

12 • Gases and Their Properties

PRACTICE TEST

- A pressure of 745 mmHg corresponds to ____ kPa.
a) 55.89 kPa c) 99.3 kPa
b) 0.980 kPa d) 745 kPa
- Liquid nitrogen has a boiling point of $-196\text{ }^{\circ}\text{C}$ this corresponds to...
a) -469 K c) 153 K
b) 77 K d) 469 K
- 1.20 atm is the same pressure as:
a) 1.2 mmHg d) 850 mmHg
b) 760 mmHg e) 358 mmHg
c) 912 mmHg
- For an ideal gas, which pair of variables are inversely proportional to each other (if all other factors remain constant)?
a) P, V c) V, T
b) P, T d) n, P
- A real gas would act most ideal at
a) 1.0 atm and 273 K
b) 10 atm and 546 K
c) 10 atm and 273 K
d) 0.5 atm and 546 K
e) 0.5 atm and 273 K
- One mole of hydrogen, H_2 , occupies 61.2 L at
a) $100\text{ }^{\circ}\text{C}$ and 1.00 atm
b) $200\text{ }^{\circ}\text{C}$ and 1.00 atm
c) $0\text{ }^{\circ}\text{C}$ and 0.500 atm
d) $50\text{ }^{\circ}\text{C}$ and 0.500 atm
e) $100\text{ }^{\circ}\text{C}$ and $.500\text{ atm}$
- A 31.0 mL sample of gas is collected at a temperature of $37\text{ }^{\circ}\text{C}$ and pressure of 720 mmHg . What is its volume at $17\text{ }^{\circ}\text{C}$ and 580 mmHg .
a) 23 mL d) 41 mL
b) 27 mL e) 58 mL
c) 36 mL
- The coldest possible temperature of a gas is:
a) $0\text{ }^{\circ}\text{C}$ b) 273 K c) -273 K d) $-273\text{ }^{\circ}\text{C}$
- The pressure of 4.0 L of an ideal gas in a flexible container is decreased to one-third of its original pressure and its absolute temperature is decreased by one-half. The volume then is
a) 1.0 L b) 4.0 L c) 6.0 L d) 8.0 L e) 24 L
- A given mass of gas in a rigid container is heated from $100\text{ }^{\circ}\text{C}$ to $300\text{ }^{\circ}\text{C}$. Which of the following best describes what will happen to the pressure of the gas? The pressure will...
a) decrease by a factor of three.
b) increase by a factor of three.
c) increase by a factor less than three.
d) decrease by a factor greater than three.
- What is the pressure exerted by some nitrogen gas collected in a tube filled with water on a day when the room temperature is $18.0\text{ }^{\circ}\text{C}$ and the room pressure is 750.0 mmHg ? [The partial pressure of water at $18\text{ }^{\circ}\text{C}$ is 15.5 mmHg .]
a) 15.5 mmHg d) 760.0 mmHg
b) 750.0 mmHg e) 732.0 mmHg
c) 734.5 mmHg

12. As the average kinetic energy of the molecules of a sample increases, the temperature of the sample
- decreases
 - increases
 - remains the same
13. If a gas that is confined in a rigid container is heated, the pressure of the gas will...
- increase
 - decrease
 - remain the same
14. A mixture of gases at 810 kPa pressure contains:
- 3.0 moles of oxygen gas,
 - 2.0 moles of helium gas, and
 - 4.0 moles of carbon dioxide gas.
- What is the partial pressure of helium gas, P_{He} .
- 405 kPa
 - 1620 kPa
 - 810 kPa
 - 81.0 kPa
 - 180 kPa
15. If a gas has a pressure of 2.0 atm, which one of the following equations will express its pressure after...
- the number of moles has been increased to three times the original amount,
 - the absolute temperature (K) has been reduced to half, and
 - the volume has been tripled?
- $P_2 = 2.0 \text{ atm} \times \frac{1}{3} \times \frac{2}{1} \times \frac{4}{1}$
 - $P_2 = 2.0 \text{ atm} \times \frac{3}{1} \times \frac{1}{2} \times \frac{1}{3}$
 - $P_2 = 2.0 \text{ atm} \times \frac{3}{1} \times \frac{2}{1} \times \frac{1}{3}$
 - $P_2 = 2.0 \text{ atm} \times \frac{1}{3} \times \frac{1}{4} \times \frac{3}{1}$
16. A sample of gas occupies 30.0 L at 0.800 atm and 298 K. How many moles of gas are in the sample?
- 22.4
 - 0.981
 - 1.02
 - 2.23
 - none of these
17. When ammonium nitrite undergoes decomposition, only gases are produced according to the equation:
- $$\text{NH}_4\text{NO}_2(\text{s}) \rightarrow \text{N}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$$
- What is the total volume of gases produced at 819K and 1.00 atm pressure when 128 g of ammonium nitrite undergoes the above decomposition reaction?
- _____
18. At STP, it was found that 1.12 L of a gas had a mass of 2.78 g. Its molar mass is
- 2.78 g/mol
 - 27.8 g/mol
 - 55.6 g/mol
 - 111 g/mol
19. A mixture of gases, nitrogen, oxygen, and carbon dioxide at 27 °C and 0.50 atmospheres pressure occupied a volume of 492 mL. How many moles of gas are there in this sample?
- 0.010
 - 1/9
 - 7.6
 - 10
20. At a given temperature, gaseous ammonia molecules (NH_3) have a velocity that is _____ gaseous sulfur dioxide molecules (SO_2).
- greater than
 - less than
 - equal to
 - more inf. needed
21. The ratio of the average velocities of $\text{SO}_2(\text{g})$ to $\text{CH}_4(\text{g})$ at 300 K is
- 1:4
 - 1:2
 - 4:1
 - 2:1
22. A sealed flask contains 1 molecule of hydrogen for every 3 molecules of helium at 20 °C. If the total pressure is 400 kPa, the partial pressure of the hydrogen is...
- 100 kPa
 - 200 kPa
 - 300 kPa
 - 400 kPa

23. A given mass of a gas occupies 5.00 L at 65 °C and 480 mmHg. What is the volume of the gas at 630 mmHg and 85 °C?
- a) $5.00 \times \frac{65}{85} \times \frac{480}{630}$
- b) $5.00 \times \frac{338}{358} \times \frac{480}{630}$
- c) $5.00 \times \frac{358}{338} \times \frac{480}{630}$
- d) $5.00 \times \frac{358}{338} \times \frac{630}{480}$
- e) $5.00 \times \frac{338}{358} \times \frac{630}{480}$
24. Which statement best explains why a confined gas exerts pressure?
- a) the molecules are in random motion
- b) the molecules travel in straight lines
- c) the molecules attract each other
- d) the molecules collide with the container walls
25. CH₄ gas and O₂ gas are together in a container. Which statement correctly describes the **velocities** of the two molecules.
- a) The two molecules have the **same** average velocity.
- b) The CH₄ is moving **twice** as fast as the O₂.
- c) The CH₄ is moving **faster**, but **not twice as fast** as the O₂.
- d) The O₂ is moving **faster** than the CH₄.

12 • Properties of Gases

TEST ANSWERS

Please use CAPITAL letters:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

21. _____

22. _____

23. _____

24. _____

25. _____

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

Use the Formula Sheet from class.