IB Chemistry HL - S1.5

Ideal gases

Exercises + Practice questions

Official answers appended at the end

Exercise

Q1. The volume of an ideal gas in a container is increased at constant temperature. What happens as a result of this change?

A The frequency of collisions of the molecules with the container wall decreases.

B The intermolecular force between the molecules decreases.

C The speed of the particles increases.

D The volume of a gas particle increases.

Q2. Identify an assumption of the ideal gas model.

A Molecules have zero mass.

B The forces between the molecules of the gas and the container are always zero.

C Collisions between molecules and the walls of the container are elastic.

D The kinetic energy of a given molecule of the gas is constant.

Q3. The temperature of a closed gas container is increased. What happens to the pressure and average speed of the particles?

	Pressure	Average speed
A	increases	faster
B	decreases	faster
C	increases	no change in speed
D	decreases	no change in speed

Q4. Which of the following are assumptions of the kinetic model of ideal gases?

I. Particles are perfectly elastic spheres.

II. The interactions between the particles are negligible when not colliding.

III. The particles are in continuous random motion.

A I and II **B** I and III **C** II and III **D** I, II and III

Q5. Why does the pressure of an ideal gas change when the temperature is increased?

A The particles collide with each other more frequently.

B The time of contact between the molecules and the wall is reduced.

C The force of attraction between the molecules is reduced.

D The particles collide with the walls of the container more frequently.

Q6. Identify which of the four assumptions listed on page 122 applies to a monatomic gas.

Exercise

Q7. Gases deviate from ideal gas behaviour because their particles:

A have negligible volume **B** have forces of attraction between them

C are polyatomic **D** are not attracted to one another

Q8. **(a)** List the main features of the kinetic theory for ideal gases.

(b) Explain the reason for the difference in behaviour between real and ideal gases at low temperature.

Q9. Under what conditions of temperature and pressure are real gases likely to behave like ideal gases?

explode.

Exercise

Q10. Which two values of temperature are equivalent (to the nearest degree) when measured on the Kelvin and Celsius scales?

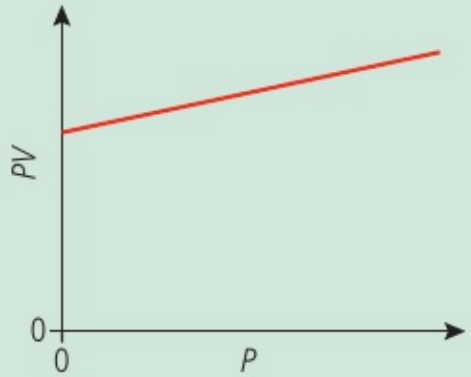
	Kelvin scale	Celsius scale
A	25	298
B	50	323
C	283	110
D	323	50

Q11. An ideal gas in a container of fixed volume at a temperature of 27 °C and a pressure of 4.0 atm is heated. Determine the new pressure when the temperature is increased by 300 °C.

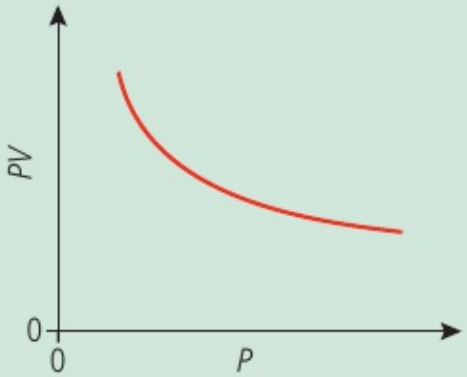
A 0.44 atm **B** 2.0 atm **C** 8.0 atm **D** 44 atm

Q12. The volume V for a fixed mass of an ideal gas was measured at constant temperature and different pressures P. Identify the graph that shows the correct relationship.

A



B



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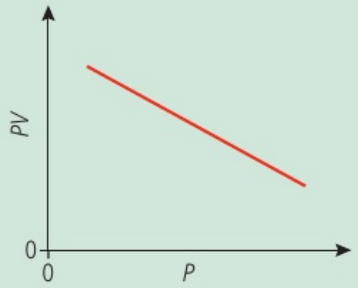
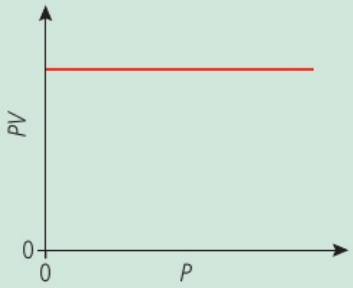


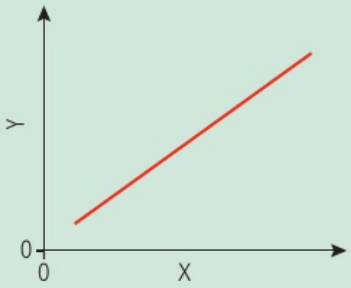
D



Q13. A 200 cm^3 container contains a gas at 15 °C and 1.0×10^5 Pa. The gas is then heated to 160 °C. Deduce the new pressure of the gas.

A 1.1×10^5 Pa **B** 1.5×10^5 Pa **C** 1.1×10^4 Pa **D** 1.5×10^4 Pa

Q14. The graph shows the experimental relationship between two properties of a constant amount of a gas.



Identify X and Y and the control variable.

	X	Y	Control variable
A	pressure (atm)	volume (dm^3)	temperature
B	temperature (°C)	pressure (Pa)	volume
C	temperature (°C)	volume (m^3)	pressure
D	1/pressure (Pa^{-1})	volume (cm^3)	temperature

Q15. A student investigated the relationship between temperature and pressure of a gas and produced a graph of their results.