**SCIENCE LAB NOTEBOOK FORMAT**

Lab notebooks are important records of the work a scientist performs in both academia and industry and are required components of research at universities and companies. Recording your work and collecting data in a notebook is an essential skill in many careers. Consequently, we are introducing this skill now so that those students will be adequately prepared later.  Your lab notebook will also help promote proper preparation for each laboratory and to assess your ability to complete each experiment.

**RULES:**

1. Each lab write-up must be completed in ink only
2. If you make a mistake, and you will, cross out the error with a single line—no scribbling.
3. Only the original pages—not the carbon copies—should be turned in for grading.
4. Write hard enough to see the writing on the carbon copy since you will be turning in the original pages for grading.
5. Be sure to use every page; do not leave blank pages in between experiments.

**Here is how the points for the labs are earned:**

* **If** a pre-lab assignment is given, and not completed on for the next lab day, a 50% reduction of the first two sections of the lab rubric can be earned (Introduction and Procedures).
* **Special situations:**
  + Pre-lab is written up, but absent on lab day 🡪 get data and info from partner and complete lab
  + Absent day lab was given out, but present for the lab 🡪 do your pre-lab assignment during lab
  + Dismissed/leaving during lab 🡪 see item 1
  + If you were absent for all portions of the lab, and have only missed one for the quarter, you get an “omit” and you MUST write the title of the lab in your table of contents, the date you were absent, and write OMIT in the “points earned” column.\*\* Beyond this one missing of a lab, you will need to see me to make arrangements on how to make up work.

**Some “UNACCEPTABLE” procedures for your lab notebook:**

* Putting information on lab sheet or other paper and transferring it to your lab notebook.
* Copying info from another student, word for word or calculation for calculation. For some data items, it is acceptable to directly get information from another student. In doubt? Ask me.
* Gross careless/sloppy manner in doing any part of your lab.

**Your Notebook Will Include the Following:**

* **Question**: The question to be answered in the experiment should be clearly written on the first page of the lab notebook entry.
* **Introduction**: A brief (five sentence) introduction to the experiment should be written at the top of the page. The introduction should state the goals and objectives of the laboratory. It should also describe what data will be collected and how will it be collected (summarize the experiment) and how that data will be used to arrive at conclusions at the completion of the laboratory.
* **Variables**: You will be expected to identify the independent variable, dependent variable, and controlled variable.
* **Hypothesis**: Should be written as If \_\_\_\_\_\_\_\_\_\_, then \_\_\_\_\_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The hypothesis is a one-sentence liner where you make your prediction and support it with an explanation. The “if” is the independent variable and the “then” is the dependent variable.
* **Equations**: Write down any equations that will be used during the experiment to perform any calculations
* **Materials**: Your materials list must be very complete. You must indicate how much of each material will be used in the experiment. Leave a couple of lines so you can add extra things you forgot.
* **Procedure**: Writing on the left hand column, this should very clear, step-by-step list of things you plan to do during the experiment. Each step should be short (one sentence or phrase). Leave a couple of lines so you can add extra things you forgot
* **Observation**: On the right-hand column next to the appropriate step, take notes on what you experience with your senses. Use all of your senses—except taste!—when making observations. Make notes about the state of your chemicals/objects (e.g., physical state, color, smell) where appropriate, what happens when chemicals are mixed (e.g., color changes, gas evolution), and temperature changes. Also, use this section to accurately record data. Be as precise in your measurements as possible. Include at least one picture of the setup of the lab or what is going on in the lab.
* **Data and Calculations**: This is where you record all the data and results you collected during the experiment. This is typically done in the form of tables and charts. Also show any calculations you made for the experiment.
* **Class Analysis:** This is the section where you compare your results to the rest of the class. This helps to see whether your results are correct or not. You will answer the following questions:

1. What did you notice about the class’ results? Name at least two things.

2. How does your results compare with the rest of the class? Why do you think that is the case?

3. Is there any group that seemed to have incorrect results? Why do you think their results went wrong?

* **Conclusion:** The conclusion is the most important part of the experiment. This is where you analyze your results. You will:
* A one-line sentence that states whether the hypothesis is correct or not.
* Cite at least 2 forms of supportive evidence from the observations, data and/or calculation that proves why hypothesis is correct or not. Be very specific!
* Explain at least two things that could have caused errors in the lab
* Explain two things you could change in the lab to prevent errors in the future.
* Two questions you have relating to the experiment.

**Below features how your lab notebook will be set up:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Exp. Number**  1 | **Experiment/Subject:**  Effect of Surface Area on Rate | **Date:** 10/1/13 |  |
| **Name:** Princess Francois | **Lab Partner**  Bruce Gutierrez, Seema Ullal | **Locker/Desk No.** N/A | **Course & Section #**  Chemistry-Pd. 1  A & P- Pd. 2 |

Question:

What effect does the surface area have on the rate of dissolving?

Introduction:

In this experiment, we are looking to test the effect of surface area on the rate of dissolving. In order to do this, we will test the effect of three different surface areas of an Alka Seltzer Table (whole tablet, chunks, crushed) on the rate at which an Alka Seltzer dissolves. We will take data of the time it takes for a whole table, ¼ chunks and completely crushed Alka Seltzer to completely dissolve. If it takes longer to dissolve as you use smaller pieces, that means the surface area has a negative effect. If it takes shorter to dissolve as you use smaller pieces, that means the surface area has a positive effect.

Variables:

* Independent variable: surface area
* Dependent variable: rate at which the Alka Seltzer tablets dissolve
* Controlled variables:

1. amount of water

2. amount of Alka Seltzer

3. temperature of water

Hypothesis:

If I increase the surface area of the Alka Seltzer, then the rate at which the tables dissolve increases because the Alka Seltzer has more contact points with water.

Equations:

N/A

Materials:

* 6 Alka Seltzer Tablets
* Petri dish
* Mortar and pestel
* water
* beaker
* stopwatch

|  |  |
| --- | --- |
| Procedure | Observation |
| 1. Put 1 whole Alka Seltzer Tablet into 100 mL of water. 2. Record the time it takes for it to dissolve. 3. Rinse the beaker thoroughly. 4. Repeat steps 1 and 2 for a 2nd trial. 5. Calculate the mean between the two trials. 6. Break 1 Alka Seltzer Tablet into small pieces in a petri dish. 7. Put the small pieces of Alka Seltzer into 100 mL of water. Be careful to put all bits and pieces into the beaker. 8. Record the time it takes for it to dissolve.      1. Rinse the beaker thoroughly. 2. Repeat steps 5-7 for 2nd trial. 3. Calculate the mean between the two trials. 4. Completely crush an Alka Seltzer tablet into powder in a petri dish. 5. Dump all the powder into 100 mL of water. Be careful to put all bits and pieces into the beaker. 6. Record the time it takes for it to dissolve. 7. Rinse the beaker thoroughly.      1. Repeat steps 10-12 for 2nd trial. 2. Calculate the mean between the two trials. | Tablet = white  Tablet doesn’t fizz right away (**picture here)**  Time: 90s  Time: 100s  Pieces are different sizes  Begins to fizz right away.  Some pieces left in beaker. (**picture here)**  Time: 78s  Time: 72s  Looks very powdery  Some powder remained in beaker (**picture here)**  Time: 53s  Time: 65s |

Data and Calculations:

Data:

|  |  |  |  |
| --- | --- | --- | --- |
| **Time It Takes for Tablet to Dissolve** | | | |
|  | **Whole Tablet** | **Chunks** | **Crushed** |
| **Trial 1** | 90s | 78s | 53s |
| **Trial 2** | 100s | 72s | 65s |
| **Mean** | 95s | 75s | 59s |

Calculations:

Whole Tablet: 90+ 100 = 95s

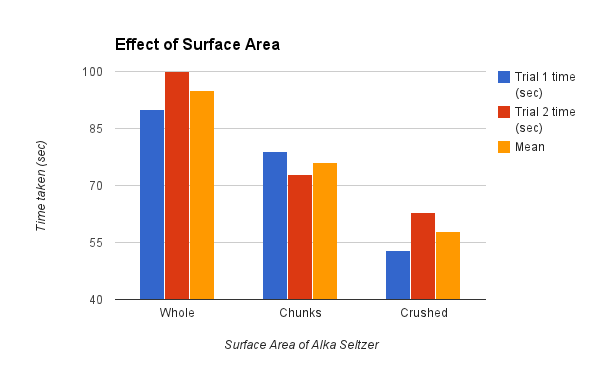
2

Chunks: 78+72 = 75s

2

Crushed: 53 + 65 = 59s

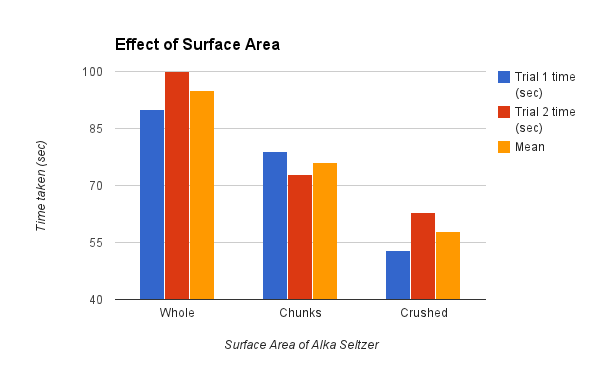
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Class Analysis:

Classroom Results:

|  |  |  |  |
| --- | --- | --- | --- |
| **Time It Takes for Tablet to Dissolve** | | | |
|  | **Whole Tablet** | **Chunks** | **Crushed** |
| **Trial 1** |  |  |  |
| **Trial 2** |  |  |  |
| **Mean** |  |  |  |



1. What did you notice about the class’ results? Name at least two things.

Most the class’ results showed that the crushed tablet dissolved the fastest. People’s results ranged around the same numbers, with a 5 second difference.

2. How does your results compare with the rest of the class? Why do you think that is the case?

My results are about the same with the rest of the class. I think this shows that my hypothesis is correct.

3. Is there any group that seemed to have incorrect results? Why do you think their results went wrong?

Group #1 results showed that the chunked tablet dissolved the fastest. Maybe there was something wrong with their stopwatch or they started to time the rate at the wrong moment.

Conclusion:

* My hypothesis was correct.
* 2 pieces of evidence that proved my hypothesis to be correct:

1. The mean rate of the whole tablet took 20 seconds slower than the mean rate of the chunked tablet.
2. There is a 36 second difference between the whole tablet and crushed tablet.

* Sources of error:

1. how the tablet was broken into pieces. The chunks may not have all been the same size.
2. the timing could be off because the counting down may not have started immediately after the tablet hit the water.

* Things to change in the experiment:

1. A knife could be used to break everything into equal size.
2. Having one person drop the tablet while someone else starts the stopwatch could help with more accurate timing.

* Two questions about experiment:

1. How would temperature affect the dissolving rate?
2. Would using a different type of tablet have an impact on the results?