

## Gases Practice Questions

### Multiple Choice

1. A mixture of methane and helium is placed in a 2.0 L flask at 27°C. The partial pressure of CH<sub>4</sub> is 0.72 atm and the partial pressure of helium is 0.22 atm. What is the mole fraction of methane?  
a. 0.23      b. 0.29      c. 0.50      d. 0.77      e. 3.5
2. Ammonia gas is produced commercially from the reaction of nitrogen and hydrogen. What volume of ammonia can be produced from the reaction of  $5.5 \times 10^3$  kg of N<sub>2</sub> and  $1.5 \times 10^3$  kg of H<sub>2</sub>? Assume the reaction is 100% efficient and the product is collected at 325 K and 25 atm.  
$$\text{N}_2(g) + 3\text{H}_2(g) \rightarrow 2\text{NH}_3(g)$$
  
a.  $7.0 \times 10^3$  L    b.  $1.4 \times 10^4$  L    c.  $1.8 \times 10^4$  L    d.  $4.2 \times 10^5$  L    e.  $5.2 \times 10^5$  L
3. If a gas effuses 1.73 times faster than Kr, what is its molar mass?  
a. 16.0 g/mol    b. 28.0 g/mol    c. 36.6 g/mol    d. 55.4 g/mol    e. 126.9 g/mol
4. Sulfur burns in oxygen with a deep blue flame to produce sulfur dioxide. If 5.85 g S<sub>8</sub> and 1.00 atm of O<sub>2</sub> completely react in a 5.00 L flask (at 25°C), determine the partial pressure of SO<sub>2</sub> (at 25°C) and the total pressure in the flask.  $\text{S}_8(s) + 8\text{O}_2(g) \rightarrow 8\text{SO}_2(g)$   
a. O<sub>2</sub> = 0 atm, SO<sub>2</sub> = 1.00 atm, total pressure = 1.00 atm  
b. O<sub>2</sub> = 0.093 atm, SO<sub>2</sub> = 0.917 atm, total pressure = 1.00 atm  
c. O<sub>2</sub> = 0.107 atm, SO<sub>2</sub> = 0.893 atm, total pressure = 1.00 atm  
d. O<sub>2</sub> = 0.855 atm, SO<sub>2</sub> = 0.145 atm, total pressure = 1.00 atm  
e. O<sub>2</sub> = 0.917 atm, SO<sub>2</sub> = 0.163 atm, total pressure = 1.08 atm
5. A mass of 5.0 grams of dry ice, CO<sub>2</sub>(s), is sealed in an evacuated 2.0 L plastic soda bottle. What is the pressure inside the bottle when the CO<sub>2</sub> is heated to 35°C?  
a. 0.16 atm    b. 1.4 atm    c. 8.9 atm    d. 18 atm    e. 63 atm
6. At a given temperature, molecules of different gases  
a. have the same average kinetic energy.    d. have the same density.  
b. have the same average velocity.    e. have identical masses.  
c. have the same diameter.
7. An unknown mass of ammonium perchlorate, NH<sub>4</sub>ClO<sub>4</sub>, is placed in an evacuated 1.00 L flask and heated to 251°C. At this temp. the NH<sub>4</sub>ClO<sub>4</sub> decomposes violently. The gaseous products exert a pressure of 466 mmHg at 251°C. What mass of NH<sub>4</sub>ClO<sub>4</sub> was placed in the flask?  $2\text{NH}_4\text{ClO}_4(s) \rightarrow \text{N}_2(g) + \text{Cl}_2(g) + 2\text{O}_2(g) + 4\text{H}_2\text{O}(g)$   
a. 0.149 g    b. 0.419 g    c. 0.682 g    d. 1.67 g    e. 3.19 g
8. In an experiment, argon is allowed to effuse through a tiny opening into an evacuated 5.00x10<sup>2</sup> mL flask for 30.0s, at which point the pressure in the flask is found to be 15.0mmHg. This is repeated using an unknown gas at the same temperature and pressure. After 30.0s, the pressure is found to be 47.4mmHg. What is its molar mass?  
a. 4.00 g/mol    b. 16.0 g/mol    c. 28.0 g/mol    d. 32.0 g/mol    e. 83.8 g/mol
9. 25.0L of H<sub>2</sub> at 50.0atm and 25°C expands to 65.0L and is subsequently heated to 35°C. What is the new pressure?  
a. 19.9 atm    b. 25.2 atm    c. 26.9 atm    d. 28.4 atm    e. 31.2 atm
10. A 10.0 L flask is used to collect 0.500 moles of N<sub>2</sub> and 0.180 moles of O<sub>2</sub> over water at 30°C. What is the pressure in the flask? (vapor pressure H<sub>2</sub>O(l) = 31.8 mm Hg)  
a. -30.1 atm    b. 1.15 atm    c. 1.48 atm    d. 1.69 atm    e. 1.73 atm
11. Which conditions will cause the greatest deviation from the ideal gas law?  
a. 100 atm and 500 K    c. 0.001 atm and 500 K    e. 0.001 and 273 K  
b. 100 atm and 10 K    d. 0.001 and 10 K
12. What volume of O<sub>2</sub> at 22°C and 1.00atm contains the same number of molecules as 0.400L H<sub>2</sub> at 45°C and 1.00atm?  
a. 0.251 L    b. 0.298 L    c. 0.371 L    d. 0.400 L    e. 0.431 L