

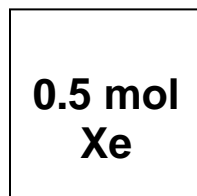
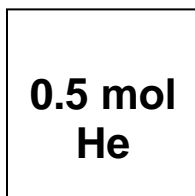
- Perform the following conversions of pressure units:  
 $1.6 \times 10^5$  torr = \_\_\_\_\_ atm  
[A]  $3.2 \times 10^2$     [B]  $4.6 \times 10^2$     [C]  $3.2 \times 10^3$     [D]  $2.1 \times 10^2$     [E]  $2.1 \times 10^3$
- A sample of helium gas occupies 2.65 L at 1.20 atm. What pressure would this sample of gas exert in a 1.50-L container at the same temperature?  
[A] 3.31 atm    [B] 1.20 atm    [C] 2.12 atm    [D] 0.679 atm    [E] none of these
- A sample of helium gas occupies 12.4 L at 23°C and 0.956 atm. What volume will it occupy at 40°C and 0.956 atm?  
[A] 7.13 L    [B] 11.7 L    [C] 21.6 L    [D] 13.1 L    [E] none of these
- A balloon has a volume of 1.20 L at 24.0°C. The balloon is heated to 48.0°C. Calculate the new volume of the balloon.  
[A] 2.40 L    [B] 1.70 L    [C] 1.30 L    [D] 2.10 L    [E] 1.20 L
- If the temperature of an ideal gas is raised from 100°C to 200°C, while the pressure remains constant, the volume  
[A] remains the same    [B] doubles    [C] goes to 1/2 the original volume  
[D] increases by a factor of 100    [E] none of these
- A 4.37-g sample of a certain diatomic gas occupies a volume of 3.00 L at 1.00 atm and a temperature of 45°C. Identify this gas.  
[A] O<sub>2</sub>    [B] F<sub>2</sub>    [C] Cl<sub>2</sub>    [D] H<sub>2</sub>    [E] N<sub>2</sub>
- What do the initials STP stand for, and what are the numerical values of each?
- What is the numerical value of the molar volume of any gas at STP?
- An oxygen sample has a volume of 4.50 L at 27°C and 800.0 torr. How many oxygen molecules does it contain?  
[A]  $5.8 \times 10^{22}$     [B]  $1.16 \times 10^{22}$     [C]  $1.16 \times 10^{23}$   
[D]  $2.32 \times 10^{24}$     [E] none of these
- Mercury vapor contains Hg atoms. What is the volume of 200. g of mercury vapor at 822 K and 0.500 atm?  
[A] 82.2 L    [B] 67.2 L    [C] 329 L    [D] 135 L    [E] none of these

11. 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.  
[A] 0.056 mol    [B] 42 mol    [C] 22 mol    [D] 1.3 mol    [E] 0.82 mol
12. A vessel with an internal volume of 10.0 L contains 2.80 g of nitrogen gas, 0.403 g of hydrogen gas, and 79.9 g of argon gas. At 25°C, what is the pressure (in atm) inside the vessel?  
[A] 2.38 atm    [B] 6.43 atm    [C] 0.471 atm    [D] 3.20 atm    [E] 5.62 atm
13. 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?  
[A] It would double.    [B] It would become half its value.  
[C] It would decrease.    [D] It would increase.    [E] two of these
14. Which conditions of  $P$  and  $T$  are most ideal for a gas?  
[A] low  $P$ , high  $T$     [B] high  $P$ , low  $T$     [C] high  $P$ , high  $T$   
[D] depends on the gas    [E] low  $P$ , low  $T$
15. An ideal gas is a hypothetical substance consisting of particles with \_\_\_\_\_ volume and \_\_\_\_\_ attraction for one another.  
[A] large; strong    [B] small; weak    [C] zero; no  
[D] small; strong    [E] large; weak
16.  $C_2H_4$  reacts with  $O_2$  according to the following equation:  
 $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(g)$   
What volume of oxygen at STP is needed to react with 1.50 mol of  $C_2H_4$ ?  
[A] 33.6 L    [B] 67.2 L    [C] not enough information given  
[D] 4.50 L    [E] 101 L
17. Given the equation  
 $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$   
A 3.00-g sample of  $KClO_3$  is decomposed and the oxygen at 24.0°C and 0.982 atm is collected. What volume of oxygen gas will be collected assuming 100% yield?  
[A] 608 mL    [B] 911 mL    [C] 1820 mL    [D] 304 mL    [E] none of these

18. Describe the relationship between the following variables, including graphs.

- a. P and V
- b. V and T
- c. P and T

19. These two containers of gas contain 0.5 moles of gas each (not necessarily drawn to scale):



Both gases have a temperature of 93.8 K and have a pressure of 132 kPa.

- a. Which box contains more molecules? How many times more?
- b. Which gas has the greater volume? How many times greater?
- c. Which gas has the greater mass? How many times greater?

[1] [D]

[2] [C]

[3] [D]

[4] [C]

[5] [E]

[6] [B]

[7] standard temperature = 273 K  
pressure = 1 atm

[8] 22.4 L/mol

[9] [C]

[10] [D]

[11] [A]

[12] [E]

[13] [D]

[14] [A]

[15] [C]

[16] [E]

[17] [B]