Specific Heat

Questions and Answers

1. 800 g of water are warmed from 10 ^{o}C to 80 ^{o}C. How much energy was absorbed by the water?

   $Q = mc\,\Delta T$
   $= 800g\ (4.19J/\{g^{o}C\})\ (80\text{-}10)\ ^{o}C$
   $= 234\ 640\ J$

2. 700 g of water were allowed to cool from it boiling point to 20 ^{o}C. How much energy in kJ were released into the room?

   boiling point of water = 100 C = initial temperature of water
   $Q = mc\,\Delta T$
   $= 700g\ (4.19J/\{g^{o}C\})\ (20\text{-}100)\ ^{o}C$
   $= -234\ 640\ J$
   $= -235\ kJ$

   Notice that a (-) sign for Q implies that the *water lost* heat.

3. How many kJ of energy must a heater supply in order for 200 kg of bathwater to warm up from 10 ^{o}C to our body temperature of 37 ^{o}C?

   200 kg of water = m = 200 000g
   $Q = mc\,\Delta T$
   $= 200\ 000g\ (4.19J/\{g^{o}C\})\ (37\text{-}10)\ ^{o}C$
   $= 22\ 626\ 000\ J$
   $= 22\ 626\ kJ$

4. If 9000 J of heat are absorbed by 800 g of water at 5.0 ^{o}C, what maximum temperature will the water attain?

   $Q = mc\,\Delta T$
   $9000 = 800\ (4.19)(x - 5)$
   $x = 7.7\ ^{o}C$

5. 800 kJ were absorbed by a puddle, sending its temperature rising from 20 to 25 C. How much water was in the pond?

   $Q = mc\,\Delta T$
   $800\ 000\ J = m\ (4.19)(25\text{-}20)$
   $m = 38\ 187\ g = 38\ kg$

6. Find the specific heat of a material that lost 41900 J of energy when 200 g of the material went down 50 C in temperature. What was the material?

$Q = mc\,\Delta T$
Notice that both the ΔT and the Q are negative because heat was lost:
$-41900\text{ J} = 200\ c\ (-50)$
$c = 4.19\text{ J/(g C)}$

Since that is the *c* of water, the material was H_2O.