Mini Quiz Gases

ICE Y

1. Which statement comparing neon and argon (both in the gas phase at 25°C) is true? Assume both gases are ideal.

A. The most probable speed of neon atoms and argon atoms is the same.
B. The root-mean-square speed of neon atoms is greater than that of argon atoms.
C. The root-mean-square speed of argon atoms is greater than that of neon atoms.
D. The average kinetic energy of neon atoms is greater than that of argon atoms.
E. The average kinetic energy of argon atoms is greater than that of neon atoms.

2. The van der Waals equation is used to:

A. calculate the root-mean-square speed of a gas
B. determine the value of the absolute zero of temperature
C. calculate the most probable speed of a gas molecule
D. estimate the diffusion rate of an ideal gas
E. adjust the ideal gas equation so that it can be applied to real gases

3. Each of the following is a gas at STP. Which one has the greatest density at STP?

A. SiF_4 B. CH_3SH C. Rn D. HCN E. CH_2O

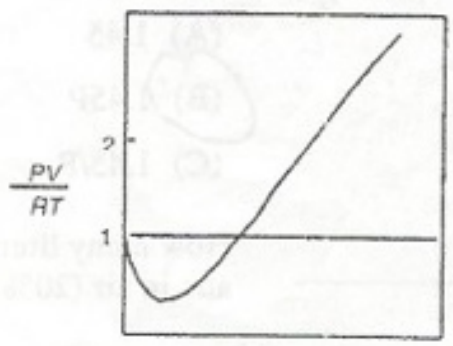
4. Nitrogen dioxide is formed according to the equation:

$$N_2(g) + 2O_2(g) \longrightarrow 2NO_2(g)$$

An empty 22.4 L flask at 273 K is charged with 10.0 mol of $N_2(g)$ and 10.0 mol of $O_2(g)$. What is the final pressure in the flask at the conclusion of the reaction?

A. 10.0 atm B. 12.5 atm C. 15.0 atm D. 17.5 atm E. 20.0 atm

5. The drawing on the right compares the behavior of a real gas (curved line) with an ideal gas (straight line). It is similar to one shown in the text and discussed in lecture. To what does the x-axis correspond?



A. pressure
B. volume

6. Which one of the following statements is **false**?

A. Ideal gases are compressible.
B. Ideal gases obey Boyle's Law.
C. At constant pressure, the volume occupied by a constant amount of an ideal gas is directly proportional to the temperature in kelvins.
D. At constant temperature, the average kinetic energy of the molecules of 1 mole of an ideal gas increases with increasing pressure.
E. At constant temperature, the pressure of a constant amount of an ideal gas is inversely proportional to its volume.

7. A mixture of the two gases carbon monoxide (CO) and carbon dioxide (CO_2) is placed in one compartment of a two-compartment container. The second compartment is evacuated and separated from the first by a porous barrier. How fast do the two gases pass through the barrier into the second compartment?

A. Carbon monoxide and carbon dioxide enter the second compartment at the same rate.
B. Carbon monoxide enters the second compartment times 1.25 faster than carbon dioxide.
C. Carbon dioxide enters the second compartment times faster 1.25 than carbon monoxide.
D. Carbon monoxide enters the second compartment times 1.6 faster than carbon dioxide.
E. Carbon dioxide enters the second compartment times 1.6 faster than carbon monoxide.

8. On a day when the barometric pressure is 740 mm Hg, what is the partial pressure of argon if the mole fraction of argon in the air is 0.00934?

A. 4.8 mm Hg B. 6.9 mm Hg C. 8.5 mm Hg D. 9.8 mm Hg E. 12.6 mm Hg

9. A sealed 50 mL flask contains only carbon dioxide (CO_2) at a pressure of 1000 torr. The temperature is 25°C. How much carbon dioxide is present?

A. 0.12 g B. 0.18 g C. 0.24 g D. 0.30 g E. 0.36 g

10. Cyanogen is a gas with a density of2.335 g/L at 0 °C and 1 atm. What is its molecular formula?

A. CN B. C_2N C. CN_2 D. C_2N_2 E. C_2N_3

11. A gas at 25°C occupies a 10 liter volume at P atm pressure. The gas is allowed to expand to a volume of 15 liters at 377°C. What is the new pressure?

(A) 1.45
(B) 1.45P
(C) 1.45/P
(D) 1.07
(E) 1.07/P

12. How many liters of air are needed to completely burn 1 mol of methane in air (20% oxygen) at STP according to the reaction

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O?$$

(A) 22.4
(B) 44.8
(C) 11.2
(D) 224
(E) 64.0

Mini Quiz 9a's

1) B

2) E

3) C

4) C $N_2 + 2O_2 \rightarrow 2NO_2$

start 10mol 10mol

End 5mol 0 10mol = 15mol

$$P = \frac{(15\text{mol})(.0821\ \text{L atm/mol K})(273\text{K})}{22.4\text{L}} = 15\text{ atm}$$

5) A

6) D

7) B $\frac{\text{rate CO}}{\text{rate CO}_2} = \sqrt{\frac{44\text{g}}{28\text{g}}} = \sqrt{1.57} = 1.25$

8) B $P_{Ar} = X_{Ar} P_T = (740\text{ mmHg})(.00934)$

$= 6.9\text{ mmHg}$

9. A $n = \frac{PV}{RT} = \frac{\left(\frac{1000\ mmHg}{760\ mmHg}\right)(.05L)}{\left(.0821\frac{L\,atm}{mol\,K}\right)(298K)}$

$= .0027\ mol\ CO_2$

10. D $n = \frac{PV}{RT} = \frac{(1atm)(1L)}{\left(.0821\frac{L\,atm}{mol\,K}\right)(273K)} = .044\frac{6}{mol}$

$\frac{2.335g}{.0446mol} = 52\ g/mol$ C_2N_2

11. B $P_2 = \frac{PVT_2}{TV_2} = \frac{(10L)(P)(650K)}{(15L)298K}$

$= 1.45P$

12. D

$1mol\ CH_4 \times \frac{2mol\ O_2}{1mol\ CH_4} \times \frac{1\ mol\ Air}{.2mol\ O_2} \times \frac{22.4L}{1mol} =$

224L of air