

Here are two examples of a lab report. The first is what not to do, the second is a cleaned-up and much improved version of the same report.

Dr. Ethan Gallogly

What **NOT** to do...

A. Student  
Chemistry 1

## Experemint 10

As described in the lab manual:

1. Record the barometric pressure. 2. Measure about 10 g of ice using the chemical balance and place it into a 100 mL beaker. Heat over a flame until half of the ice has melted. Remove from heat and measure the temperature as accurately as possible using your laboratory thermometer. Repeat with a 10.0 g sample of your unknown. Be sure to record your unknown number. 3. Measure 50 mL of water using your graduated cylinder and pour it into a 200 mL beaker. Bring the liquid to a boil over a flame. After the liquid has been boiling for approximately 1-2 minutes, measure the temperature of the boiling liquid. Repeat with a 10 g sample of your unknown. Record all data in your lab notebook and clean up.

We followed all the steps above pretty much closely and pretty much got the results for water that we expected, except that the stockroom had cheap thermometers because one of them broke (this was my lab partner's fault – she used it as a stirring rod which is exactly what you said not to do in your lecture) and the new one was off by a few degrees – but it was close enough for this simple experiment.

The pressure in the room was 761.2 and the temperatures we measured for our unknown were:

-15 and 17.

Correcting for our water results this made our measurements –15.2 and 17.4 after the corrections.

Based on these temperatures and the data we looked up in the library, our unknown was certainly “blabber gas.” The error in our

results was really small and the experiment worked really good. Other errors include: possible math errors in our calculations and human error.

Overall the lab was really good and we learned quite a lot of stuff. I especially liked the part where the blabber gas exploded when heated scaring my partner (I think that may be why she broke the thermometer). The only criticism of the lab is that the equipment wasn't really great and that we ran out of time but otherwise it was a really good experience and I think it taught us a lot of chemistry.

### Notes:

For references we used our textbook, lab manual, and the Chemical Handbook found on shelf 2 of the library (behind the reference desk).

## **What to do:**

A. Student  
Chemistry 1

# Identification of a Compound using Melting and Boiling Points

## Introduction

One of the primary methods used to characterize a new compound is the physical determination of its normal melting and boiling points. The "normal" melting and boiling point is the temperature at which a substance melts or boils when the barometric pressure is 760 mmHg or 1 atm. In this experiment we will first calibrate our thermometers using ice and water, whose normal melting and boiling points are well characterized as 0.0 °C and 100.0 °C, respectively<sup>[1]</sup>. Following this, we will measure the normal melting and boiling points of an unknown compound. We will use this data to determine the identity of our unknown from a

list of possible unknown samples and physical data from the [Chemical Handbook](#)[2].

### Experimental Procedure

As described in the lab manual,[3] ice was placed in a beaker and warmed until approximately 50% had melted. The temperature of the ice/water mixture was then measured with a thermometer. This was followed by a similar measurement of our solid unknown. In part II, water was heated until boiling and the temperature of the liquid/gas mixture measured with a thermometer. This was followed by a similar measurement using our unknown compound. To get the best results possible, the procedure in the manual was modified by repeating each trial three times.

### Data & Results

The Barometric pressure in the lab was measured to be 761.2 mmHg.

**Table One – Experimental Data**

Trial	Water	Water	Unknown 7	Unknown 7
	Melting Pt.	Boiling Pt.	Melting Pt.	Boiling Pt.
1	<del>0.7 °C</del> *	101.2 °C	80.2 °C	272.7 °C
2	0.1 °C	101.1 °C	80.7 °C	272.8 °C
3	0.0 °C	100.9 °C	80.4 °C	273.0 °C
4	0.1 °C	n/a	n/a	n/a
<b>Averages:</b>	<b>0.15 °C</b>	<b>101.1 °C</b>	<b>80.4 °C</b>	<b>272.8 °C</b>
<b>Standard deviation (s):</b>	<b>± 0.06</b>	<b>± 0.15</b>	<b>± 0.15</b>	<b>± 0.06</b>
<b>95% confidence limits:</b>	<b>± 0.14</b>	<b>± 0.4</b>	<b>± 0.4</b>	<b>± 0.14</b>

\* This trial was eliminated because the thermometer was broken (there was a bubble of air in the mercury). A new thermometer was obtained from the stockroom and used for all other data.

**Observations:** The unknown was yellowish-orange in color and had a fruity smell.

As can be seen from our water data the experimental values for the melting and boiling points of water differed from the theoretical values by +0.15 °C and +1.1 °C, respectively. These differences were used to calibrate the average data for the

unknown. Thus the corrected values for the unknown boiling and melting points are given in Table 2.

**Table Two – Corrected Temperatures**

	<b>Unknown 7</b>	<b>Unknown 7</b>
	<b>Melting Pt.</b>	<b>Boiling Pt.</b>
<b>Measured value</b>	<b>80.4 °C ± 0.4 (95%)</b>	<b>272.80 ± 0.14 °C (95%)</b>
<b>Correction</b>	+0.15 °C	+ 1.1 °C
<b>Corrected value</b>	<b>80.5 °C ± 0.4 (95%)</b>	<b>273.90 ± 0.14 °C (95%)</b>

These values were used to identify our unknown. Table Three below lists possible unknowns and the melting and boiling points for these compounds found in the [Chemical Handbook](#).<sup>2</sup>

**Table Three – Reference Data from Chemical Handbook**

<b>Compound</b>	<b>Melting Point</b>	<b>Boiling Point</b>
Blabber Gas	-15.8 °C	17.2 °C
Freezer Gel	82.7 °C	456.1 °C
Silly Putty	57.2 °C	121 °C
Billgatesium	1000 °C	unknown
Farsel Juice	80.8 °C	274.0 °C
Shampoo	-1.2 °C	108.7 °C

Based on these data we conclude that our sample was probably “Farsel Juice” since both the melting and boiling points fall within the confidence limits of our average melting and boiling points. Additional evidence to support our conclusion is that Farsel Juice is described in the [Chemical Handbook](#) as having a yellowish-orange in color and has a “peach-like” smell. Our unknown was this color and one of our group members observed a “fruity” smell when she opened the bottle.

Although our measured melting and boiling points differed from the theoretical data by a few percent, this difference was very small leading us to believe that our results were quite good. While there is still room for error in our results due to the change in boiling and melting points as a function of atmospheric pressure this difference should be very small. Other factors such as

contaminates in the water used may have affected the results, but again every effort to minimize such effects was made by using only deionized water. Finally we did encounter some problems with our thermometer in the first trial, but this was fixed by replacing it at the stockroom. Thus our careful work, our additional color and smell observations, and the fact that the corrected average of data exactly matched only one of the choices with 95% confidence, all suggest that our unknown was in fact Farsel Juice.

## Conclusions

In this lab we determined the identity of our unknown to be Farsel Juice using normal melting and boiling points. A future experiment might include an additional calibration using the barometric pressure and/or inclusion of other chemical properties such as reactions of the compounds with acids and stuff to further test the nature of the chemicals and more positively identify the chemicals.

---

[1] Agenius, I.M., General Chemistry for College, 2nd Ed., Overcharge Publishing House, Beverly Hills California, 1999, page 12.

[2] Dr. Joe Scientist, Ed., Chemical Handbook, 578th Ed., Big Chemical Press Inc., Bigtown, USA, 1999.

[3] Wizard, Mr., "Don't try this at home" – Experiments for General Chemistry, 1st Ed., Explosive Info Co., Ground Zero, 1978, Experiment 2, pp. 10-15.