Notes 3-2 -- Chem Honors
Masses of Gases Demo (Syringe)

Name Answer Key
Period______ **Date**______________

Data Table: Various gases are filled into a syringe and massed. Each gas sample has the same volume.

Mass of syringe (plunger all the way in) = 77.574 g   mass of syringe + vacuum = 77.418 g

	AIR	**CH_4**	**O_2**	**He**	**CO_2**
mass of syringe + gas	**77.576 g**	**77.516 g**	**77.590 g**	**77.439 g**	**77.655 g**
mass of sample of gas (g) (all have same volume)	**77.576 g – 77.418 g = 0.158 g**	**0.098 g**	**0.171 g**	**0.021 g**	**0.237 g**
relative mass of gas compared to CO_2	**0.158 g / 0.237 g = 0.667**	**0.41**	**0.726**	**0.0886**	**1.00 = 1.00**
experimental molecular mass of gas (CO_2 is set to a mass of 44.0 because this makes mass of H = 1.0 amu)	**0.667 × 44.0 amu = 29.3 amu**	**18 amu**	**31.9 amu**	**3.9 amu**	**44.0 amu**
accepted molecular mass of gases	* **29.0 amu**	**16.0 amu**	**32.0 amu**	**4.0 amu**	**44.0 amu**
% error	$\frac{\lvert 29.3-28.9 \rvert \text{ amu}}{28.9 \text{ amu}}$ **=1%**	**13%**	**0.3%**	**3%**	—

Post Demo Questions:

1) ***To find accepted molecular mass of air:**
"Air" is of course, NOT on the periodic table. It is actually a mixture of N_2 gas, O_2 gas and some Ar gas. Using the percent composition of air given below, find the accepted molecular mass of air.
Air is 78.1 % N_2, 20.9 % O_2 and 0.934 % Ar.
$(0.781)(28.0 \text{ amu}) + (0.209)(32.0 \text{ amu}) + (0.00934)(40.0 \text{ amu}) = 28.9 \text{ amu}$

2) In the lab, we assumed that the gas from the gas jets was pure methane gas (CH_4). However, in reality there is some ethane gas (CH_3CH_3) mixed in. Does this fact help to explain your experimental error in your mass of CH_4? Explain.
Since ethane has more atoms, it should have more mass (30 vs. 16) and the experimental molecular mass should have been higher. Thus, it explains why this experimental molecular mass is too high.