

# Gas laws and particle motion

AP Chemistry · Test

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Class: \_\_\_\_\_ Mark: \_\_\_\_ / 20

This test lasts 45 minutes and is worth 20 points. Use  $R = 8.314 \text{ L}\cdot\text{kPa}/(\text{mol}\cdot\text{K})$ , show every substitution with units and convert temperatures to kelvin. For explanations, link your answer to the motion of particles.

**Level:** AP Chemistry · **Curriculum:** AP Chem Unit 3

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

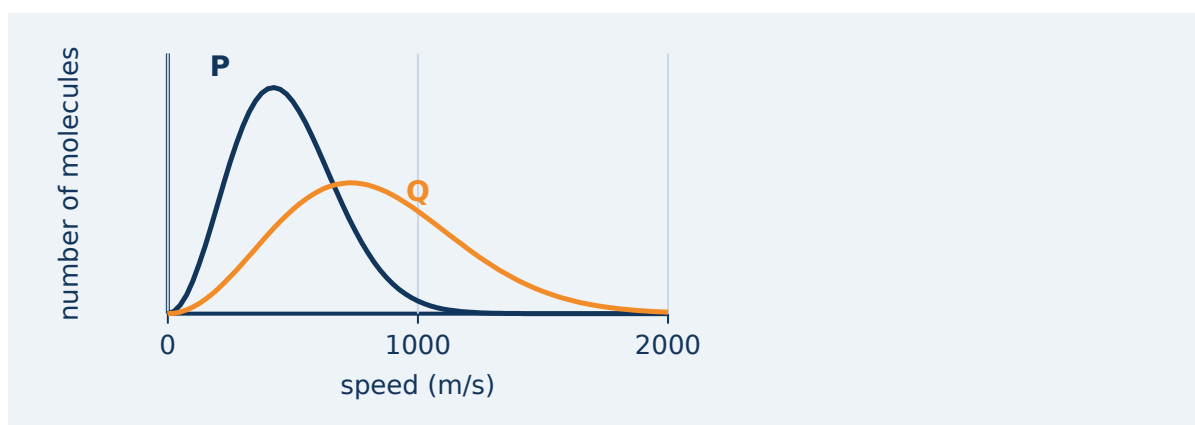
## Question 1 Gas law basics (2 marks)

A fixed amount of gas has a volume of 8.0 L at 150 kPa. Calculate the volume at 400 kPa and the same temperature.

## Question 2 Ideal gas law (3 marks)

Calculate the amount of gas in a 2.50 L container at 200 kPa and 27 °C.

## Question 3 Speed distribution (4 marks)



Speeds of molecules at two temperatures.

- Identify which curve is at the higher temperature. (1 mark)
- Explain two differences between the curves. (2 marks)
- State what happens to the area under Q if the number of molecules doubles. (1 mark)

**Question 4 Total pressure of a mixture** (2 marks)

A 5.00 L container at 300 K holds 0.200 mol He and 0.300 mol Ne. Calculate the total pressure.

**Question 5 Partial pressure of helium** (2 marks)

For the same mixture (0.200 mol He, 0.300 mol Ne, total pressure 249 kPa), calculate the partial pressure of helium.

**Question 6 Why gases deviate** (3 marks)

Explain why a real gas deviates from ideal behaviour at high pressure and at low temperature.

**Question 7 Molar mass** (2 marks)

A gas of mass 0.800 g occupies 0.500 L at 100 kPa and 300 K. Calculate its molar mass.

**Question 8 Gas over water** (2 marks)

Explain why the vapour pressure of water must be subtracted from the total pressure when gas is collected over water.