Name _____ Date _____ Class _____

Chapter Test A

A. Matching

Match each description in Column B with the correct term in Column A. Write the letter of the correct description on the line.

Column A   **Column B**

_____ **1.** ideal gas constant (R)   **a.** The volume of a fixed mass of gas is directly proportional to the Kelvin temperature if the volume is kept constant.

_____ **2.** Boyle's law   **b.** At constant volume and temperature, the total pressure exerted by a mixture of gases is equal to the sum of the partial pressures of the component gases.

_____ **3.** Dalton's law of partial pressures   **c.** $8.31 \dfrac{L \cdot kPa}{K \cdot mol}$

_____ **4.** ideal gas law   **d.** the contribution each gas in a mixture makes to the total pressure

_____ **5.** combined gas law   **e.** A gas tends to move to an area of lower concentration until the concentration is uniform throughout.

_____ **6.** Charles's law   **f.** $\dfrac{P_1 \times V_1}{T_1} = \dfrac{P_2 \times V_2}{T_2}$

_____ **7.** diffusion   **g.** $P \times V = n \times R \times T$

_____ **8.** partial pressure   **h.** For a given mass of gas at constant temperature, the volume of gas varies inversely with the pressure.

B. Multiple Choice

Choose the best answer and write its letter on the line.

_____ **9.** As the temperature of a fixed volume of gas increases, the pressure will
  a. vary inversely.   **c.** be unchanged.
  b. decrease.   **d.** increase.

_____ **10.** A breathing mixture used by deep-sea divers contains helium, oxygen, and carbon dioxide. What is the partial pressure of oxygen at 101.3 kPa total pressure if P_{He} = 84.0 kPa and P_{CO_2} = 0.10 kPa?
  a. 10.3 kPa   **c.** 34.4 kPa
  b. 17.2 kPa   **d.** 185.4 kPa

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_____ **11.** Increasing the volume of a given amount of gas at constant
temperature causes the pressure to decrease because
a. the molecules are striking a larger area with the same force.
b. there are fewer molecules.
c. the molecules are moving more slowly.
d. there are more molecules.

_____ **12.** When a container is filled with 3.00 mol of H_2, 2.00 mol of O_2, and
1.00 mol of N_2, the pressure in the container is 465 kPa. The partial
pressure of O_2 is
a. 78 kPa.   **c.** 155 kPa.
b. 116 kPa.   **d.** 212 kPa.

_____ **13.** A box with a volume of 22.4 L contains 1.0 mol of nitrogen and 2.0 mol
of hydrogen at 0°C. Which of the following statements is true?
a. The total pressure in the box is 202.6 kPa.
b. The partial pressure of N_2 and H_2 are equal.
c. The total pressure is 101.3 kPa.
d. The partial pressure of N_2 is 101.3 kPa.

_____ **14.** The volume of a gas is doubled while the temperature is held constant.
The pressure of the gas
a. remains unchanged.   **c.** is doubled.
b. is reduced by one half.   **d.** depends on the kind of gas.

_____ **15.** As the temperature of the gas in a balloon decreases
a. the volume increases.
b. the pressure increases.
c. the average kinetic energy of the gas particles decreases.
d. All of the above are true.

_____ **16.** The volume of a gas is increased from 0.5 L to 4.0 L while the
temperature is held constant. The pressure of the gas
a. increases by a factor of four.   **c.** increases by a factor of eight.
b. decreases by a factor of eight.   **d.** increases by a factor of two.

_____ **17.** A gas occupies 40.0 mL at −123°C. What volume does it occupy at
27°C, assuming pressure is constant?
a. 182 mL   **c.** 80.0 mL
b. 8.80 mL   **d.** 20.0 mL

_____ **18.** A gas occupies a volume of 0.2 L at 25 kPa. What volume will the gas
occupy at 2.5 kPa?
a. 4 L   **c.** 2 L
b. 20 L   **d.** 0.02 L

_____ **19.** Which of these changes would *not* cause an increase in the pressure of
a contained gas?
a. Another gas is added to the container.
b. Additional amounts of the same gas are added to the container.
c. The temperature is increased.
d. The gas is moved to a larger container.

_____ **20.** If a balloon containing 1000 L of gas at 50°C and 101.3 kPa rises to an altitude where the pressure is 27.5 kPa and the temperature is 10°C, its volume there is

a. $1000 \text{ L} \times \dfrac{27.5 \text{ kPa}}{101.3 \text{ kPa}}$

c. $1000 \text{ L} \times \dfrac{27.5 \text{ kPa}}{101.3 \text{ kPa}} \times \dfrac{323 \text{ K}}{283 \text{ K}}$

b. $1000 \text{ L} \times \dfrac{283 \text{ K}}{323 \text{ K}} \times \dfrac{101.3 \text{ kPa}}{27.5 \text{ kPa}}$

d. $1000 \text{ L} \times \dfrac{50°C}{10°C} \times \dfrac{101.3 \text{ kPa}}{27.5 \text{ kPa}}$

C. Problems

Solve the following problems in the space provided. Show your work.

21. A gas has a pressure of 655 kPa at 227°C. What will its pressure be at 27°C if the volume does not change?

22. A 10-g mass of krypton occupies 15.0 L at a pressure of 156 kPa. Find the volume of the krypton when the pressure is increased to 215 kPa at the same temperature.

23. A gas occupies a volume of 180 mL at 35.0°C and 95.9 kPa. What is the volume of the gas at conditions of STP?

24. A gas has a volume of 550 mL at a temperature of −55.0°C. What volume will the gas occupy at 30.0°C, assuming constant pressure?

D. Essay

Write a short essay for the following.

25. What are some of the differences between a real gas and an ideal gas?

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E. True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

_____ **26.** Two small bicycle pumps are filled with different gases; one contains He, the other Ar. Using the same pressure, it will take longer to force out the He than the Ar.

_____ **27.** Theoretically, an ideal gas will contract in volume with increasing pressure and reduced temperature until absolute zero is reached.

_____ **28.** To obtain a value for the number of moles using the ideal gas law, one uses the conditions of STP.

_____ **29.** The kinetic energy of a moving body is directly proportional to the square of its velocity.

F. Additional Problems

Solve the following problems in the space provided. Show your work.

30. The gaseous product of a reaction is collected in a 25.0-L container at 27°C. The pressure in the container is 216 kPa, and the gas has a mass of 96.0 g. What is the molar mass of the gas?

31. The separation of uranium-235 from uranium-238 has been carried out using gaseous diffusion. Calculate the relative rates of diffusion of gaseous UF_6 containing these isotopes.

Molar mass of UF_6 containing uranium-235 = 349.0 amu.
Molar mass of UF_6 containing uranium-238 = 352.0 amu.