**Period 6 Multiple Choice Exercises**

**E.1** When water is cooled to form ice there is a decrease in

a) the kinetic energy of the molecules.
b) the latent heat of the water.
c) the intermolecular force.
d) molecular contraction.
e) Both a) and b) are correct.

**E.2** When you transfer heat to a substance, you always increase its

a) heat capacity.
b) specific heat.
c) temperature.
d) energy.
e) Both c) and d) are correct

**E.3** One can change a substance from a liquid to a solid by

a) removing thermal energy from the substance.
b) adding thermal energy to the substance.
c) adding the latent heat of vaporization to the substance.
d) adding the latent heat of fusion to the substance.
e) Both a) and d) are necessary

**E.4** Consider two pails of water at the same temperature. Pail A contains 80 kg of water and Pail B contains 40 kg of water. Which one of the following statements is TRUE?

a) The water in pail A has a larger specific heat than the water in pail B.
b) The water in pail A has a greater thermal conductivity than the water in pail B.
c) The water in pail A has a greater heat capacity than the water in pail B.
d) The water in pail A has a smaller specific heat than the water in pail B.
e) None of the statements is true.

**E.5** How much thermal energy must be removed from 25 grams of water at 40 °C to turn the water into ice at 0 °C? The latent heat of fusion of water is 80 calories/gram.

a) 500 cal
b) 1,000 cal
c) 2,000 cal
d) 3,000 cal
e) 4,500 cal
Solutions to Period 6 Multiple Choice Exercises

E.1 When water is cooled to form ice there is a decrease in

a) the kinetic energy of the molecules.
b) the latent heat of the water.
c) the intermolecular force.
d) molecular contraction.
e) Both a) and b) are correct.

E.2 When you transfer heat to a substance, you always increase its

a) heat capacity.
b) specific heat.
c) temperature.
d) energy.
e) Both c) and d) are correct.

*If the added heat produces only a phase change, such as melting ice at 0 °C into liquid water at 0 °C, there is no increase in temperature.*

E.3 One can change a substance from a liquid to a solid by

a) removing thermal energy from the substance.
b) adding thermal energy to the substance.
c) adding the latent heat of vaporization to the substance.
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d) The water in pail A has a smaller specific heat than the water in pail B.
e) None of the statements is true.

*Specific heat and thermal conductivity are properties of the substance (water, in this case). Of the choices, only heat capacity is dependent on the amount of the substance.*
E.5 How much thermal energy must be removed from 25 grams of water at 40 °C to turn the water into ice at 0 °C? The latent heat of fusion of water is 80 calories/gram.

a) 500 cal
b) 1,000 cal
c) 2,000 cal
d) **3,000 cal**
e) 4,500 cal

\[ Q = S_{\text{heat}} \times M \times \Delta T = \frac{1.00 \text{ cal}}{\text{gram} \, ^\circ C} \times 25 \text{ grams} \times (40 \, ^\circ C - 0 \, ^\circ C) = 1,000 \text{ cal} \]

\[ Q = L_{\text{heat}} \times M = \frac{80 \text{ cal}}{\text{gram}} \times 25 \text{ grams} = 2,000 \text{ cal} \]

\[ Q_{\text{total}} = 1,000 + 2,000 = 3,000 \text{ cal} \]