Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Lab Day & Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_

## Data Sheet

 Unknown ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
|  | Run |
|  | First |  | Second |  | Third |
| Mass of flask with liquid **after** cooling, including boiling chip and foil  |  |  |  |  |  |
| Mass of empty flask, boiling chip, and foil |  |  |  |  |  |
|  Mass of unknown |  |  |  |  |  |
| Water bath temperature when vaporization is complete / °C |  |  |  |  |  |
|  Water bath temperature / K |  |  |  |  |  |
| Barometric pressure / cm Hg |  |  | (Same) |  | (Same) |
|  Barometric pressure / atm |  |  | (Same) |  | (Same) |
| Flask volume / mL |  |  |  |  |  |
|  Flask volume / L |  |  |  |  |  |
| Moles of unknown vapor / mol |  |  |  |  |  |
|  Molar mass of unknown |  |  |  |  |  |
|  Density of unknown vapor / (g/L) |  |  |  |  |  |
|  Average molar mass of unknown |  |  |  |  |  |
| Formula of unknown (from instructor) |  |  |  |  |  |
|  Accepted molar mass of unknown |  |  |  |  |  |
|  Percent error |  |  |  |  |  |

## Post Lab Questions

1. The density of air is around 1.15 g/L at sea level and 35 °C. How does this relate to why the unknown pushes air out of the flask on heating? (Hint: what density did you calculate for your unknown?)
2. For each of the following errors made in the procedure, determine the effect on the calculated molar mass, and circle larger, smaller or unchanged. (For example, since molar mass is $\frac{mass}{moles}$, if an error caused the mass to be too large or the moles too small, the molar mass would be too large.) Explain your choice
	1. When the unknown liquid is added to the Erlenmeyer flask, a drop of water (which isn’t very volatile) falls unnoticed into the flask.

Larger Smaller Unchanged

Reason:

* 1. The flask is heated so long that too much of the unknown vapor escapes from the flask.

Larger Smaller Unchanged

Reason:

* 1. The top of the flask is considerably above the water level in the water bath (i.e., the gas in the top of the flask is cooler than the water bath temperature).

Larger Smaller Unchanged

Reason: