

**Demo WS -- Chem Honors  
Masses of Gases (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) = 77.561 g mass of syringe + vacuum = 77.414 g

	<u>AIR</u>	<u>CH<sub>4</sub></u>	<u>O<sub>2</sub></u>	<u>CO<sub>2</sub></u>
mass of syringe + gas	77.571 g	77.490 g	77.582 g	77.640 g
mass of sample of gas (g) (all have same volume)	$77.571 \text{ g} - 77.414 \text{ g} = 0.157 \text{ g}$	0.076 g	0.168	0.226 g
relative mass of gas compared to CO <sub>2</sub>	$0.157 \text{ g} / 0.226 \text{ g} = 0.695$	0.34	0.743	1.00 = 1.00
experimental molecular mass of gas (CO <sub>2</sub> is set to a mass of 44.0 because this makes mass of H = 1.0 amu)	$0.695 \times 44.0 \text{ amu} = 30.6 \text{ amu}$	15 amu	32.7 amu	44.0 amu
accepted molecular mass of gases	* 28.9 amu	16.0 amu	32.0 amu	44.0 amu
% error	$\frac{ 30.6 - 28.9  \text{ amu}}{28.9 \text{ amu}} \times 100 = 5.9\%$	6%	2%	—

**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<sub>2</sub> gas, O<sub>2</sub> 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<sub>2</sub>, 20.9 % O<sub>2</sub> 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<sub>4</sub>). However, in reality there is some ethane gas (CH<sub>3</sub>CH<sub>3</sub>) mixed in. Does this fact help to explain your experimental error in your mass of CH<sub>4</sub>? Explain.

Since ethane has more atoms, it should have more mass and the experimental molecular mass should have been higher. Thus, even if this is the case, it does not explain our experimental error.