Gas Laws

MULTIPLE CHOICE

1. What are standard temperature and pressure conditions for gases?

a. 0°C and 0 torr
b. 0 K and 760 torr
c. -273°C and 1 atm
d. 0°C and 760 torr
e. 0°C and 1 torr

2. If the volume of a confined gas is doubled while the temperature remains constant, what change (if any) would be observed in the pressure?

a. It would be half as large.
b. It would double.
c. It would be four times as large.
d. It would be 1/4 as large.
e. It would remain the same.

3. A given mass of 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?

a. The pressure will decrease by a factor of five.
b. The pressure will increase by a factor of five.
c. The pressure will increase by a factor of about two.
d. The pressure will increase by a factor of about eight.
e. The pressure will increase by a factor of about twenty-five.

4. Which of the following has the most molecules?

a. 1.00 L of CH_4 at 0°C and 1.00 atm
b. 1.00 L of N_2 at 0°C and 1.00 atm
c. 1.00 L of O_2 at 20°C and 1.00 atm
d. 1.00 L of CO_2 at 50°C and 1.25 atm
e. 1.00 L of CO at 0°C and 1.25 atm

5. Avogadro stated that equal volumes of gases under the same conditions of temperature and pressure have equal

a. numbers of molecules.
b. numbers of grams.
c. molar masses.
d. atoms.
e. speeds.

7. What volume of CH_4 at 0°C and 1.00 atm contains the same number of molecules as 0.50 L of N_2 measured at 27°C and 1.50 atm?

a. 0.37 L
b. 0.46 L
c. 0.68 L
d. 0.50 L
e. 0.82 L

8. If 3.0 L of helium at 20.0°C is allowed to expand to 4.4 L, with the pressure remaining the same, what is the new temperature?

a. 702°C
b. 430°C
c. 157°C
d. -30.0°C
e. -55°C

9. At what temperature will 41.6 grams N_2 exerts a pressure of 815 torr in a 20.0 L cylinder?

a. 134 K
b. 176 K
c. 238 K
d. 337 K
e. 400 K

10. When 7.00 grams of helium and 14.0 grams of argon were mixed in a flask, the pressure was measured as 712 torr. What is the partial pressure of the helium?

a. 593 torr
b. 356 torr
c. 833 torr
d. 1070 torr
e. 1420 torr

11. 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 mol fraction of neon?

a. 0.20
b. 0.25
c. 0.33
d. 0.60
e. 0.80

12. Which of the following gases has the greatest density at 0°C and 1 atm?

a. N_2
b. 0_2
c. F_2
d. Ne
e. CO

13. Calculate the density of SO_3 gas at 35¯C and 715 torr.

a. 0.0285 g/L
b. 1.43 g/L
c. 2.15 g/L
d. 2.98 g/L
e. 3.57 g/L

14. What is the molar mass of a gas which has a density of 1.30 g/L measured at 27°C and 0.400 atm?

a. 38.0 g/mol
b. 48.0 g/mol
c. 61.5 g/mol
d. 80.0 g/mol
e. 97.5 g/mol

15. What is the chemical formula of a gas if it has a pressure of 1.40 atm and a density of 1.82 g/L at 27°C?

a. CO_2
b. CO
c. CH_4
d. O_2
e. N_2

16. What volume of O_2, collected at 22.0°C and 728 mmHg would be produced by the decomposition of 8.15 g $KClO_3$?

$$2KClO_3(s) \rightarrow 2KCl(s) + 3\ O_2(g)$$

a. 1.12 L
b. 1.48 L
c. 1.68 L
d. 2.23 L
e. 2.52 L

17. Ammonia gas is synthesized according to the balanced equation

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$$

If 15.0 liters of nitrogen are reacted with an excess of hydrogen, how many liters of ammonia could be produced? Assume all gas volumes are measured at the same temperature and pressure.

a. 5.00 L
b. 10.0 L
c. 15.0 L
d. 20.0 L
e. 30.0 L

18. 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 0.313 mL/minute, what is the molar mass of the unknown
gas?

a. 28 g/mole
b. 35 g/mole
c. 39 g/mole
d. 68 g/mole
e. 84 g/mole

19. 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, its velocity is also halved.
e. As the velocity of a particle is doubled, the kinetic energy decreases by a factor of four.

20. At a particular temperature, which of the following molecules has an average velocity closest to that of ethylene, C_2H_4, at the same temperature?

a. N_2
b. CO_2
c. NO_2
d. O_2
e. CH_4

21. 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.

ANSWER KEY FOR TEST Gas Laws

1. d
2. a
3. c
4. e
5. a
7. c
8. c
9. b
10. a
11. b
12. c
13. d
14. d
15. d
16. e
17. e
18. a
19. b
20. a
21. b