Name: _____
Hour: ____ Date: _____

Chemistry: *Dalton's Law of Partial Pressure*

Directions: *Solve each of the following problems. Show your work, including proper units, to earn full credit.*

1. Container A (with volume 1.23 dm^3) contains a gas under 3.24 atm of pressure. Container B (with volume 0.93 dm^3) contains a gas under 2.82 atm of pressure. Container C (with volume 1.42 dm^3) contains a gas under 1.21 atm of pressure. If all of these gases are put into Container D (with volume 1.51 dm^3), what is the pressure in Container D?

2. Container A (with volume 1.56 L) contains a gas under 185.3 kPa of pressure. Container B has $^1/_3$ the volume of Container A, but its gas is under twice the pressure as that of Container A. If the gases from A and B are combined into Container C (with volume 0.95 L), what is the pressure in Container C?

3. Container A (with volume 150 mL) contains a gas under an unknown pressure. Container B (with volume 250 mL) contains a gas under 628 mm Hg of pressure. Container C (with volume 350 mL) contains a gas under 437 mm Hg of pressure. If all of these gases are put into Container D (with volume 300 mL),, giving it 1439 mm Hg of pressure, find the original pressure of the gas in Container A.

4. The gases of three identical containers A, B, and C are under pressures of 1.44 atm, 3.16 atm, and 2.52 atm, respectively. These gases are then combined into Container D (with a volume of 3.92 L) so that the pressure in Container D is 4.38 atm. Containers A, B, and C have the same volume. Find that volume.

Answers: 1. 5.51 atm 2. 507.1 kPa 3. 812 mm Hg 4. 2.41 L

KEY

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1. Container A (with volume 1.23 dm^3) contains a gas under 3.24 atm of pressure. Container B (with volume 0.93 dm^3) contains a gas under 2.82 atm of pressure. Container C (with volume 1.42 dm^3) contains a gas under 1.21 atm of pressure. If all of these gases are put into Container D (with volume 1.51 dm^3), what is the pressure in Container D?

$$P_1V_1 = P_2V_2$$
$$1.23\ dm^3 \quad 3.24\ atm = P_2 \quad 1.51\ dm^3$$
$$P_{2,A} = 2.64\ atm$$

$$P_1V_1 = P_2V_2$$
$$0.93\ dm^3 \quad 2.82\ atm = P_2 \quad 1.51\ dm^3$$
$$P_{2,B} = 1.74\ atm$$

$$P_1V_1 = P_2V_2$$
$$1.42\ dm^3 \quad 1.21\ atm = P_2 \quad 1.51\ dm^3$$
$$P_{2,C} = 1.14\ atm$$

$$P_T = P_A + P_B + P_C$$
$$P_T = 2.64\ atm + 1.74\ atm + 1.14\ atm$$
$$P_T = 5.52\ atm$$

2. Container A (with volume 1.56 L) contains a gas under 185.3 kPa of pressure. Container B has $^1/_3$ the volume of Container A, but its gas is under twice the pressure as that of Container A. If the gases from A and B are combined into Container C (with volume 0.95 L), what is the pressure in Container C?

$$P_1V_1 = P_2V_2$$
$$1.56\ L \quad 185.3\ kPa = P_2 \quad 0.95\ L$$
$$P_{2,A} = 304.3\ kPa$$

$$P_1V_1 = P_2V_2$$
$$0.52\ L \quad 370.6\ kPa = P_2 \quad 0.95\ L$$
$$P_{2,B} = 202.8\ kPa$$

$$P_T = P_A + P_B$$
$$P_T = 304.3\ kPa + 202.8\ kPa$$
$$P_T = 507.1\ kPa$$

3. Container A (with volume 150 mL) contains a gas under an unknown pressure. Container B (with volume 250 mL) contains a gas under 628 mm Hg of pressure. Container C (with volume 350 mL) contains a gas under 437 mm Hg of pressure. If all of these gases are put into Container D (with volume 300 mL),, giving it 1439 mm Hg of pressure, find the original pressure of the gas in Container A.

A	B	C	D
P = ?	P_B = 628 mm Hg	P = 437 mm Hg	$P_T = P_A + P_B + P_C$
V = 150 mL	V = 250 mL	V = 350 mL	P_T = 1439 mm Hg
			V = 300 mL

$$P_BV_B = P_2V_2$$
$$628\ mm\ Hg \quad 250\ mL = P_2 \quad 300\ mL$$
$$P_{2,B} = 523.3\ mm\ Hg$$

$$P_CV_C = P_2V_2$$
$$437\ mm\ Hg \quad 350\ mL = P_2 \quad 300\ mL$$
$$P_{2,C} = 509.8\ mm\ Hg$$

$$P_T = P_A + P_B + P_C$$
$$1439\ mm\ Hg = P_A + 523.3\ mm\ Hg + 509.8\ mm\ Hg$$
$$P_A = 405.9\ mm\ Hg$$

$$\therefore \quad P_AV_A = P_2V_2$$
$$P_A \quad 150\ mL = 405.9\ mm\ Hg \quad 300\ mL$$
$$P_{1,A} = 812\ mm\ Hg$$

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4. The gases of three identical containers A, B, and C are under pressures of 1.44 atm, 3.16 atm, and 2.52 atm, respectively. These gases are then combined into Container D (with a volume of 3.92 L) so that the pressure in Container D is 4.38 atm. Containers A, B, and C have the same volume. Find that volume.

1.44 atm x + 3.16 atm x + 2.52 atm x = 4.38 atm 3.92 L

7.12 x = 4.38 atm 3.92 L

x = 2.41 L

Answers: 1. 5.51 atm 2. 507.1 kPa 3. 812 mm Hg 4. 2.41 L