

Liberty High School

Science Department Lab Report Format

General Information:

12 pt Times New Roman font

Double Spaced

1 inch margins

Always write in third person

Write in Full Sentences except for the materials list

Each class must write at least one Formal Lab Report

Each lab report should equal 50 – 100 points (approx one test grade)

Important Reminders for a Lab Report

Check Spelling

Use Significant figures and units regarding measurements and calculations

Avoid personal pronouns

Headings should stand out and each section should be separated by 1 line

Neatness counts -> use rulers when needed (especially when using tables and graphs), type if possible

Do not copy verbatim (word for word) from the lab handout or any other source. This is plagiarism and would result in a zero mark and possible further consequences.

Title- Heading, Name, Name of Partners, Class Name, Teacher Name, Date Lab Report

Introductory Paragraph– This section should be written in complete sentences and should connect lab concepts to class content, The introduction should provide background information on the history of the concepts tested, scientists, theories, and any laws tested in the experiment. Cite Sources Used. The introduction should contain any prior knowledge on which the experiment is based including an explanation of principles, definitions, experimental techniques, theories and laws.

State Problem / Purpose The objective is a concise statement in complete sentences outlining the purpose of the experiment. The purpose section of a lab is where you tell the reader your reason for doing the lab in the first place and briefly summarize any relevant background information about the experiment, including any relevant chemical equations and/or algebraic equations.

Hypothesis: Possible if ____ then ____ statement. Define any variables such as manipulated, measured, controlled and the cause and effect predicted. The hypothesis is a one-line sentence where you discuss how you'll solve the problem at hand. The statement after "if" is the independent variable. The independent variable is whatever you will do to solve the problem. The statement after "then" is the dependent variable, because what happens will depend on what you did in the first place. Generally, the dependent variable will be the problem you mentioned in the purpose.

Materials: (Bulleted List) The materials section is a list of all equipment, reagents (chemicals), and computer programs that were used to complete the experiment. Drawings of the apparatus setup should be included in this section if needed. The materials list must be complete. Indicate how much of each material will be used in the experiment.

If you plan on arranging some of the equipment into a more complex setup (for example, if you are going to heat something over a Bunsen burner, you will need a ring stand, wire gauze, etc.), draw it as well as mention the equipment used.

Procedure: This section may be written in either paragraphs or numbered steps. Explain the test design, and allow for pictures and diagrams. The procedure is a detailed statement (step by step) of how the experiment was performed such that the experiment could be repeated using your report. Safety precautions that were followed should be stated in this section. The procedure must be written in the impersonal (3rd person) past tense:

e.g. We are taking the temperature every 2 minutes. NO

The temperature was taken every 2 minutes. YES

Data / Results / Observations: This is a collection of observations, measurements, multiple trials, data tables, charts, and repeating steps. This section may consist of quantitative and/or qualitative observations of the experiment. A qualitative piece of data is a written description and/or sketch of what was seen during the experiment. Quantitative information may be in the form of a table or simply a written description. When graphs are required, special attention should be paid to the following items: the type of graph expected (straight line or curve), utilizing the entire graph paper, plotted point size, title of the graph, and axis labels. When numerous measurements have occurred, data is to be placed in a data table whenever possible. Figure headings are placed below the figure and should give a short description of the figure. The figure number should be in bold print. Table headings are found above the table and should also have a brief description.

Analysis / Calculations: Graphs, Error Calculations, Equations, Statistical Analysis - One example of each type of calculation should be included. Results from numerous calculations should be placed in a data table with the proper number of significant figures and correct units. % yield and % error calculations should be included when possible.

Conclusion: The conclusion is a concise statement that answers the objective. The result of percent error and/or percent yield should be discussed and compared with known results. A portion of the conclusion should be dedicated to error analysis which discusses any possible sources of error that may have contributed to the percent error or yield. The conclusion should be written in the impersonal past tense. How to change the experiment for improved results, What did you learn? Explain what the results are telling you, Accept/Reject Hypothesis, Answer any Questions posed by the lab or teacher. A one-line sentence that supports the hypothesis or states that the hypothesis is incorrect. For example, if you proved the hypothesis that "If I poke myself in the eye, then my eye will hurt", this first sentence would be "When I poked myself in the eye, it hurt." If the hypothesis didn't work, an explanation of what possibly went wrong. These should be specific suggestions (I should have heated the mixture to 55^o C), not general suggestions (I should have heated it more). List at least two possible errors in the lab, as well as ways to prevent those errors in the future. The errors you mention should be errors that you can do something about, not mystical errors that probably did not occur.

Works Cited: (MLA Format) Any information borrowed from another source which is not common knowledge must be cited within the text of the report as outlined in the MLA Format Guide for LHS. All sources of information are to be listed in the Literature Cited section of the lab report in alphabetical order.

Additional Notes:

Reports will be graded largely on their ability to clearly communicate results and important conclusions to the reader. You must, of course, use proper English and spelling, along with comprehensible logic and appropriate style. You should proofread your report as well as spell-check it.

- Neatness and organization will also influence the grade a report receives. Be sure to follow explicitly the format indicated above. Type reports, and attach lab notes as appendices.
- Avoid being overly verbose and flowery when attempting to convey your point - be concise.
- Avoid qualitative phrases such as "the results were quite close" or "heat fluxes were in good agreement with the correlation." Be as quantitative as possible.
- Do not copy material without citing the source. This includes lab manuals, text books, your neighbor, old labs, etc. Plagiarism, of any degree, will not be accepted.

Boiling Point of Water

John Smith

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Science Class

Mr. Smith

26 November 2009

Introduction:

Kinetic theory states that all molecules in matter are in constant motion (Kane and Sternheim, 1984). As these molecules absorb more energy they have a higher amount of random movement. As energy is absorbed in the form of heat the average kinetic energy (temperature) of the molecules will increase except during a phase change. The absorbed energy used in the phase change breaks the attractive forces between the molecules, thus transformation occurs in the orientation of the molecules. An example of a phase change would be the boiling point of water which is a change from a liquid to a gas. This can be observed by using a temperature versus time line graph when the slope becomes zero (plateau) The boiling point of water is expected to be 100.00 °C (Merck, 1976).

Objective:

The purpose of this experiment is to determine the boiling point of water.

Hypothesis:

If the pressure in the classroom is close to 1 atmosphere, then the boiling point of water should be approximately 100 degrees Celsius.

Materials List:

500 ml beaker

distilled water,

thermometer,

hot plate,

Word Processing Software

Procedure:

The required materials were selected and taken to the workstation.

The beaker was filled with approximately 300 ml of distilled water.

The beaker was gently placed on the hotplate.

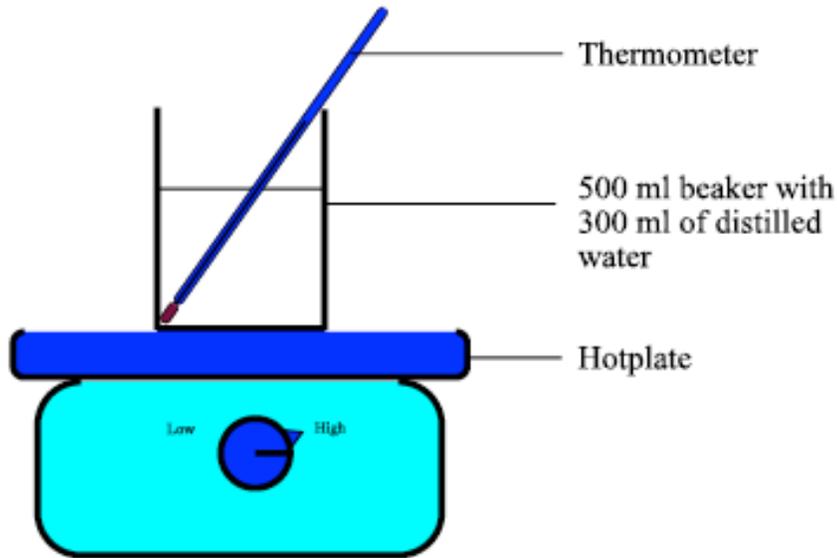
The thermometer was placed in the beaker and the initial temperature was recorded.

The hotplate was switched on to high.

The temperature was recorded every 2 minutes until 6 minutes after boiling began.

The hotplate was turned off and the materials were allowed to cool for at least 10 minutes before the equipment was dismantled.

Figure 1. The equipment for this experiment was set up as shown in this figure.



Data / Results / Observations:

Quantitative Results

Table 1 Graph displaying data obtained from the heating of water from 0 to 16 minutes

Time (minutes)	0	2	4	6	8	10	12	14	16
Temp (°C)	20.05	41.46	60.62	79.39	97.11	99.68	99.51	99.51	99.51

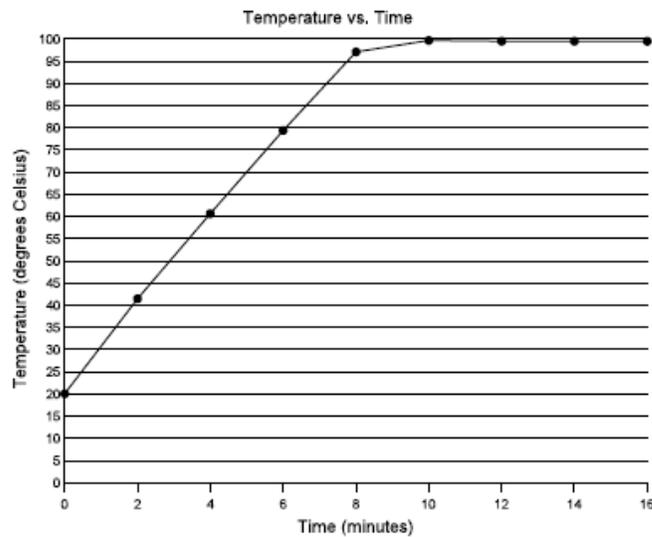


Figure 2. A line graph of temperature versus time of the data obtained in Table 1

Qualitative Results

Numerous small bubbles formed at the bottom of the beaker at 70.6 °C. The size and rate of bubble formation increased as the temperature increased. At 100.0 °C the rate and size of bubble formation remained constant. At that temperature, there was constant production of steam.

Calculations / Analysis:

Calculation of percent error:

$$\begin{aligned}\% \text{ error} &= \left| \frac{\text{theoretical value} - \text{experimental value}}{\text{theoretical value}} \right| \times 100 \\ &= \left| \frac{100.00 \text{ }^\circ\text{C} - 99.51 \text{ }^\circ\text{C}}{100.00 \text{ }^\circ\text{C}} \right| \times 100 \\ &= \frac{0.49 \text{ }^\circ\text{C}}{100.00 \text{ }^\circ\text{C}} \times 100 \\ &= 0.49 \% \text{ error}\end{aligned}$$

Conclusion:

It was determined from the data plotted in the temperature versus time graph (Figure 2) that the boiling point of water is 99.51 °C. This concurs very closely with the stated hypothesis, therefore the experiment was deemed a success. The percent error was found to be 0.49%. Possible sources of error could have involved impurities in the water and human error in reading the thermometer. Possible sources of error may be impurities in the water which may be chemicals from dirty glassware. Improvements would include more accurate thermometers, clean equipment and proper reading of the thermometer.

Works Cited:

Kane, Joseph W. and Morton M. Sternheim. Physics.

New York: John Wiley & Sons, 1984 ed.

Merck, Josef. Merck Index of Chemical Constants. New

York: Benjamin/Cummings Publishing Company Inc. 1976.