3. Wind-up radios and clocks rely on the energy stored in springs.

(a) What is this type of stored energy called?(1)

Elastical Potential Energy (EPE)

(b) Write an equation for the stored energy in the spring, explaining all terms used.(2)

k = Spring Constant (N/m)

W = ½ F x W = work (w) F = force applied (N)

4. State the units for

(a) Energy Joules (J) (1)

(b) Work done Joules (J) (1)

(c) Power watts (W) (1)

5. This energy diagram shows the useful energy transfer for an electric lamp.

(a) What type of energy is wasted in the process?(1)

Thermal energy

(b) Write a word equation for "efficiency".(1)

Efficiency = useful energy transferred by the device x 100 / total energy supplied to the device.

(c) What is meant by "the principle of conservation of energy"?(1)

That energy cannot be created or destroyed only transferred.

(d) Explain how the lamp obeys this principle.(2)

The electrical energy is transferred into light and thermal energy. The energy is not destroyed. It was transferred, not created.

Energy to melt ice = Mass of water * Specific latent heat of fusion of water

9113.28J = 0.0175 * 520,759

Discussion

Actual specific latent heat of fusion of water: 334,000Jkg^{-1}

My specific latent heat of fusion of water: 520,759Jkg^{-1}

Difference: 186,759Jkg^{-1}

My value is greater than the actual specific latent heat of fusion of water.

My results were different from the actual values as the specific latent heat of fusion of water value was too high. This may be because the mass of melted ice was too low. The heater was not in the middle of the funnel, therefore the thermal energy was not distributed evenly on the ice cubes. This also leads to the waste of thermal energy, as the heater was also touching the filter paper; heating that up instead along with the funnel (partially).

Other inconsistencies and sources or errors could be that due the voltmeter and ammeter being inaccurate. If the ammeter and/or voltmeter is reading the current and/or volts incorrectly, then there would be a fault in the calculations causing the electrical energy value to be incorrect. This would later make the specific latent heat of fusion of water to be incorrect also. To reduce this error, before using the ammeters and voltmeters, check that they are accurate and set to the right setting and compare them to others to ensure accuracy. Also, the person could be reading the current and/or volts as a negative number and putting the minus to the equation. This would cause the calculation to be inaccurate as a negative number will be used. To reduce this error, swap the wires around to make sure the numbers appear positive. However, it does not matter if it appears as a negative number as long as you ignore the minus symbol and look at it as a positive number; the digits are the same. When using the incorrect calculations and formulas, it will cause the results to be inaccurate. For example, recording the mass of the beaker in grams instead of kilograms. The formula requires the value to be in kilograms, otherwise your value would be different from the actual answer. To reduce this error, follow the instructions carefully and use the right values in the right form for the formulas and calculations. The top pan balance may be faulty and the supposed recorded weight of beaker may differ from the actual weight. To reduce this error, weigh the beaker on several top pan balances. If the masses are not the same, but very close, work out the average mass of the beaker. Do not use the value that has a big difference. Due to the internal body temperature of the person doing the experiment, if they touch the ice as well as the heater when pushing the ice in the funnel, then their thermal energy will be contributing when melting the ice. This will cause the electrical energy supplied value to be incorrect. To reduce this error, use a pen to push the ice in the funnel when doing the experiment, as the pen will contribute no heat.

To improve the accuracy of the experiment I would have done the tests multiple times to work out an average value for the specific latent heat of fusion of water. I would have also make sure that the heater was in the middle of the funnel, so that the heat would have been distributed evenly against the ice.