1.1 - Energy Changes in a System, and in the Ways Energy is Stored

Flashcards

What is the equation for kinetic energy?
Give SI units for all quantities involved.

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$$\tfrac{1}{2}\,m\,v^2$$

½ x Mass x (Velocity)²

Energy (J), Mass(kg), Velocity(m/s)

What is the equation for elastic potential energy? Give SI units for all quantities involved.

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Give SI units for all quantities involved.

$$\tfrac{1}{2} k x^2$$

½ x Spring Constant x (Extension)²

Energy (J), Spring Constant (N/m), Extension(m)

What is the equation for gravitational potential energy? Give SI units for all quantities involved.

What is the equation for gravitational potential energy? Give SI units for all quantities involved.

mgh

Mass x Gravitational Field Strength x Height

Energy (J), Mass(kg), Gravitational Field Strength (N/kg),

Height (m)

What two are things that can be caused by heating a substance?

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1. Raise the temperature of the substance

2. Change the state of the substance

What three factors determine the temperature change of a system?

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1. Mass of substance being heated
2. Type of material (Specific heat capacity)
3. Energy input into the system

State the equation used to calculate the temperature change when a substance is heated. Give appropriate units.

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

- Energy (J), Mass (kg), Specific Heat Capacity (J/kg/°C), Temperature (°C)

Define specific heat capacity.

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The amount of energy needed to increase the temperature of 1kg of a substance by 1°C.

Define specific latent heat.

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The amount of energy needed to change the state of 1kg of a substance **with no change in temperature**.

State the equation for the energy required to change state. Give appropriate units.

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- Energy to change state = mass x specific latent heat
- Energy (J), Mass (kg), Specific latent heat (J/kg)

State the units for Specific Heat Capacity.

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J/°C/kg

Joules/Degree Celsius/Kilogram

Define power.

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The rate at which energy is transferred (or rate at which work is done).

State **two** equations for power. Give SI units for all quantities involved.

State **two** equations for power. Give SI units for all quantities involved.

=energy transferred/time

=work done/time

Energy (J), Work Done (J), Time (s)

What is the unit of power?

What is the unit of power?

Watt (W)

Two motors lift the same mass through the same height. Motor A does this in half the time of Motor B. Which dissipates the most power?

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Motor A.

The energy transferred is the same but the time taken is less.

Describe the energy changes involved when a ball is thrown upwards and then returns to its starting position. Ignore air resistance.

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- Upwards: KE is converted to GPE
- Peak: Maximum GPE, zero KE
- Downwards: GPE is converted to KE

KE (Kinetic Energy), GPE (Gravitational Potential Energy)

Describe the energy transfers for a bungee jumper.

Describe the energy transfers for a bungee jumper.

- When falling, the GPE is converted to KE of jumper.
- As the cord tightens, KE is converted and stored as Elastic Potential Energy (EPE).
- At lowest point, the jumper's initial GPE equals the EPE stored in the cord.

Explain why a bungee jumper slows down once the cord begins to stretch.

Explain why a bungee jumper slows down once the cord begins to stretch.

- Kinetic energy decreases since it is converted to elastic potential energy.
- Since KE is proportional to (velocity)², as KE decreases, so does velocity.

Give examples of chemical energy stores.

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- Food

- Fuel (eg. wood, coal, petrol)

- Batteries

State 4 different stores of energy.

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1. Kinetic Energy

2. Gravitational Potential Energy

3. Elastic Potential Energy

4. Chemical Energy