WKS
Partial Pressures & *Gas Collection*

Name Answer Key
Date _____ Period _____

Note: Dalton's Law of Partial Pressures: $P_{Total} = P_A + P_B + P_C + \ldots$
Refer to Table on back of this sheet for the vapor pressure of water at various temperatures.
Some of these questions were taken from the Holt Modern Chemistry text. (p329 and 359)

1) Air is primarily composed of three gases-- carbon dioxide (CO_2) , nitrogen (N_2) and oxygen (O_2). If a sample of air has a pressure of 760.0 mm Hg and the partial pressures of CO_2 and N_2 are given as P_{CO_2} = 0.285 mm Hg and P_{N_2} = 593.5 mm Hg, what is the partial pressure of O_2?

$$P_{O_2} = P_{atm} - \left(P_{N_2} + P_{CO_2}\right) = 760.0 \text{ mm Hg} - \left(593.5 \text{ mm Hg} + 0.285 \text{ mm Hg}\right) = \boxed{166.2 \text{ mm Hg}}$$

2) What is the total pressure of a mixture of gases made up of CO_2, O_2 and H_2 if the partial pressures are 22.3 kPa, 44.7 kPa and 112.0 kPa respectively?

$$P_{total} = P_{CO_2} + P_{O_2} + P_{H_2} = 22.3 \text{ kPa} + 44.7 \text{ kPa} + 112.0 \text{ kPa} = \boxed{179.0 \text{ kPa}}$$

3) Find the partial pressure of SO_2 in a reaction mixture with SO_3 and O_2 if the total pressure is 30.4 kPa if the P_{O_2} = 16.5 kPa and P_{SO_3} = 3.7 kPa.

$$P_{SO_2} = P_{total} - \left(P_{O_2} + P_{SO_3}\right) = 30.4 \text{ kPa} - \left(16.5 \text{ kPa} + 3.7 \text{ kPa}\right) = \boxed{10.2 \text{ kPa}}$$

4) Suppose some oxygen gas is collected over water at 20°C. If the total pressure of the gases collected (O_2 and H_2O) is 730.0 mm Hg, what is the partial pressure of the O_2 gas collected? (p329 #40)
**Use the table on the back to determine the partial pressure of the water vapor mixed in with the O_2.

$$P_{O_2} = P_{total} - P_{H_2O} = 730.0 \text{ mm Hg} - 17.5 \text{ mm Hg} = \boxed{712.5 \text{ mm Hg}}$$

5) A sample of oxygen gas is collected in a 175 mL container over water at 15°C. If the total pressure of the collected gases (O_2 and H_2O) is 752.0 mm Hg, what is the partial pressure of just the O_2 gas, in atm?

$$P_{O_2} = P_{total} - P_{H_2O} = \left(752.0 \text{ mm Hg} - 12.8 \text{ mm Hg}\right) \times \frac{1 \text{ atm}}{760 \text{ mm Hg}} = \boxed{0.973 \text{ atm}}$$

6) A student collects H_2 gas in a 50 mL eudiometer over water at 23°C. The total pressure is 104.3 kPa. What is the partial pressure of the H_2, in kPa?

$$P_{H_2} = P_{total} - P_{H_2O} = 104.3 \text{ kPa} - 2.81 \text{ kPa} = \boxed{101.5 \text{ kPa}}$$

APPENDIX A: HOLT MODERN CHEMISTRY

TABLE A-8 WATER-VAPOR PRESSURE

Temperature (°C)	Pressure (mm Hg)	Pressure (kPa)	Temperature (°C)	Pressure (mm Hg)	Pressure (kPa)
0.0	4.6	0.61	**23.0**	21.1	2.81
5.0	6.5	0.87	**23.5**	21.7	2.90
10.0	9.2	1.23	**24.0**	22.4	2.98
15.0	12.8	1.71	**24.5**	23.1	3.10
15.5	13.2	1.76	**25.0**	23.8	3.17
16.0	13.6	1.82	**26.0**	25.2	3.36
16.5	14.1	1.88	**27.0**	26.7	3.57
17.0	14.5	1.94	**28.0**	28.3	3.78
17.5	15.0	2.00	**29.0**	30.0	4.01
18.0	15.5	2.06	**30.0**	31.8	4.25
18.5	16.0	2.13	**35.0**	42.2	5.63
19.0	16.5	2.19	**40.0**	55.3	7.38
19.5	17.0	2.27	**50.0**	92.5	12.34
20.0	17.5	2.34	**60.0**	149.4	19.93
20.5	18.1	2.41	**70.0**	233.7	31.18
21.0	18.6	2.49	**80.0**	355.1	47.37
21.5	19.2	2.57	**90.0**	525.8	70.12
22.0	19.8	2.64	**95.0**	633.9	84.53
22.5	20.4	2.72	**100.0**	760.0	101.32