Specific Heat Capacity

3. When you turn on the hot water to wash dishes, the water pipes have to heat up. How much heat is absorbed by a copper water pipe with a mass of 2.3 kg when the temperature is raised from 20.0°C to 80.0 °C?

4. The cooling system of a car engine contains 20.0 L of water (1 L of water has a mass of 1 kg).

   a. What is the change in temperature of the water if the engine operates until 836.0 KJ of heat is added?
   b. Suppose that it is winter, and the car's cooling system is filled with methanol. The density of methanol is 0.80 kg/L. What would be the increase in temperature of the methanol if it absorbed 836.0 KJ of heat?
   c. Which is a better coolant, water or methanol? Explain.

5. Electric companies sell electricity by the kWh, where 1 kWh = 3.6×10^6 J. Suppose that it costs $0.15 per kWh to run an electric water heater in your neighborhood. How much does it cost to heat 75 kg of water from 15 °C to 43 °C to fill a bathtub?

6. The temperature of 335 g of water changed from 24.5°C to 26.4°C. How much heat did this sample absorb?

   (ans. 2660 J)

7. How much heat in kilojoules has to be removed from 225g of water to lower its temperature from 25.0°C to 10.0°C?

   (ans. –14.1 kJ)

8. How much heat does it take to bring 1.0kg of water from 25°C to 99°C?

   (ans. 309000 J)

9. An insulated cup contains 75.0g of water at 24.00°C. A 26.00g sample of metal at 82.25°C is added. The final temperature of the water and metal is 28.34°C. What is the specific heat of the metal?

   (ans 971 J/kg°C)