PRE-LABORATORY QUESTIONS

1. Why is the actual temperature of boiling water measured instead of simply reporting it as 100.0 °C?

2. Why is it only necessary to measure the mass of the flask assembly containing the water to the nearest ±0.1 g, whereas it is necessary to measure the masses of the empty flask assembly and the flask assembly containing the condensed sample to the nearest ± 1 mg (0.001 g)?

3. A student collected the following data using the procedure given in this experiment:

   Atmospheric Pressure = 752.6 torr
   Temperature of boiling water = 99.6 °C
   Temperature of water in flask = 23.8 °C
   Mass of empty flask = 135.263 g
   Mass of flask containing condensed sample = 135.684 g
   Mass of flask filled with water = 398.5 g

   (a) Calculate the volume of the flask.

   (b) Calculate the mass of the vaporized sample.
(c) Convert the temperature of the boiling water to Kelvin.

(d) Expressed the pressure in units of atmospheres.

(e) Calculate the Molar Mass of the liquid.
DATA SHEET

Name: __________________________  Section: ________  Date: ________________

Unknown Number: ________________

<table>
<thead>
<tr>
<th></th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Bath Temperature (°C)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mass of Flask Assembly with Condensed Sample (g)</td>
<td></td>
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<tr>
<td>Mass of Empty Flask Assembly (g)</td>
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<tr>
<td>Mass of Flask Assembly with Deionized Water (g)</td>
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<tr>
<td>Water Temperature in Flask (°C)</td>
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<tr>
<td>Atmospheric Pressure (torr)</td>
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<tr>
<td>Mass of Deionized Water (g)</td>
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<tr>
<td>Density of Deionized Water at Measured Temperature (g/MI)</td>
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<tr>
<td>Volume of Deionized Water (Volume of Flask Assembly) (L)</td>
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</tbody>
</table>

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<tr>
<th></th>
<th>Trial 1</th>
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</thead>
<tbody>
<tr>
<td>Mass of Condensed Sample (g)</td>
<td></td>
<td></td>
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<tr>
<td>Volume of Deionized Water (Volume of Flask Assembly) (L)</td>
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<tr>
<td>Water Bath Temperature (K)</td>
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<tr>
<td>Atmospheric Pressure (atm)</td>
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<tr>
<td>Molar Mass</td>
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Average Molar Mass

Average Molecular Weight
POST LABORATORY QUESTIONS

1. The following systematic errors are possible during the determination of the molar mass of a volatile liquid using the procedure described in this experiment. Determine whether each error would make the final value of the molar mass of the volatile liquid too high, too low or would cause no change in the result. Place an X in the box that corresponds to your answer.

<table>
<thead>
<tr>
<th>Too High</th>
<th>Too Low</th>
<th>No Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>All the liquid did not vaporize in the flask.</td>
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<tr>
<td>The temperature of the boiling water was 2.0 °C above the temperature recorded.</td>
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<td>The flask and the vapor were not at thermal equilibrium with the boiling water.</td>
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<tr>
<td>The flask with vent assembly containing the condensed sample was below room temperature when weighed.</td>
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<td>The volatile liquid was a mixture of liquids.</td>
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<td>The volatile liquid left a non-volatile residue in the flask.</td>
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<td>A small amount of scale buildup on the outside of the flask occurred after each trial because tap water was used instead of Deionized water.</td>
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<tr>
<td>The eye dropper was not filled with water during the determination of the volume of the flask.</td>
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</tbody>
</table>

2. A student reported an average molar mass of 0.0256 g/mol for the volatile liquid. Why is the result unreasonable?