

14

THE BEHAVIOR OF GASES

Chapter Test A

A. Matching

Match each description in Column B with the correct term in Column A. Write the letter of the correct description on the line.

Column A	Column B
_____ 1. ideal gas constant (R)	a. The volume of a fixed mass of gas is directly proportional to the Kelvin temperature if the volume is kept constant.
_____ 2. Boyle's law	b. At constant volume and temperature, the total pressure exerted by a mixture of gases is equal to the sum of the partial pressures of the component gases.
_____ 3. Dalton's law of partial pressures	c. $8.31 \frac{\text{L}\cdot\text{kPa}}{\text{K}\cdot\text{mol}}$
_____ 4. ideal gas law	d. the contribution each gas in a mixture makes to the total pressure
_____ 5. combined gas law	e. A gas tends to move to an area of lower concentration until the concentration is uniform throughout.
_____ 6. Charles's law	f. $\frac{P_1 \times V_1}{T_1} = \frac{P_2 \times V_2}{T_2}$
_____ 7. diffusion	g. $P \times V = n \times R \times T$
_____ 8. partial pressure	h. For a given mass of gas at constant temperature, the volume of gas varies inversely with the pressure.

B. Multiple Choice

Choose the best answer and write its letter on the line.

- _____ 9. As the temperature of a fixed volume of gas increases, the pressure will
- | | |
|--------------------|------------------|
| a. vary inversely. | c. be unchanged. |
| b. decrease. | d. increase. |
- _____ 10. A breathing mixture used by deep-sea divers contains helium, oxygen, and carbon dioxide. What is the partial pressure of oxygen at 101.3 kPa total pressure if $P_{\text{He}} = 84.0 \text{ kPa}$ and $P_{\text{CO}_2} = 0.10 \text{ kPa}$?
- | | |
|-------------|--------------|
| a. 10.3 kPa | c. 34.4 kPa |
| b. 17.2 kPa | d. 185.4 kPa |

- _____ 11. Increasing the volume of a given amount of gas at constant temperature causes the pressure to decrease because
- the molecules are striking a larger area with the same force.
 - there are fewer molecules.
 - the molecules are moving more slowly.
 - there are more molecules.
- _____ 12. When a container is filled with 3.00 mol of H_2 , 2.00 mol of O_2 , and 1.00 mol of N_2 , the pressure in the container is 465 kPa. The partial pressure of O_2 is
- 78 kPa.
 - 116 kPa.
 - 155 kPa.
 - 212 kPa.
- _____ 13. A box with a volume of 22.4 L contains 1.0 mol of nitrogen and 2.0 mol of hydrogen at $0^\circ C$. Which of the following statements is true?
- The total pressure in the box is 202.6 kPa.
 - The partial pressure of N_2 and H_2 are equal.
 - The total pressure is 101.3 kPa.
 - The partial pressure of N_2 is 101.3 kPa.
- _____ 14. The volume of a gas is doubled while the temperature is held constant. The pressure of the gas
- remains unchanged.
 - is reduced by one half.
 - is doubled.
 - depends on the kind of gas.
- _____ 15. As the temperature of the gas in a balloon decreases
- the volume increases.
 - the pressure increases.
 - the average kinetic energy of the gas particles decreases.
 - All of the above are true.
- _____ 16. The volume of a gas is increased from 0.5 L to 4.0 L while the temperature is held constant. The pressure of the gas
- increases by a factor of four.
 - decreases by a factor of eight.
 - increases by a factor of eight.
 - increases by a factor of two.
- _____ 17. A gas occupies 40.0 mL at $-123^\circ C$. What volume does it occupy at $27^\circ C$, assuming pressure is constant?
- 182 mL
 - 8.80 mL
 - 80.0 mL
 - 20.0 mL
- _____ 18. A gas occupies a volume of 0.2 L at 25 kPa. What volume will the gas occupy at 2.5 kPa?
- 4 L
 - 20 L
 - 2 L
 - 0.02 L
- _____ 19. Which of these changes would *not* cause an increase in the pressure of a contained gas?
- Another gas is added to the container.
 - Additional amounts of the same gas are added to the container.
 - The temperature is increased.
 - The gas is moved to a larger container.

- _____ 20. If a balloon containing 1000 L of gas at 50°C and 101.3 kPa rises to an altitude where the pressure is 27.5 kPa and the temperature is 10°C, its volume there is

a. $1000 \text{ L} \times \frac{27.5 \text{ kPa}}{101.3 \text{ kPa}}$

c. $1000 \text{ L} \times \frac{27.5 \text{ kPa}}{101.3 \text{ kPa}} \times \frac{323 \text{ K}}{283 \text{ K}}$

b. $1000 \text{ L} \times \frac{283 \text{ K}}{323 \text{ K}} \times \frac{101.3 \text{ kPa}}{27.5 \text{ kPa}}$

d. $1000 \text{ L} \times \frac{50^\circ\text{C}}{10^\circ\text{C}} \times \frac{101.3 \text{ kPa}}{27.5 \text{ kPa}}$

C. Problems

Solve the following problems in the space provided. Show your work.

21. A gas has a pressure of 655 kPa at 227°C. What will its pressure be at 27°C if the volume does not change?
22. A 10-g mass of krypton occupies 15.0 L at a pressure of 156 kPa. Find the volume of the krypton when the pressure is increased to 215 kPa at the same temperature.
23. A gas occupies a volume of 180 mL at 35.0°C and 95.9 kPa. What is the volume of the gas at conditions of STP?
24. A gas has a volume of 550 mL at a temperature of -55.0°C. What volume will the gas occupy at 30.0°C, assuming constant pressure?