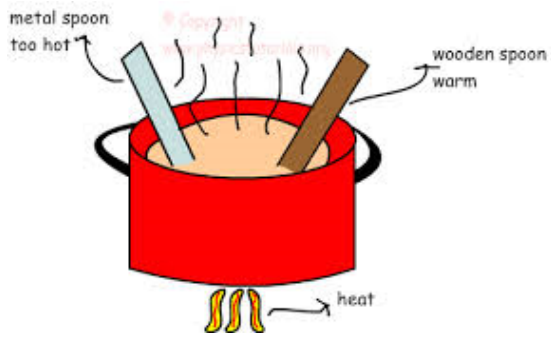
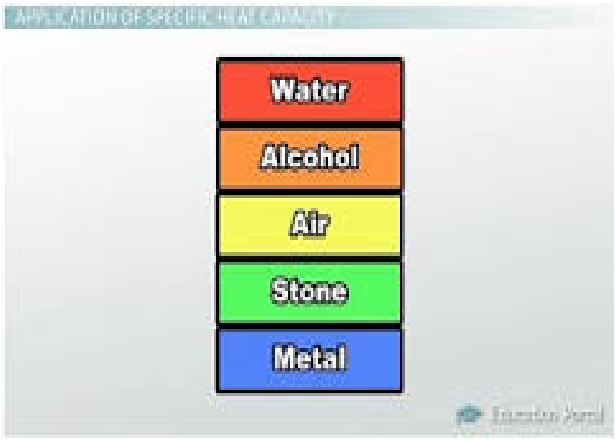
Specific Heat

Def: The amount of heat required to raise the temperature of 1 g of a substance by 1℃.

Specific heat is a characteristic property. The higher SH a substance has, the longer it takes to get hot, but the more heat it absorbed so it will take longer to lose the heat.

Specific Heat of water.mp4





Formula $Q = mc\Delta T$

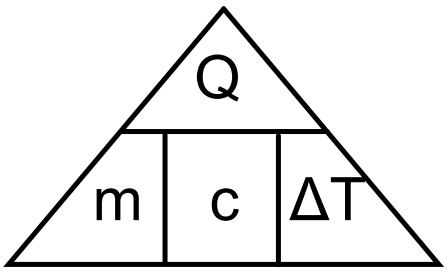
Variables	Stands for	Unit
Q	heat energy	J
m	mass	g
c	specific heat	J/g.℃
T	Temperature	℃
ΔT	Change in temperature	℃

Temperature formulas:

- To get ΔT: final temperature - initial temperature
- To get initial temperature: FT - ΔT
- To get final temperature: IT + ΔT

- Conversion kg-g x 1 000
- Specific heat of water 4.19 J/g℃

Using triangle to isolate:



* 100mL of water = 100g because density is 1g/mL

Practice questions:

FT = IT + ΔT
IT = FT - ΔT

1. The mass of water is 210 g, its initial temperature was 15℃. After heating it for 22 minutes, the water's temperature was 65℃. Calculate the heat energy absorbed.

$Q = mc\Delta T$

$210g \times 4.19 J/g \cdot ^\circ C \times (65 - 15)^\circ C$

43995 44000 J

2. There was 200 g of water with an initial temperature of 15℃. The water had absorbed 24 000 J of energy. What was the water's final temperature?

$FT = IT + \Delta T$

$15^\circ C + 30^\circ C$

$45^\circ C \rightarrow 50^\circ C$

$\Delta T = \frac{Q}{mc}$ $\frac{24000 J}{200g \times 4.19 J/g \cdot ^\circ C}$

28.63.... $30^\circ C$ C

3. Oil absorbed 55 000 J of heat and has a specific heat of 2.0 J/g℃. What was oil's temperature if 2.2 kg had a final temperature of 70.0℃?

$IT = FT - \Delta T$

$70.0 - 13$

$57^\circ C$

$\Delta T = \frac{Q}{mc}$ $\frac{55000}{2200 \times 2.00}$

12.5

$13^\circ C$

4. What was the mass of water if it absorbed 31 000 J of heat and had a temperature change of 54℃?

$m = \frac{Q}{c\Delta T}$ $\frac{31000 J}{4.19 J/g \cdot ^\circ C \times 54^\circ C}$

137.010... g

140g

5. What is vinegar's specific heat if 30.0 g is heated for 18 minutes and has a temperature change of 26℃ to produce 50 500 J of heat?

$C = \frac{Q}{m\Delta T}$ $\frac{50500 J}{30.0g \times 26^\circ C}$

64.74... $J/g \cdot ^\circ C$

$65 J/g \cdot ^\circ C$

Attachments

Specific Heat of water.mp4