m = g
c = J/g°C
Δt = change in temp

Specific Heat Worksheet

1. A beaker contains 610.0 g of water at 15.0°C. After being heated for ~~22 minutes~~ the water's temperature rose to 48.0°C. Calculate the heat energy absorbed. * 3 sig figs

$Q = mc\Delta t$ $Q = (610.0g)(4.19J/g°C)(48.0°C - 15.0°C)$

$= 84\,344.7J \rightarrow$ **84 300J or 8.43×10^4 J**

2. A beaker contains 270 g of water at 15°C. The water absorbs 24 000 J of energy. What is the water's final temperature? 2 sig figs

$Q = mc\Delta t$ $\Delta t = \frac{Q}{m \times c}$ $\frac{24000J}{(270g \times 4.19J/g°C)} = 21.21°C = 21°C$

$Ft = \Delta t + It$ $21°C + 15°C = 36°C$

3. Oil has a specific heat capacity of 2.0 J/g.°C. If 200 g of oil absorbs 5 005 J of heat energy to reach a final temperature of 40.0°C, what was its initial temperature? 2 sig figs

$\Delta t = \frac{Q}{m \times c}$ $\frac{5005J}{(200 \times 2.0)} = 12.51°C = 10°C$

$It = Ft - \Delta t$ $40.0°C - 10°C = 30°C$

4. A beaker contains 405 g of water at 19°C. After being heated for ~~42 minutes~~ the water's temperature reaches 55°C. Calculate the heat energy absorbed. 2 sig figs

$Q = mc\Delta t$ $= (405g)(4.19)(55 - 19°C)$

$Q = 61090.2 =$ **61 000J or 6.1×10^4**

5. You pour 250 ml of water into a glass just out of the freezer. After a while, you notice that the temperature of the water has fallen from 18°C to 12°C. (2 sig figs)

   a- Is this an energy transfer or transformation? transfer

   b- Calculate the heat energy transfer.

   $Q = mc\Delta t$ $250 \times 4.19 \times (12 - 18) = 6285J = 6300J$

   c- Explain if the water gives off or absorbs energy.

   d- Explain of the glass gave off or absorbed energy.

6. Syrup has a specific heat capacity of 1.3 J/g.°C. If 200 g of syrup absorbs 5 000 J of heat energy to reach a final temperature of 55°C, what was its initial temperature? 1 sig fig

C m Q Ft

$Q = mc\Delta t$ $\Delta t = \frac{Q}{mc}$ $\frac{5000\text{J}}{(200)(1.3)} = 19.23°C = 20°C$

$It = Ft - \Delta t$ $55 - 20 = 35°C$ = 40°C

↓ - place

7. What is the mass of water if it absorbs 65 000 J of heat energy to go from a temperature of 75°C to 94°C?

Q * 2 sig figs.

$m = \frac{Q}{c\Delta t}$ $\frac{65000}{(4.19)(94-75)} = 816.48\text{g} = 820\text{g}$

8. What is honey's specific heat if 90.0 g are heated for ~~18.0 minutes~~ and experience a temperature change of 40.0°C absorbing 7 500.0 J of heat? 3 sig figs

m Q Δt

$C = \frac{Q}{m \times \Delta t}$ $\frac{7500.0}{90.0 \times 40.0} = 2.083 = 2.08\ \text{J/g°C}$

9. Water's specific heat is 4.19 J/g.°C. Olive oil's specific heat is 1.9 J/g.°C.
   a- Which one would get hotter faster? Oil
   b- Which one would keep its heat for longer? water
   c- Why would we put water in a car's cooling system over olive oil?

Water has a high specific heat. Takes long to get hot therefore it will not overheat quickly