AQA GCSE PHYSICS (HIGHER) · 8463

PHYSICS



MARK SCHEME

4.3.3 PARTICLE MODEL AND PRESSURE (PACK 2)

SCORE	PERCENTAGE
/31	%

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Q1.

(a) they move in random directions

1

they move with a range of different speeds

1

(b) the (mean) speed of the particles would increase

allow kinetic energy increases

1

(c) (if the temperature increases) the pressure increases

allow an explanation in terms of large pressure difference

1

so it could explode

1

(d) p = 0.1 (MPa)

1

(e) $p = 2.25 \times \left(\frac{25}{100}\right)$

allow any correct method of determining 25% of 2.25
allow use of 2.2−2.3

1

p = 0.56

allow 0.55−0.575

1

t = 27 (minutes)

allow 26−28 minutes
allow correct value of t using their calculated value of p

1

*an answer of 27 scores **3** marks*

(f) (the volume of the air) increases

1

[10]

Q2.

(a) random

accept in all directions

1

description must be of random motion

(b) heating increases the temperature of the gas

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1

temperature is proportional to kinetic energy

1

if kinetic energy increases speed increases

1

(c) energy is needed to change the state of the water

1

to break the bonds

1

(d) $1000 = m / 2.5 \times 10^{-5}$

1

$m = 2.5 \times 10^{-5} \times 1000$

1

$m = 0.025$ (kg)

1

$E = 0.025 \times 2\,260\,000$

1

$E = 56\,500$ (J)

1

*allow 56 500 (J) without working shown for **5** marks*
***0** marks awarded for $E = m \times L$*

(e) any **four** from:

- because the water is preheated) the change in temperature of the water is less
- so less energy is used to heat the water ($E=mc\Delta\theta$)
- therefore they (condensing boilers) are more efficient
- so less energy is wasted
- less gas is burned to heat the same amount of water
- less waste gas (CO_2) is produced by the boiler **or** (because less gas is used) they are cheaper to run / save money

4

[15]

Q3.

(a) kilograms per metre cubed, kg / m^3

1

(b) (solid has) more particles
allow atoms for particles

1

in the same volume **or** in a given volume
allow description of a given area

1

(c) randomly

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this order only

1

kinetic

1

(d) (pressure) rises

1

[6]

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Q1.

(a) Over 90% of students scored at least 1 mark and 73 % scored 2 marks.

(b) 69% of students answered correctly. Many students who weren't awarded the mark probably intended to say that the speed increased, but simply offered 'increased' as their response, which is ambiguous. Many incorrect responses referred to increased vibration or faster vibration in the air.

(c) A little over 70% of students recognised that the canister was in danger of exploding/bursting. 33% went on to say that the increase in pressure was the cause. Of the students that failed to score any marks, most just made simple statements such as 'the diver will not be able to breathe'.

(d) Only 31% of students deduced that the pressure would stop dropping when the pressure inside the can was the same as the atmospheric pressure.

(e) 32% of students scored all three marks on the question. 27% were able to calculate the final pressure but then read the value from the graph incorrectly.

A number of students incorrectly calculated 75% of the initial pressure and then read the value off the graph correctly as t = 6, and scored one mark.

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