

Dougherty Valley HS Chemistry  
BM #1 - Gases

- Gaseous chlorine is held in two separate containers at identical temperature and pressure. The volume of container 1 is 1.30 L and it contains 6.70 mol of the gas. The volume of container 2 is 2.66 L. How many moles of the gas are in container 2?
  - 13.7 mol
  - 23.2 mol
  - 0.516 mol
  - 3.27 mol
  - none of these
- A sample of helium gas occupies 15.2 L at 23°C and 0.956 atm. What volume will it occupy at 40°C and 1.20 atm?
  - 20.2 L
  - 21.1 L
  - 11.5 L
  - 12.8 L
  - 15.4 L
- What would happen to the average kinetic energy of the molecules of a gas sample if the temperature of the sample increased from 20°C to 40°C?
  - It would double.
  - It would increase.
  - It would decrease.
  - It would become half its value.
  - Two of these.
- Determine the partial pressure of the hydrogen gas in this mixture.
  - 562 torr
  - 580 torr
  - 598 torr
  - 616 torr
  - 634 torr

Use the following to answer questions 6-7:

Consider three 1-L flasks at STP. Flask A contains  $\text{NH}_3$  gas, flask B contains  $\text{NO}_2$  gas, and flask C contains  $\text{N}_2$  gas.

Use the following to answer questions 3-5:

Zinc metal is added to hydrochloric acid to generate hydrogen gas and is collected over a liquid whose vapor pressure is the same as pure water at 20.0°C (18 torr). The volume of the mixture is 1.7 L and its total pressure is 0.810 atm.

- Determine the number of moles of hydrogen gas present in the sample.
  - 42 mol
  - 0.82 mol
  - 1.3 mol
  - 0.056 mol
  - 22 mol
- Which contains the largest number of molecules?
  - flask A
  - flask B
  - flask C
  - all are the same
  - none

7. In which flask do the molecules have the highest average velocity?
- flask A
  - flask B
  - flask C
  - all are the same
  - none
8. A sample of oxygen gas has a volume of 2.07 L at 27°C and 800.0 torr. How many oxygen molecules does it contain
- $5.33 \times 10^{22}$
  - $4.05 \times 10^{25}$
  - $5.92 \times 10^{23}$
  - $6.80 \times 10^{24}$
  - none of these
9. Use the kinetic molecular theory of gases to predict what would happen to a closed sample of a gas whose temperature increased while its volume decreased.
- Its pressure would decrease.
  - Its pressure would increase.
  - Its pressure would hold constant.
  - The number of moles of the gas would decrease.
  - The average kinetic energy of the molecules of the gas would decrease.
10. A gaseous mixture containing 1.5 mol Ar and 3.5 mol CO<sub>2</sub> has a total pressure of 9.6 atm. What is the partial pressure of CO<sub>2</sub>?
- 2.9 atm
  - 1.8 atm
  - 22 atm
  - 6.7 atm
  - 9.6 atm
11. A glass column is filled with mercury and inverted in a pool of mercury. The mercury column stabilizes at a height of 747 mm above the pool of mercury. What is the pressure of the atmosphere?
- 1.02 atm
  - 0.747 atm
  - 0.983 atm
  - 474 atm
  - 0.655 atm
- Use the following to answer question 12:
- You have a 400-mL container containing 55.0% He and 45.0% Ar by mass at 25°C and 1.5 atm total pressure. You heat the container to 100°C.
12. Calculate the total pressure.
- 1.20 atm
  - 1.50 atm
  - 1.88 atm
  - 2.01 atm
  - none of these
13. Consider the following **unbalanced** equation:
- $$\text{C}_2\text{H}_5\text{OH}(g) + \text{O}_2(g) \rightarrow \text{CO}_2(g) + \text{H}_2\text{O}(l)$$
- 1.62 g of ethanol reacts with oxygen. What is the **total** volume of gas present (in L) after the reaction is complete, assuming the reaction takes place at 1.00 atm and 25°C?
- 0.559 L
  - 9.32 L
  - 4.19 L
  - 6.44L
  - 1.68 L

14. Which of the following is *not* an assumption of the kinetic molecular theory for a gas?
- A) Gases are made up of tiny particles in constant chaotic motion.
  - B) Gas particles are very small compared to the average distance between the particles.
  - C) Gas particles collide with the walls of their container in elastic collisions.
  - D) The average velocity of the gas particles is directly proportional to the absolute temperature.
  - E) All of the above are correct.
15. Which conditions of  $P$ ,  $T$ , and  $n$ , respectively, are most ideal?
- A) high  $P$ , high  $T$ , high  $n$
  - B) low  $P$ , low  $T$ , low  $n$
  - C) high  $P$ , low  $T$ , high  $n$
  - D) low  $P$ , high  $T$ , high  $n$
  - E) low  $P$ , high  $T$ , low  $n$
16. What volume does 48.1 g of  $N_2$  occupy at STP?
- A) 76.9 L
  - B) 2.15 L
  - C) 38.5 L
  - D) 534 L
  - E) none of these
17. It is found that 250. mL of a gas at STP has a mass of 1.44 g. What is the molar mass?
- A) 129 g/mol
  - B) 5.76 g/mol
  - C) 11.2 g/mol
  - D) 22.4 g/mol
  - E) 62.2 g/mol

Use the following to answer question 18:

Three 1.00-L flasks at 25°C and 725 torr contain the gases  $CH_4$  (flask A),  $CO_2$  (flask B), and  $C_2H_6$  (flask C).

18. In which flask is there 0.039 mol of gas?
- A) flask A
  - B) flask B
  - C) flask C
  - D) all
  - E) none
19. A 7.73-g piece of solid  $CO_2$  (dry ice) is allowed to sublime in a balloon. The final volume of the balloon is 1.00 L at 300. K. What is the pressure of the gas?
- A) 4.32 atm
  - B) 190 atm
  - C) 3.18 atm
  - D) 0.231 atm
  - E) none of these
20. Which of the following is true about the kinetic molecular theory?
- A) The volume of a gas particle is considered to be small – about 0.10 mL.
  - B) Pressure is due to the collisions of the gas particles with the walls of the container.
  - C) Gas particles repel each other, but do not attract one another.
  - D) Adding an ideal gas to a closed container will cause an increase in temperature.
  - E) At least two of the above statements are correct.

## Answer Key

1. A
2. D
3. D
4. B
5. C
6. D
7. A
8. A
9. B
10. D
11. C
12. C
13. D
14. D
15. E
16. C
17. A
18. D
19. A
20. B