Multiple Choice: 4 points each

1) The maximum blood pressure that is reached in the arteries when the heart muscle contracts is
   A) standard pressure
   B) diastolic pressure
   C) systolic pressure
   D) the pulse
   E) boiling pressure

2) Which measurement describes the temperature of a gas?
   A) 2.5 L
   B) 0.45 moles
   C) 3.5 g/L
   D) 315 K
   E) 725 mm Hg

3) The unit of 1 atmosphere used to describe the pressure of a gas is equal to
   A) 100 mm Hg.
   B) 200 mm Hg.
   C) 600 mm Hg.
   D) 760 mm Hg.
   E) 1000 mm Hg.

4) What unit of temperature is used in gas law calculations?
   A) Kelvin
   B) Celsius
   C) either Celsius or Fahrenheit
   D) Fahrenheit
   E) either Celsius or Kelvin

5) A 5.00-L tank contains helium gas at 1.50 atm. What is the pressure of the gas in mm Hg?
   A) 1140 mm Hg
   B) 760 mm Hg
   C) 507 mm Hg
   D) 5.50 mm Hg
   E) 1.50 mm Hg

6) Which of the following correctly describes the process of inspiration (air entering the lungs)?
   A) The lungs expand, causing their internal pressure to increase.
   B) There is no change in the internal pressure in the lungs.
   C) The lungs expand, causing their internal pressure to decrease.
   D) The lungs contract, causing their internal pressure to decrease.
   E) The lungs contract, causing their internal pressure to increase.
7) The volume of a gas with a pressure of 1.2 atm decreases from 4.0 L to 1.0 L. What is the final pressure of the gas, assuming constant temperature?
   A) 0.3 atm   B) 1.0 atm   C) 1.2 atm   D) 3.3 atm   E) 4.8 atm

\[ P_1V_1 = P_2V_2 \]
\[ (1.2 \text{ atm})(4.0 \text{ L}) = P_2(1 \text{ L}) \]
\[ 4.8 \text{ atm} = P_2 \]

8) The balloon is put into a freezer whose temperature drops below freezing.
   A) A   B) B   C) C

9) The balloon is taken to the top of a high mountain where the atmospheric pressure is less than 1 atm.
   A) A   B) B   C) C

10) Heather comes into the room and sees a helium balloon with the initial volume as shown in the diagram. She unties the balloon, inhales some helium, and re ties the balloon. Heather then proceeds to talk like Donald Duck.
    A) A   B) B   C) C

11) Complete the following statement: The volume of a gas increases when the _____ decreases.
    A) temperature   B) pressure   C) quantity of gas   D) Both C & D

12) Which property cannot be directly measured with the given instrument?
    A) Pressure - barometer
    B) Mass - analytical balance
    C) Temperature - thermometer
    D) Density - graduated cylinder
13) At STP, temperature and pressure have the values of
A) 273 K and 1 mm Hg.
B) 760 K and 273 atm.
C) 0 K and 760 mm Hg.
D) 273 K and 760 mm Hg.
E) 0 K and 1 atm.

14) Seth forgot to label the axis on his graph. He now needs to know the details of his graph because he must use it in his lab final. Would you help him decipher which of the following would most closely match his graph?
A) Pressure vs. Temperature at constant Volume.
B) Pressure vs. Volume at constant Temperature.
C) Volume vs. Temperature at constant Pressure.

15) Selena measured the barometric pressure in Thatcher. Which of the following would represent the value she measured?
A) 298 K
B) 0.45 moles
C) 683 mm Hg
D) 2.5 L
E) 1.076 g/L

16) A tank contains helium gas at 490 mm Hg, nitrogen gas at 0.75 atm, and neon at 520 torr. What is the total pressure in atm? (Hint: Conversion vans are great Scout vehicles.)
A) 1600 atm
B) 1000 atm
C) 55 atm
D) 2.1 atm
E) 1.5 atm

17) At 570.0 mm Hg and 25°C, a gas sample has a volume of 2.270 L. What is the final pressure (in mm Hg) at a volume of 1.250 L and a temperature of 175°C? (I sure like my cousin Kelvin Taylor).
A) 1560 mm Hg
B) 1230 mm Hg
C) 690 mm Hg
D) 470 mm Hg
E) 210 mm Hg

18) A gas sample in a closed, expandable container of initial volume 5.00 L was allowed to warm from 25°C to 35°C. What was its new volume? (Lord Kelvin was a great scientist)
A) 3.57
B) 4.84
C) 5.17
D) 7.00 L
E) 4380 L

19) Temperature of a liquid at which the vapor pressure of the liquid equals the atmospheric pressure is the
A) Melting Point  B) Heat of Vaporization  C) Heat of Fusion  D) Boiling Point
20) The average kinetic energy of a given gas sample is proportional to
A) the temperature in Kelvin
B) the temperature in Celsius
C) the size of the vessel.
D) the atomic number of the gas.

21) Which gas molecules have the greatest average speed at STP?
A) Carbon dioxide, CO₂
B) Sulfur dioxide, SO₂
C) Hydrogen gas, H₂
D) butane, C₄H₁₀

\[ KE = \frac{1}{2} m v^2 \qquad \text{small mass, high velocity} \]

22) Travis fills a container with 0.175 moles of Helium. Kaylee comes by and adds 0.350 moles of oxygen. Austin follows with 0.450 moles of hydrogen. If the total pressure is 866 mmHg, what is the partial pressure of the hydrogen?
A) 390 mmHg
B) 400 mmHg
C) 450 mmHg
D) 975 mmHg

\[ \frac{175}{137} \text{ He} \times \frac{450}{995} \times 866 \text{ mmHg} = 399.6 \text{ mmHg} \]

23) An air balloon contains 8.35 L of air at a pressure of 1.33 atm and at a temperature of 25.0°C. What is the temperature of the air if the balloon shrinks to a volume of 2.25 L under a pressure of 2.02 atm? (4 points)

\[ \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \]

\[ T_2 = \frac{(2.02)(2.25)(298)}{(1.33)(8.35)} = 121.96 \text{ K or } -151 \text{ °C} \]

24) Calculate the liters of carbon monoxide produced from 12.5 grams of carbon (Did you enjoy mole day?) and excess sulfur dioxide if the experiment is conducted at room temperature and at sea level which is 1.0 atm and 298 K? (4 points, but only if you take the bus)

\[ \frac{5C + 2 \text{SO}_2 \rightarrow \text{CS}_2 + 4\text{CO}}{12.5 \text{ g} \ C \times \text{ mol} \cdot \text{g}^{-1} \times \text{ mol} \cdot \text{CO} \text{ at } 25 \text{ C}} = 0.9336 \text{ mol CO} \]

\[ \frac{P V}{T} = n R \frac{T}{P} \quad \text{or} \quad V = \frac{P V}{T} \]

\[ V = (0.9336)(0.082057)(298 \text{ K}) \]

\[ V = 20.28 \text{ L} \]
25) A cylinder contains He at 3.2 atm of pressure, Ne at 1.25 atm, and CO2 at 1525 mmHg. What is the pressure inside the container? (4 points)

\[
\begin{array}{c}
3.2 \text{ atm} \\
1.25 \text{ atm} \\
2.00 \\
\hline
2.76 \text{ atm} \\
1525 \text{ mmHg} \\
1520 \\
500 \\
\hline
6.46 \text{ atm} \\
4910 \text{ mmHg}
\end{array}
\]

26) Explain one of the following: (4 points so be fairly specific)

a) Explain how the lungs work. Include the words pressure, volume, and diaphragm in your explanation.

b) Explain how "Squiggy" the Cartesian diver works. Include words like pressure, volume, gas, density.
PV=nRT \quad \frac{PV_1}{n_1 T_1} = \frac{P_2 V_2}{n_2 T_2} \quad R=0.082057 \text{ L} \cdot \text{atm}/\text{K} \cdot \text{mol}

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