<u>**CONCEPT:**</u> THE IDEAL GAS LAW: DENSITY
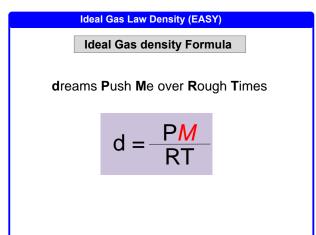
<u>**Density**</u>

● Recall, *density* represents the amount of _____ per unit of _____.
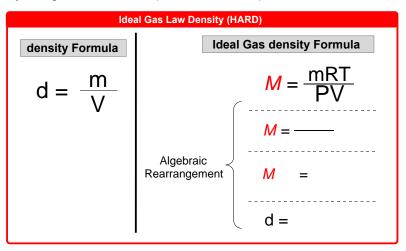
Density Formula
$d = \dfrac{m}{V}$ ☐ d = density of the gas in _____.   ☐ m = Mass of the gas in <u>grams</u>.   ☐ V = Volume of the gas in _____.

EXAMPLE: An unknown gas sample has a density of 1.70 g/L. If the sample has a volume 120.0 mL, what is its mass in grams?

<u>**Ideal Gas Law Derivation**</u>

● The Ideal Gas Law can be used to determine the density of a gas under certain pressure and temperature conditions.

Ideal Gas Law Density (EASY)

Ideal Gas density Formula

dreams **P**ush **M**e over **R**ough **T**imes

$$d = \frac{PM}{RT}$$

Ideal Gas Law Density (HARD)

density Formula

$$d = \frac{m}{V}$$

Ideal Gas density Formula

$$M = \frac{mRT}{PV}$$

Algebraic Rearrangement

$M = \underline{\quad\quad}$

$M \quad =$

$d =$

EXAMPLE: A gaseous compound of nitrogen and hydrogen is found to have a density of 0.977 g/L at 0.69474 atm and 373.15 K. What is the molecular formula of the compound?

a) N_2H_4 b) NH_3 c) HN_3 d) HN   e) N_4H_8

CONCEPT: THE IDEAL GAS LAW: DENSITY

PRACTICE: Consider two containers of gases at the same temperature. One has helium at a pressure of 1.00 atm. The other contains carbon dioxide with the same density as the helium gas. What is the pressure of the carbon dioxide gas sample?

PRACTICE: Determine the molecular formula of a gaseous compound that is 49.48% carbon, 5.19% hydrogen, 28.85% nitrogen, and 16.48% oxygen. At 27°C, the density of the gas is 1.5535 g/L and it exerts a pressure of 0.0985 atm.