

AQA A-Level Physics

Topic 6.2 Thermal Physics

Flashcards

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What is internal energy?



What is internal energy?

The sum of the potential and kinetic energies of a system.



How can you increase the thermal energy of a system?



How can you increase the thermal energy of a system?

We can increase it by heating it up or doing work on the object.



Explain the energy changes that occur during a change of state.



Explain the energy changes that occur during a change of state.

During change of state the potential energy of the particles change but the kinetic energies doesn't change.



What equation can be used to determine the energy required to change the temperature of a substance?



What equation can be used to determine the energy required to change the temperature of a substance?

$$Q = mc\Delta T$$

Q - J

m - kg

c - JK⁻¹

T - K



Give the equation to work of the energy for change of state ?



Give the equation to work of the energy for change of state ?

$$Q = ml$$

Q - J

m - kg

l - Jkg⁻¹



What is the Ideal gas equation?



What is the Ideal gas equation?

$$pV = nRT$$

p - Pa

R - is the Molar Gas constant, 8.31 Jmol⁻¹K⁻¹

n - is the number of mols

T - K

V m³



What is the first law of thermodynamics?



What is the first law of thermodynamics?

$$\Delta U = Q - W$$

Where Q = the heat added **to** a system

And W is the work done **by** the system



What is the specific heat capacity of substance?



What is the specific heat capacity of substance?

The energy required to raise the temperature of 1kg of a substance by 1K.



What is the specific latent heat of a substance?



What is the specific latent heat of a substance?

The energy required to change the state per unit mass of a substance, while keeping the temperature constant.



What is an ideal gas?



What is an ideal gas?

A gas that:

- The gas molecules don't interact with each other.
- The molecules are thought to be perfectly spheres.



What is the internal energy of an ideal gas equal to?



What is the internal energy of an ideal gas equal to?

It is equal to the internal energy of an ideal gas.



What is Boyle's law?



What is Boyle's law?

Pressure is inversely proportional to volume, providing temperature is constant.



In an ideal gas, how would increasing the volume change the temperature of the gas, while the pressure remains constant?



In an ideal gas, how would increasing the volume change the temperature of the gas, while the pressure remains constant?

As you increase the volume, you also increase the temperature.



Explain how increasing the temperature of a balloon, while keeping the volume the same will increase the pressure.



Explain how increasing the temperature of a balloon, while keeping the volume the same will increase the pressure.

- As the temperature increases, the average kinetic energy increases.
- Therefore the particles are travelling at a higher speed on average
- There are also more frequent collisions
- Which means the particles would exert a greater force
- Which would cause a increased rate of change of momentum
- Therefore increasing pressure.



What is absolute zero?



What is absolute zero?

At -273°C

This is where objects have no/minimum kinetic energy.



What is Avogadro's constant? (in words)



What is Avogadro's constant? (in words)

The number of atoms there are in one mole of a substance.



True or false: 'All collisions between particles and between particles and the wall are elastic' is an assumption of an ideal gas?



True or false. 'All collisions between particles and between particles and the wall are elastic' is an assumption of an ideal gas?

True.



State an assumption of an ideal gas related to time?



State an assumption of an ideal gas related to time?

The time for each collisions is negligible in comparison to the time take between collisions.



Describe 3 other assumptions of the ideal gas equation.



Describe 3 other assumptions of the ideal gas equation.

3 of the following:

- The particles move randomly
- They follow Newton's laws of motion
- No intermolecular forces act between particles
- Volume of the particles is negligible compared to the volume of the container they are in



What is meant by the root mean square speed?



What is meant by the root mean square speed?

The square root of the mean of the squares of the speeds of the molecules.



What is Brownian motion?



What is Brownian motion?

Brownian motion is the idea that very small objects have random motion in a liquid or gas due to random bombardment by the molecules in this substance. This movement will be fractionally more on one side than the other so a force will push it for an instant as the net forces shifts directions. This random motion is Brownian Motion and gives evidence for the existence of atoms.

