

MARK SCHEME

GCSE

PHYSICS

AQA - TRIPLE SCIENCE

P3 - TEST 6

PARTICLE MODEL OF MATTER

Advanced

Mark schemes

- 1.** (a) 1 (cm³) 1
- (b) pressure is inversely proportional to volume 1
- data to prove inversely proportional relationship
*eg $8 \times 200 = 1600$
and $10 \times 160 = 1600$*
*if no other marks score allow for 1 mark: as volume decreases
pressure increases* 2
- (c) (as the gas is compressed) the volume of gas decreases 1
- (so there are) more frequent collisions of gas particles with
container walls 1
- (and) each particle collision with the wall causes a force 1
- (so there is a) greater force on walls 1
- [8]**
- 2.** (a) surface area
or
duration of experiment
*accept shape of beaker
size of beaker is insufficient* 1
- (b) any **two** from:
- takes readings automatically
*ignore easier **or** takes readings for you*
 - takes readings more frequently
 - reduces / no instrument reading error
ignore human error
 - higher resolution
allow better resolution
 - don't need to remove probe to take reading
 - more accurate
- 2

- (c) (i) 0.07 (°C/s)
allow 1 mark for obtaining a temperature drop of 7 (°C)
allow 1 mark for an answer between 0.068 and 0.069 (°C/s) 2
- (ii) rate of temperature change is greater at the start
accept rate of evaporation is greater at the start
- or**
rate of temperature change decreases
allow rate of evaporation decreases
allow temperature decreases faster at the start 1
- (iii) A
reason only scores if A is chosen
lower temperature decrease (over 200 seconds)
accept lower gradient 1
- (iv) no effect (as rate of evaporation is unchanged)
allow larger temperature change (per second as mass of liquid is lower) 1
- (d) particles with more energy
accept particles with higher speeds 1
- leave the (surface of the) liquid 1
- (which) reduces the average (kinetic) energy (of the remaining particles)
allow reference to the total energy of the liquid reducing 1
- [11]
- 3.** (a) there are strong forces (of attraction) between the particles in a solid
accept molecules / atoms for particles throughout
accept bonds for forces 1
- (holding) the particles close together
particles in a solid are less spread out is insufficient 1

or

(holding) the particles in a fixed pattern / positions

but in a gas the forces between the particles are negligible

accept very small / zero for negligible

accept bonds for forces

1

so the particles spread out (to fill their container)

accept particles are not close together

gas particles are not in a fixed position is insufficient

1

(b) (i) particles are (shown) leaving (the liquid / container)

accept molecules / atoms for particles throughout

accept particles are escaping

particles are getting further apart is insufficient

1

(ii) *accept molecules / atoms for particles throughout*

accept speed / velocity for energy throughout

particles with most energy leave the (surface of the) liquid

accept fastest particles leave the liquid

1

so the mean / average energy of the remaining particles goes down

1

and the lower the average energy (of the particles) the lower the temperature (of the liquid)

1

[8]

4.

(a) ions / electrons gain (kinetic) energy

accept atom / particles / molecules for ion

accept ions vibrate faster

accept ions vibrate with a bigger amplitude

accept ions vibrate more

do not accept ions move faster

1

(free) electrons transfer energy by collision with ions

or energy transferred by collisions between vibrating ions

1

- (b) move faster or take up more space
do not accept start to move / vibrate 1
- (warmer) water expands **or** becomes less dense (than cooler water)
do not accept answers in terms of particles expanding 1
- warm water rises (through colder water) **or** colder water falls to take its place 1
- (c) transfer of energy by waves / infrared (radiation)
accept rays for waves
do not accept transfer of energy by electromagnetic waves
ignore reference to heat 1

[6]

- 5.** (a) air near freezer compartment is cooled or loses energy
accept air at the top is cold 1
- cool air is (more) dense or particles close(r) together (than warmer air)
do not allow the particles get smaller / condense 1
- so (cooler) air falls 1
- air (at bottom) is displaced / moves upwards / rises
do not allow heat rises
accept warm air (at the bottom) rises 1
- (b) if volume is doubled, energy use is not doubled
or
 volume ÷ energy not a constant ratio 1
- correct reference to data, eg 500 is 2×250 but 630 not 2×300 1
- (c) accept suitable examples, eg
 advantage:
- reduces emissions into atmosphere
 - lower input power or uses less energy or wastes less energy
 - costs less to run
- cost of buying or installing new fridge is insufficient*
ignore reference to size of fridge 1

disadvantage:

- land fill
- energy waste in production
- cost or difficulty of disposal
- transport costs

1

[8]