

APOLLO

Gas laws

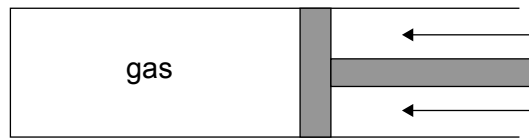
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Physics

First assessment 2025

9 questions | questions

9. An ideal gas is held in a cylinder by a piston. The piston compresses the gas rapidly.



The average speed of the gas molecules increases because the gas molecules...

- A. have a smaller volume available in which they can move.
- B. receive thermal energy transferred from outside the cylinder.
- C. receive energy from the piston as they collide with it.
- D. make more collisions every second with each other.

8. A gas is held in a container. An identical container holds the same number of more massive molecules of another gas at the same temperature.

What is true about the density and pressure in both containers?

	Density in both containers	Pressure in both containers
A.	same	same
B.	same	different
C.	different	same
D.	different	different

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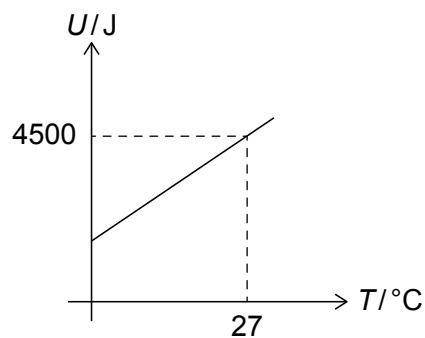
- 20.** Gases in the atmosphere are compounds of $^{12}_6\text{C}$, ^1_1H , $^{16}_8\text{O}$ and $^{14}_7\text{N}$.

Four of these gases are CO_2 , N_2O , CH_4 and H_2O . A pure sample of each gas is produced. Each sample has the same volume, pressure, and temperature.

Which sample has the smallest mass?

- A. CH_4
- B. N_2O
- C. CO_2
- D. H_2O

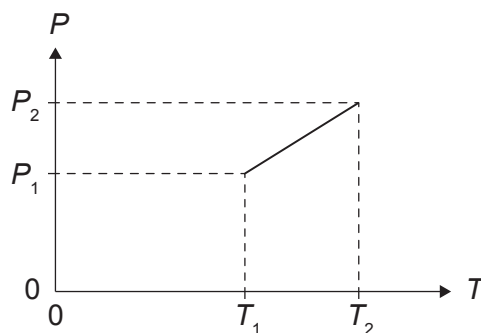
10. The graph shows the variation of the internal energy U with temperature T for a sample of an ideal monatomic gas. R is the gas constant.



How many moles of the gas are in the sample?

- A. $\frac{500}{3R}$
- B. $\frac{15}{R}$
- C. $\frac{1000}{9R}$
- D. $\frac{10}{R}$

10. A sample of n moles of an ideal gas is kept at a constant volume. The graph shows how the pressure P of the gas varies with absolute temperature T .



What is the volume of the gas?

- A. $nR \frac{T_2 - T_1}{P_2 - P_1}$
- B. $nR \frac{P_2 - P_1}{T_2 - T_1}$
- C. $nR \left(\frac{T_2}{P_2} - \frac{T_1}{P_1} \right)$
- D. $nR \left(\frac{P_2}{T_2} - \frac{P_1}{T_1} \right)$

11. Two containers are filled with monatomic gas of equal mass at the same temperature. One container holds helium and the other neon.

The mass of a neon atom is five times the mass of a helium atom.

What is $\frac{\text{internal energy of the helium gas}}{\text{internal energy of the neon gas}}$?

- A. $\frac{1}{5}$
- B. 1
- C. $\sqrt{5}$
- D. 5

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9. A rigid vessel of volume V contains N molecules of an ideal monatomic gas. The average kinetic energy of the molecules is E_k . What is the pressure in the vessel?

- A. $\frac{2N}{3VE_k}$
- B. $\frac{2NE_k}{3V}$
- C. $\frac{3N}{2VE_k}$
- D. $\frac{3NE_k}{2V}$

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7. The internal energy of a real gas is
- A. zero.
 - B. equal to the intermolecular potential energy of the particles.
 - C. equal to the total kinetic energy of the particles.
 - D. equal to the sum of the intermolecular potential energy and the total kinetic energy of the particles.

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12. Two containers, X and Y, are filled with an ideal gas at the same pressure.

The volume of X is four times the volume of Y. The temperature of X is 327°C and the temperature of Y is 27°C .

What is $\frac{\text{amount of substance in X}}{\text{amount of substance in Y}}$?

- A. $\frac{1}{8}$
- B. $\frac{1}{2}$
- C. 2
- D. 8

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