

# 12 • Gases and Their Properties

## PRACTICE TEST

- Which of the following represents the largest gas pressure?
  - 5.0 torr
  - 5.0 mmHg
  - 5.0 atm
  - 5.0 kPa
  - 5.0 psi
- A mixture of the gases neon and krypton is in a 2.00 Liter container. The partial pressure of the neon is 0.40 atm and the partial pressure of the krypton is 1.20 atm. What is the mole fraction of neon?
  - 0.20
  - 0.25
  - 0.33
  - 0.60
  - 0.80
- If the volume of a confined gas is doubled while the temperature remains constant, what change (if any) would be observed in the pressure?
  - It would be half as large.
  - It would double.
  - It would be four times as large.
  - It would be  $\frac{1}{4}$  as large.
  - It would remain the same.
- A given mass of a gas in a rigid container is heated from 100°C to 500°C. Which of the following responses best describes what will happen to the pressure of the gas? The pressure will
  - decrease by a factor of five.
  - increase by a factor of five.
  - increase by a factor of about two.
  - increase by a factor of about eight.
  - increase by a factor of about twenty-five.
- A gas occupies a volume of 1.50 L at 400 mmHg and 100 °C. Which mathematical expression gives the correct volume at 700 mmHg and 200°C?
  - $1.50 \times \frac{400}{700} \times \frac{373}{473}$
  - $1.50 \times \frac{400}{700} \times \frac{473}{373}$
  - $1.50 \times \frac{700}{400} \times \frac{373}{473}$
  - $1.50 \times \frac{700}{400} \times \frac{473}{373}$
  - $1.50 \times \frac{400}{700} \times \frac{200}{100}$
- A 4.50 L flask of Ar at 23°C and 734 torr is heated to 55°C. What is the new pressure?
  - 366 torr
  - 935 torr
  - 1.25 torr
  - 1.07 atm
  - 2.58 atm
- At what temperature will 41.6 grams N<sub>2</sub> exert a pressure of 815 torr in a 20.0 L cylinder?
  - 134 K
  - 176 K
  - 238 K
  - 337 K
  - 400 K
- When 0.34 moles of He are mixed with 0.51 moles of Ar in a flask, the total pressure in the flask is found to be 5.0 atm. What is the partial pressure of Ar in this flask?
  - 0.85 atm
  - 1.5 atm
  - 2.0 atm
  - 3.0 atm
  - 5.0 atm

9. Which of the following gases has the greatest density at  $0^{\circ}\text{C}$  and 1 atm?
- a)  $\text{N}_2$                       d) Ne  
b)  $\text{O}_2$                       e) CO  
c)  $\text{F}_2$
10. What is the density of  $\text{CH}_4$  at  $200^{\circ}\text{C}$  and 0.115 atm?
- a) 0.0475 g/L              d) 0.870 g/L  
b) 0.0716 g/L              e) 2.09 g/L  
c) 0.542 g/L
11. What is the molar mass of a gas which has a density of 1.30 g/L measured at  $27^{\circ}\text{C}$  and 0.400 atm?
- a) 38.0 g/mol              d) 80.0 g/mol  
b) 48.0 g/mol              e) 97.5 g/mol  
c) 61.5 g/mol
12. Non-ideal behavior for a gas is most likely to be observed under conditions of
- a) standard temperature and pressure.  
b) low temperature and high pressure.  
c) low temperature and low pressure.  
d) high temperature and high pressure.  
e) high temperature and low pressure.
13. Which of the following gases effuses at the highest rate?
- a)  $\text{N}_2$                       d) Ne  
b)  $\text{O}_2$                       e) CO  
c)  $\text{F}_2$
14. The empirical formula of a certain hydrocarbon is  $\text{CH}_2$ . When 0.125 moles of this hydrocarbon is completely burned with excess oxygen, it is observed that 8.40 Liters of  $\text{CO}_2$  gas are produced at STP. What is the molecular formula of the unknown hydrocarbon?
- a)  $\text{CH}_2$                       d)  $\text{C}_3\text{H}_6$   
b)  $\text{C}_2\text{H}_4$                       e)  $\text{C}_4\text{H}_8$   
c)  $\text{C}_2\text{H}_3$
15. Carbon dioxide gas diffuses through a porous barrier at a rate of 0.20 mL/minute. If an unknown gas diffuses through the same barrier at a rate of 0.25 mL/minute, what is the molar mass of the unknown gas?
- a) 28 g/mol                      d) 68 g/mol  
b) 35 g/mol                      e) 84 g/mol  
c) 39 g/mol
16. Which of the following statements is true?
- a) All particles moving with the same velocity have the same kinetic energy.  
b) All particles at the same temperature have the same kinetic energy.  
c) All particles having the same kinetic energy have the same mass.  
d) As the kinetic energy of a particle is halved, the velocity is also halved.  
e) As the velocity of a particle is doubled, the kinetic energy decreases by a factor of four.

# 12 • Gases and Their Properties

## TEST ANSWERS

Please use **CAPITAL** letters:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
  
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
  
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_
  
16. \_\_\_\_\_

### Useful Information

STP = 0°C = 273 K and

1 atm = 760 torr = 760 mmHg

= 101.3 kPa = 14.7 psi

= 14.7  $\frac{\text{lb}}{\text{in}^2}$

Ideal Gas Constant, R

= 62.4  $\frac{\text{L}\cdot\text{mmHg}}{\text{mol}\cdot\text{K}}$

= 0.0821  $\frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}$

= 8.31  $\frac{\text{L}\cdot\text{kPa}}{\text{mol}\cdot\text{K}}$

Boyle's Law

PV = constant

Charles' Law

$\frac{V}{T}$  = constant

Gay-Lussac's Law

$\frac{P}{T}$  = constant

Combined Gas Law

$\frac{PV}{T}$  = constant

Ideal Gas Law

PV = nRT

$$\frac{P_A}{P_{TOTAL}} = \frac{\text{moles}_A}{\text{moles}_{TOTAL}}$$

$$\text{KE} = \frac{1}{2} m \cdot v^2$$

$$\frac{\text{Velocity A}}{\text{Velocity B}} = \sqrt{\frac{\text{M.W. B}}{\text{M.W. A}}}$$