

MARKING SCHEME AND MODEL ANSWERS

Chapter 12: Kinetic Theory

Maximum Marks: 40 | Suggested time: 60 minutes

Use after attempting the paper. Accept equivalent correct methods.

Suggested mark allocation:

1 mark: Correct fact, formula, unit or direction.

2 marks: Principle/formula (1); explanation, working or result (1).

3 marks: Relation (1); working/reasoning (1); final result and unit (1).

4 marks: Principle (1); setup/equation (1); working (1); result/interpretation (1).

Mark splits are a guide; award partial credit for valid steps.

Q1 - 1 mark

Negligible molecular volume and forces except during elastic collisions.

Q2 - 1 mark

$pV = nRT$.

Q3 - 1 mark

$3k_{BT}/2$.

Q4 - 1 mark

Molecular momentum transfer to walls.

Q5 - 1 mark

Three translational.

Q6 - 1 mark

It increases.

Q7 - 1 mark

$3R/2$.

Q8 - 1 mark

$\sqrt{3RT/M}$.

Q9 - 2 marks

Doubles.

Q10 - 2 marks

About 300 K.

Q11 - 2 marks

approx 6.21×10^{-21} J.

Q12 - 2 marks

2.

Q13 - 2 marks

$3nRT/2$.

Q14 - 2 marks

Negligible particle volume and negligible intermolecular forces except collisions.

Q15 - 3 marks

approx 517 m/s.

Q16 - 3 marks

approx 249 J.

Q17 - 3 marks

One-third.

Q18 - 3 marks

Three translational modes contribute $3k_{BT}/2$ per molecule.

Q19 - 4 marks

Lighter gas speed is twice as high.

Q20 - 4 marks

$U = (5/2)(2)(8.31)(300) = 24,930$ J approx 24.9 kJ.