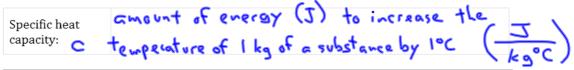
## SPH3U 6.3 Heat Capacity

## 1. Specific heat capacity



Substance	Specific Heat Capacity, c	Substance	Specific Heat Capacity, c	Substance	Specific Heat Capacity, c
water	4.18 x 10 <sup>3</sup>	aluminum	9.2 x 10 <sup>2</sup>	copper	$3.8 \times 10^{2}$
ethyl alcohol	2.46 x 10 <sup>3</sup>	glass	8.4 x 10 <sup>2</sup>	silver	2.4 x 10 <sup>2</sup>
ice	$2.1 \times 10^{3}$	iron	4.5 x 10 <sup>2</sup>	lead	1.3 x 10 <sup>2</sup>

When 200.0 mL of water is heated from 15.0 °C to 40.0 °C, how much thermal energy is

absorbed by the water? 
$$T = 0.2000 \, \text{kg} \cdot (1 \, \text{mL of water} = 1 \, \text{g}) \cdot (1 \, \text{mL of water} = 1 \, \text{$$

An empty copper pot is sitting on the stove, with a mass of 1.2 kg and a temperature of 130.0 °C. If the pot cools down to 21.0 °C, how much thermal energy does it release?

A block of iron starts off at a temperature of 22.0 °C. It is heated t o100.0 °C by placing it in boiling water. The energy required is  $4.91 \times 10^5$  J. Calculate the mass of the iron block.

## 2. The principle of thermal energy exchange

Principle of thermal energy exchange:

equation

Principle of the na warmer object touches a cooler object, the heat it loses = the heat the couler object gains.

Quescel = -Qabsorbed QR = -QA.

A 60.0 g sample of metal is heated to 100.0 °C before being placed in 200.0 mL of water with an initial temperature of 10.0 °C. Together, they reach a final temperature of 15.6 °C. What is the metal?

What is the metal?  $m_1 = 0.06 \text{ fg}$ ,  $T_{11} = 100^{\circ}\text{C}$ ,  $m_2 = 0.2 \text{ kg}$ ,  $T_{12} = 10^{\circ}\text{C}$ ,  $T_1 = 15.6^{\circ}\text{C}$ .

 $Q_{R} = -Q_{A} \cdot Q = mc\Delta T \Rightarrow m_{1} c_{1}(T_{4}-T_{11}) = -m_{1}c_{2}(T_{4}-T_{12}).$   $C_{1} = \frac{-m_{2}c_{2}(T_{4}-T_{12})}{m_{1}(T_{4}-T_{11})} = \frac{(0.2)(u.18\times10^{3})(15.6-10)}{(0.06)(15.6-100)} = 9.74\times10^{3} \frac{1}{kg^{3}c}$   $\vdots \quad the netal is alluminum.$ 

A sample of iron is heated to 80.0 °C and placed in 100.0 mL of water at 20.0 °C. The final temperature of the mixture is 22.0 °C. What is the mass of the iron?

 $m_{1}C_{1}(T_{f}-T_{i1})=-m_{2}C_{2}(T_{f}-T_{i2})$   $m_{1}=\frac{-(0.1 \text{ kg})(4.18 \text{ yi}0^{3})(22-20)}{(4.5 \text{ yi}0^{2})(22-80)}$   $=3.2 \times 10^{-2} \text{ kg}.$ 

200.0 g of silver is heated to 90.0 °C. The hot silver is then placed into 300.0 g of ethyl alcohol with an initial temperature of 5.0 °C. What is the final temperature of the mixture?  $T_{f} = T_{1.0} =$ 

**Homework:** page 287: #2, 5, 6, 8