INKPHYSICS FLASHCARDS

Thermal physics

Year 13 · 25 cards · fronts and backs

Print double-sided, flipping on the long edge, and each answer lands behind its question. Cut along the card borders.

Definitions in mark-scheme wording, the equations that are not on the AQA data sheet, each lesson's check question, and the misconceptions that lose marks. The same cards run on the website with spaced-repetition scheduling, at inkphysics.co.uk/physics/flashcards.

DEFINITION

Define: Internal energy.

DEFINITION

Define: Specific heat capacity.

DEFINITION

Define: Specific latent heat.

RECALL

State the two ways to increase the internal energy of a system.

RECALL

Explain why temperature is constant during a change of state.

RECALL

State the purpose of the two flow rates in the continuous-flow method.

DEFINITION

Define: Describe the arrangement and motion of particles in a solid.

DEFINITION

Define: Describe the arrangement and motion of particles in a liquid.

DEFINITION

The energy needed to raise the temperature of one kilogram of a substance by one kelvin without a change of state.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

DEFINITION

The sum of the randomly distributed kinetic and potential energies of the particles in a body.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

RECALL

Heating it, or doing work on it.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

DEFINITION

The energy needed to change the state of one kilogram of a substance without a change of temperature.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

RECALL

With the same inlet and outlet temperatures the heat loss is the same in both runs, so subtracting the two eliminates it.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

RECALL

The energy supplied increases the potential energy of the particles, not their kinetic energy.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

DEFINITION

Particles are close together, as in a solid, but disordered beyond the nearest few neighbours, and they slide past one another while staying in contact.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

DEFINITION

Particles are close together in a regular repeating arrangement, held by strong forces, each vibrating about a fixed position and unable to change places with its neighbours.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

DEFINITION

Define: Describe the arrangement and motion of particles in a gas.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

SPOT THE ERROR

Say what is wrong with this claim:

Heat and temperature are the same thing.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

DEFINITION

Define: Absolute zero.

IDEAL GASES AND THE GAS LAWS

RECALL

State absolute zero in degrees Celsius.

IDEAL GASES AND THE GAS LAWS

DEFINITION

Define: Boyle's law.

IDEAL GASES AND THE GAS LAWS

DEFINITION

Define: Charles's law.

IDEAL GASES AND THE GAS LAWS

DEFINITION

Define: The Avogadro constant.

IDEAL GASES AND THE GAS LAWS

DEFINITION

Define: Ideal gas.

IDEAL GASES AND THE GAS LAWS

SPOT THE ERROR

They are different quantities. Temperature tracks the average random kinetic energy of the particles, exactly proportional to it for an ideal gas; heat is energy transferred between bodies because of a temperature difference.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

DEFINITION

Particles are far apart, roughly ten times the spacing in a liquid, in no arrangement at all, moving rapidly in random straight lines with negligible forces between collisions.

THERMAL ENERGY TRANSFER AND SPECIFIC HEAT CAPACITY

RECALL

Absolute zero, 0 K, is −273 °C.

IDEAL GASES AND THE GAS LAWS

DEFINITION

The temperature at which the particles of a substance have minimum internal energy.

IDEAL GASES AND THE GAS LAWS

DEFINITION

At constant pressure, the volume of a fixed mass of gas is proportional to its absolute temperature.

IDEAL GASES AND THE GAS LAWS

DEFINITION

At constant temperature, the pressure of a fixed mass of gas is inversely proportional to its volume.

IDEAL GASES AND THE GAS LAWS

DEFINITION

A gas that obeys $pV \propto T$ at all pressures, where T is the thermodynamic temperature.

IDEAL GASES AND THE GAS LAWS

DEFINITION

The number of particles in one mole: 6.02×10^{23} mol^{-1}.

IDEAL GASES AND THE GAS LAWS

EQUATION · NOT ON THE AQA DATA SHEET

Work done by a gas at constant pressure:

W = ?

IDEAL GASES AND THE GAS LAWS

SPOT THE ERROR

Say what is wrong with this claim:

Zero degrees means zero heat.

IDEAL GASES AND THE GAS LAWS

DEFINITION

Define: Brownian motion.

MOLECULAR KINETIC THEORY

RECALL

State the evidence from Brownian motion.

MOLECULAR KINETIC THEORY

DEFINITION

Define: Root mean square speed.

MOLECULAR KINETIC THEORY

RECALL

State what determines the average kinetic energy of a gas molecule.

MOLECULAR KINETIC THEORY

RECALL

State the internal energy of an ideal gas.

MOLECULAR KINETIC THEORY

DEFINITION

Define: Describe the smoke cell demonstration of Brownian motion.

MOLECULAR KINETIC THEORY

SPOT THE ERROR

0 °C is an arbitrary zero, the freezing point of water; molecules there still move rapidly. Particles have minimum internal energy at absolute zero, 0 K or -273 °C.

IDEAL GASES AND THE GAS LAWS

EQUATION · NOT ON THE AQA DATA SHEET

$W = p\Delta V$

IDEAL GASES AND THE GAS LAWS

RECALL

Brownian motion is evidence that a fluid consists of molecules in rapid random motion, bombarding the suspended particles unevenly.

MOLECULAR KINETIC THEORY

DEFINITION

The continual random motion of visible particles, such as smoke grains, suspended in a fluid.

MOLECULAR KINETIC THEORY

RECALL

Only the absolute temperature: mean translational KE = (3/2)kT, the same for every ideal gas.

MOLECULAR KINETIC THEORY

DEFINITION

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

MOLECULAR KINETIC THEORY

DEFINITION

Smoke from a smouldering taper is sealed in a small glass cell, lit from the side and viewed through a microscope. Each smoke particle shows as a bright speck jerking about randomly and independently of the rest.

MOLECULAR KINETIC THEORY

RECALL

Entirely kinetic: with no intermolecular forces there is no potential-energy contribution.

MOLECULAR KINETIC THEORY

SPOT THE ERROR

Say what is wrong with this claim:

Air pressure comes from air's weight pressing down.

MOLECULAR KINETIC THEORY

SPOT THE ERROR

Gas pressure is not weight acting downwards. It comes from molecules colliding with surfaces, each impact changing momentum and exerting a force, so pressure acts equally in all directions.

MOLECULAR KINETIC THEORY