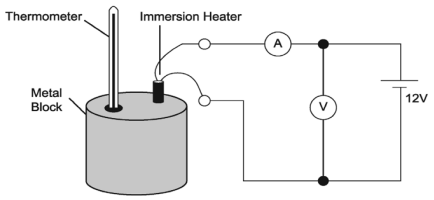
Specific Heat Capacity – Required Practical

Planning:

1. Consider the method
   - What are we investigating?
   - How might we find the answers?
2. Make a risk assessment:-
   - What are the hazards?
   - What measures will you take to manage risk?
3. Variables:-
   - What controls do we need?
   - What are the dependent variables?
   - What are the independent variables?
4. Determine for accuracy and for error:-
   - What is the calibration of the thermometer?
   - What is the resolution of the thermometer?
   - What is the time interval between reading the data?
   - What is the range of energy (work done)?

Objective:

To determine the specific heat capacity of three different metals.



Equation:

$$\Delta E = m \times c \times \Delta\theta$$

ΔE – Change in energy (J)

M – Mass (kg)

C – Specific Heat Capacity (J/kg°C)

$\Delta\theta$ – Change in temperature (°C)

Rearrange the equation

Calculate:

Use your data table to calculate SHC:

$$\frac{\Delta E}{m \times \Delta\theta} = c$$

Time (s)	Potential Difference (V)	Current (A)	Energy Transferred (J)	Temperature (°C)
0				
60				
120				
180				
240				
300				
360				
420				
480				
540				
600				

OR

Use a graph to calculate SHC:

Draw a graph and plot the energy transferred on the *x* axis, and temperature on the *y* axis.

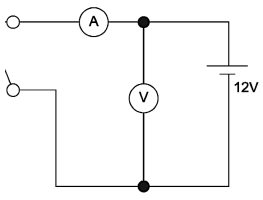
Plot your data. Draw a line of best fit. Determine the gradient – $y \div x$

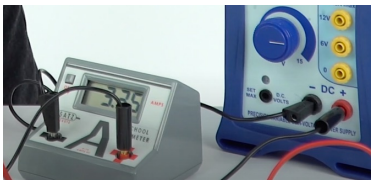
Use this formula to calculate SHC

$$\frac{1}{\text{Gradient} \times m} = c$$

Mission Assignment: Explore Specific Heat Capacity – Required Practical

MA Code: KS4-18-08





Method

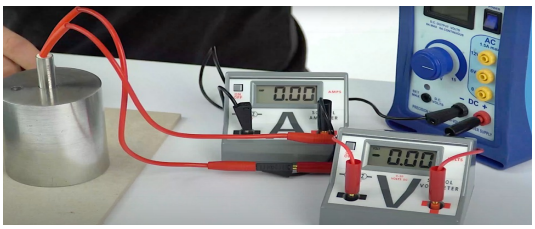
1. Set the balance to zero.
2. Measure the mass of the metal block.
3. Put a few drops of water in the small hole to make sure there is full immersion of the thermometer.
4. Place the immersion heater into the central hole.

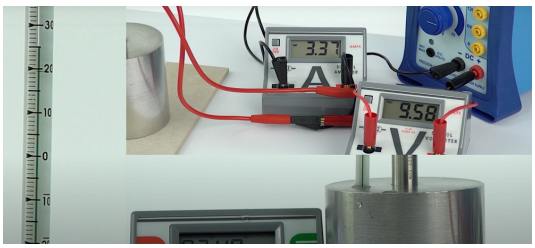
5. Set the circuit up to the diagram above

   A joulemeter can be used.

   For accuracy, use an ammeter in series, and a voltmeter in parallel across the component.

6. Set the power pack to 10v, check that the voltmeter is reading as 10v.





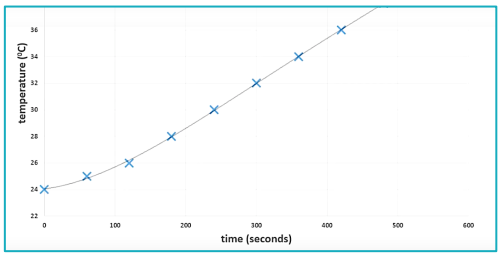
You can calculate the work done (J) by the electrical power supply with this formula:-

Power = Potential Difference X Current

P = V X I

Then by using this formula for calculating energy transferred:-

Energy (J) = Power (W) X Time (s)



Think of all of the hazards

Consider all the sources of error carefully

Time (mins)	Time (s)	Temp (°C)
0	0	24
1	60	25
2	120	26
3	180	28
4	240	30
5	300	32
6	360	34
7	420	36
8	480	38
9	540	40
10	600	42

7. Turn on the power supply and start your timer.
8. Record the current, potential difference and the temperature.
9. Repeat every 60 seconds for 10 minutes.
10. Use the formula to calculate power and energy.

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Planning Sheet

Plan an experiment for measuring the Specific Heat Capacity of a metal block.

1. Organise (What is the method)

Equation

Energy = mass X SHC X temperature rise

Rearrange the formula to find SHC. What is the SI unit for SHC?

2. Risk Assessment

4. Sources of Error

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Calculate the SHC to 3 sig. fig.

Data Analysis

Time (s)	Potential Difference (V)	Current (A)	Energy Transferred (J) (I X V X time)	Temperature (°C)
0				
60				
120				
180				
240				
300				
360				
420				
480				
540				
600