FLINN SCIENTIFIC

Name_____

Data Tables

Part 1. Molar Mass of Gas Samples

Mass of evacuated syringe _____ g

	Air	O_2*	Burner Gas	CO_2	Other
Mass of syringe and gas					
Mass of gas					
Mass of gas/Mass of oxygen					
Experimental molar mass					
Theoretical molar mass		32.0 g/mol			
Percent error					

*Oxygen is used as the reference gas for determining the molar mass of the other "unknown" gases.

Part 2. Molar Mass of Volatile Liquids

Temperature of boiling water bath _____ °C

Barometric pressure _____ mm Hg

Temperature of room temp. water bath _____ °C

Density of water at room temperature _____ g/mL

Jumbo Pipets

	Jumbo Pipet #1	Jumbo Pipet #2	Jumbo Pipet #3
Mass of empty pipet			
Mass of pipet and water			
Mass of water in filled pipet			
Volume of pipet			

Volatile Liquids

Liquid		Trial 1	Trial 2	Trial 3
Ethyl Alcohol	Mass of pipet and condensed ethyl alcohol			
	Mass of condensed ethyl alcohol			
	Molar mass of ethyl alcohol			
Acetone	Mass of pipet and condensed acetone			
	Mass of condensed acetone			
	Molar mass of acetone			
Isopropyl Alcohol	Mass of pipet and condensed isopropyl alcohol			
	Mass of condensed isopropyl alcohol			
	Molar mass of isopropyl alcohol			

Post-Laboratory Review Questions

Part 1. Molar Mass of Gass Samples

1. Why can the buoyancy force in this experiment be ignored?

2. Determine the mass of each gas in the syringe. Enter these values in the Part 1 Data Table.

3. How should the number of molecules trapped in the syringe compare between the various gases? Explain.

4. Determine the ratio of the mass of gas/mass of oxygen for each gas. Enter these values in the Part 1 Data Table.

5. How should the ratio of the mass of one molecule of gas/mass of one molecule of oxygen compare to the ratio of the mass of gas/mass of oxygen? Explain.

6. Use the molar mass of oxygen as a reference to determine the molar masses for the other gases tested in Part 1. Enter these values in the Part 1 Data Table.

7. Determine the accepted molar mass for each gas used (including the air value calculated in *Pre-Lab* question 1).

8. Determine the percent error in your molar mass values.

9. How do the molar masses compare to the accepted values for each gas tested? Are there any patterns?

10. Which gases should have the greatest experimental uncertainty? Explain.

Part 2. Molar Mass of Volatile Liquids

1. Determine the mass of the condensed, volatile vapor for each pipet trial and each unknown in Part 2. Enter these values in the Part 2 Data Table.

2. Use the *CRC Handbook of Chemistry and Physics* to determine the density of water at the temperature of the room temperature water bath used in this experiment. Enter this density value in the Part 2 Data Table. Use this value and the mass of water in each filled pipet to calculate the volume of each pipet.

3. Determine the mass of the condensed volatile liquid for each run. Enter these values in the Part 2 Data Table.

4. Calculate the molar mass of the liquid used in each run and the average of the three runs for each volatile liquid.

5. Volatile liquids with lower boiling points often give better results then those with higher boiling points. Suggest a reason for this.

6. What effect would vapor condensation in the neck of the jumbo pipets have on the reported molar mass? How large an error might this introduce?

7. Some liquids have enough attractions between molecules to form dimers. (Dimers are molecules formed from the combination of the identical molecules, $A + A \rightarrow A_2$.) What effect would this have on the experimental molar mass?