooling Curves

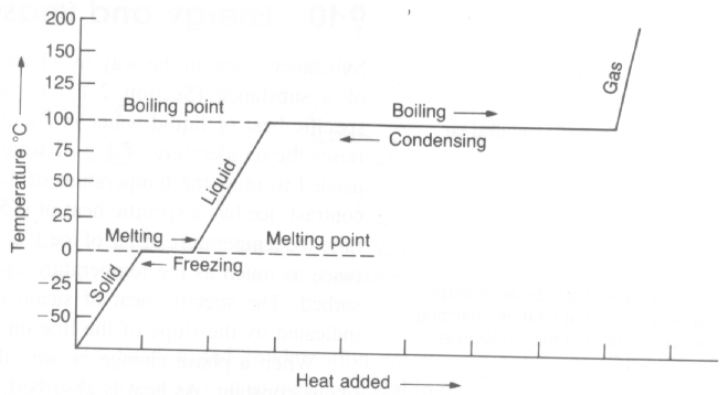

Fig. 1. Heating and cooling curve for water.

1. How does the temperature of water change during the freezing of water?

2. How does the temperature of water change during the boiling of water?

3. How much energy is needed to heat 10.0 g of water from 10.0 degrees C to 35.0 degrees C?

4. How much energy is needed to melt 10.0 g of ice at its melting point?

5. How much energy is needed to boil 10.0 g of water at its boiling point?

6. **<u>If</u>** you were to calculate how much energy is needed to turn ice at –10.0 degrees C into steam at 110.0 degrees Celsius, how many steps would there be in the calculation? What are those steps? <u>(No need to actually do any of the actual calculations.)</u>

<u>Step #_____</u> <u>Description of this calculation</u>

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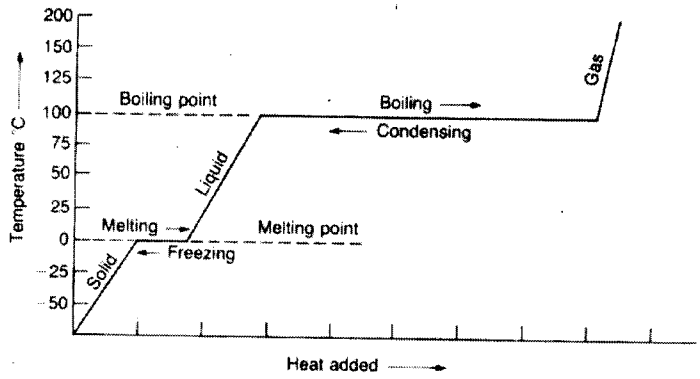

Fig. 1. Heating and cooling curve for water.

1. How does the temperature of water change during the freezing of water?

   It does not change.

2. How does the temperature of water change during the boiling of water?

   It does not change.

3. How much energy is needed to heat 10.0 g of water from 10.0 degrees C to 35.0 degrees C? $q = mC\Delta T = (10.0\,g)(4.18\,\frac{J}{g°C})(25°C) = 1050\,J$

Use reference tables to get this value

4. How much energy is needed to melt 10.0 g of ice at its melting point?

   $10.0\,g \times \frac{334\,J}{g} = 3340\,J$ or $= 3.34\,kJ$

5. How much energy is needed to boil 10.0 g of water at its boiling point?

   $10.0\,g \times \frac{2260\,J}{g} = 22600 = 2.26 \times 10^4\,J$ or $22.6\,kJ$

6. **If** you were to calculate how much energy is needed to turn ice at –10.0 degrees C into steam at 110.0 degrees Celsius, how many steps would there be in the calculation? What are those steps? (No need to actually do any of the actual calculations.)

Step #	Description of this calculation
1) ice -10°C → ice 0°C	1) $q = mC\Delta T$ (spec heat of ice) → 10°C
2) 0°C ice → 0°C water	2) mass of ice × h.o.f. of ice
3) 0°C water → 100°C water	3) $q = mC\Delta T$ C = spec heat of water, $\Delta T = 100°C$
4) 100°C water → 100°C steam	4) mass of water × h.o.v. of water
5) 100°C steam → 110°C steam	5) $q = mC\Delta T$ C = spec heat of steam, $\Delta T = 10°C$