Friday worksheet 5 –Specific heat capacity

1. Use reference to hydrogen bonding to explain the high ***specific heat capacity*** of water.

$$\mathbf{E = c \times m \times} \Delta T$$

E = energy (joules)

m = mass in grams

ΔT =change in temperature

c = the specific heat capacity of the substance

2. Now let's use the formula shown on the right. Using information contained in table 1 complete the following exercises.
   i. Calculate the amount, in kJ, of energy needed to raise the temperature of 500.0g of water at 25.0 °C to 50.0 °C.

   ii. What is the final temperature of a 50.0g sample of pure water at 25.0 °C if 0.500 kJ of energy is supplied to it.

   iii. 322 joules of energy is supplied to a sample of water of unknown mass at 34.2 °C. Calculate the mass, in grams, of the water if the final temperature is 51.2 °C.

Substance	c in J/g /c
Aluminum	0.900
Bismuth	0.123
Copper	0.386
Water	4.186
Gold	0.126

Table 1

   iv. Consider a 500g sample of pure water at 78°C in a cup that cools to 25°C.

      a. Will the person, holding the cup of water, feel their hand cooling or warming up. Explain your answer

      b. Calculate the amount of energy, in kilojoules, involved .

3. 300g of hot tea at 85°C is poured into a glass containing 200g of water at 25°C. What is the temperature of the mixture of the two liquids? Assume no energy is lost and that the hot tea can be considered as being pure water.

4. Calculate the amount of energy, in kJ, that needs to be supplied to a 200.0g mass of ice at -200°C to vaporise all the water molecules at 100 °C. Latent heat of vaporisation of water is 2,260 kJ/kg while the latent heat of fusion of water is 334 kJ/kg. Specific heat of liquid water is 4.18 J/g/°C while the specific heat of ice is 2.108 J/g/°C.