Gas Laws Summary Sheet

Boyle's Law	Charles's Law	Gay-Lussac's Law	Combined Law
for a given mass of gas at constant temperature, the volume of a gas varies <u>inversely</u> with pressure	the volume of a fixed mass of a gas is <u>directly proportional</u> to its Kelvin temperature if the pressure is kept constant	the volume of a fixed mass of a gas is <u>directly proportional</u> to its Kelvin temperature if the pressure is kept constant	combines Boyle's, Charles', and Gay- Lussac's Law into one equation
$P_1V_1 = P_2V_2$ <u>constants</u> amount of gas (moles) temperature	$\frac{V_1}{T_1} = \frac{V_2}{T_2}$ <u>constants</u> amount of gas (moles) pressure	$\frac{P_1}{T_1} = \frac{P_2}{T_2}$ <u>constants</u> amount of gas (moles), volume	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ <u>constant</u> amount of gas (moles)

Avogadro's Law	Ideal Gas Law	Dalton's Law	Graham's Law
equal volumes of gases at the same temperature and pressure contain an equal number of particles the volume of a gas at constant temperature and pressure depends on the number of gas particles present	relates the pressure, temperature, volume, and mass of a gas through the gas constant 'R'	at constant volume and temperature, the total pressure exerted by a mixture of gases is equal to the sum of the pressures exerted by each gas Gas Collection Over Water A mixture of gases results whenever a gas is collected by displacement of water. Water vapor is always present at a constant pressure, dependent on temperature, called the vapor pressure of water.	the rate of effusion/diffusion of two gases (A and B) are inversely proportional to the square root of their molar masses (M). **NOT PART OF HONORS CHEMISTRY**
$\frac{V_1}{T_1} = \frac{V_2}{T_2}$ <u>constants</u> temperature, pressure	$PV = nRT$	$P_{total} = P_1 + P_2 + P_3 \ldots P_n$	$\frac{Rate\ of\ Gas\ A}{Rate\ of\ Gas\ B} = \sqrt{\frac{M_B}{M_A}}$

Abbreviations	Standard Conditions
atm = atmosphere, mm Hg = millimeters of mercury, torr = another name for mm Hg, Pa = Pascal, kPa = kilopascal, K = Kelvin °C = degrees Celsius	0°C = 273 K 1.00 atm = 760 mm Hg = 76 cm Hg = 101.325 kPa = 101,325 Pa = 29.9 in Hg

Conversions	Gas Law's Equation Symbols
K = °C + 273 1 cm^3 (cubic centimeter) = 1 mL (milliliter) 1 dm^3 (cubic decimeter) = 1 L (liter) = 1000 mL	subscript (1) = initial condition / subscript (2) = final condition TEMPERATURE MUST BE IN **<u>KELVIN</u>!** *n* = number of moles $R = \mathbf{8.314}\frac{L \cdot kPa}{mol \cdot K}; \mathbf{0.0821}\frac{L \cdot atm}{mol \cdot K}; \mathbf{62.4}\frac{L \cdot torr}{mol \cdot K}$ In order to solve, you **<u>must</u>** have a common set of units in the problem.