**The Effect of [ insert your IDV here ] on the Time It Takes for One Alka Seltzer™ Tablet to Dissolve.**

**➊Research Question:**

What is the effect of **[ insert your IDV here ]** on the time it takes for one Alka Seltzer™ tablet to dissolve completely?

**➋IDV: [ insert your IDV here…don’t forget units!]**

**➌DV:** time (in seconds) it takes for one tablet to dissolve completely.

**➍Hypothesis & Explanation:**

If there is a relationship between **[ insert your IDV here ]** and the time it takes for one Alka Seltzer™ tablet to dissolve completely, then **[ insert your PREDICTION here, be as specific as possible].** This will occur because **[ insert your EXPLANATION OF WHY YOU THINK IT WILL HAPPEN here. Add a reference from which you got this information to back up your explanation!]**

**➎Variables Table: (This is where you add all the things you need to keep the same as to not mess up your experiment)**

|  |  |  |
| --- | --- | --- |
| **Variable to Control** | **WHY It Might Affect Experiment If Not Controlled** | **HOW The Designed Experiment Will Control For This Variable** |
| Type of Water | Different types of water might have other things already dissolved in it which can affect how the Alka Seltzer™ tablet dissolves. For instance, carbonated water will have a different effect on this experiment than tap water or distilled (pure) water. The extra carbonation in carbonated water may slow the release of carbon dioxide gas being produced by the chemical reaction due to oversaturation of the water of dissolved carbon dioxide. | I will only use tap water from room B116. |
| **[YOU come up with several other variables that are specific to YOUR experiment!]** |  |  |

**➏Materials List: (add other stuff you need for your experiment!)**

 **[# you need]** – 250 mL Ehrlenmeyer flask 1-Celcius thermometer **[# you need]** – Alka Seltzer™ tablets

1-100 mL graduated cylinder 1-stopwatch **[amount you need]** – mL of 23°C tap water

**➐Procedures: (Clearly numbered instructions)**

1. Add 50 mL of 23°C tap water to a flask.

2. Add 1 Alka Seltzer tablet to the flask and observe how long it takes for the tablet to completely dissolve in seconds. “Completely dissolved” means there are no visible pieces of the original tablet left or any more bubble formation.

3. Record the time it took to dissolve (sec) in Data Table 1.

4. [ETC…]

**➑Data Collection:**

*Data Table 1. The Effect of* ***[ insert your IDV here ]*** *on the Time It Takes for One Alka Seltzer™ Tablet to Dissolve, as measured in seconds.*

|  |  |  |
| --- | --- | --- |
| **[ insert your IDV here, UNITS UP HERE!]** | **Time to Dissolve (sec)** | **AVERAGE Time to Dissolve (sec)** |
| ***[You can type or write in your data here, regardless when it’s done it should look like the example below!]*** | 1. |  |
| 2. |
| 3. |
| 4. |
|  | 1. |  |
| 2. |
| 3. |
| 4. |

**➒Data Processing: (You need to DO something to raw data…Averaging & Graphing)**

***Data Table 1.*** *The Effect of Varying Water Temperatures on Speed of Alka Seltzer Tablet Dissolving (sec).*

|  |  |  |
| --- | --- | --- |
| **Water Temperature(°C)** | **Time to Dissove (sec)** | **AVERAGE Time to Dissolve (sec)** |
| 0 | 1. 300 |  293.8 |
| 2. 250 |
| 3. 275 |
| 4. 350 |
| 37 | 1. 100 |  98.8 |
| 2. 85 |
| 3. 105 |
| 4. 105 |
| 90 | 1. 30 |   38.8 |
| 2. 50 |
| 3. 35 |
| 4. 40 |

**EXAMPLE**

 **ONLY!**

**➓Sample Calculation:  *Example:* 300 + 250 + 275 + 350 = 1175 ÷ 4 = 293.8**

**Step 1:** Take the 4 trials of each IDV category you did and **AVERAGE** the times it took for tablet to dissolve.

**Step 2:** Make sure to **WRITE OUT** the averaging process you did under your data table.

**Step 3:** Graph **ONLY THE AVERAGES** for each IDV category! **NO GRAPHING RAW DATA POINTS!!!!!**

**➊➊Conclusion & Evaluation: (Need 4 paragraphs; tone should be professional, at least one page single spaced!)**

**1st Paragraph *(1¶):* Restate your original Research Question and Hypothesis with Explanation.**

**2nd Paragraph *(2¶):* Describe in detail how the experiment was conducted. Accurately summarize the results you got from your lab. Tell what happened using ACTUAL DATA from your tables and graphs.**

***3rd Paragraph (3¶):* Interpretation of whether your data SUPPORTS or DOES NOT SUPPORT your original hypothesis and WHY.**

**4th Paragraph *(4¶):* Identify at least 3 sources of error that could have messed up your results. Not just human error stuff! Could also be inherent flaw in way data was measured or experiment was designed!**

***(Below is an abbreviated version of a conclusion, your conclusions should be at least a page in length single spaced with a maximum 12 pt font size)***

***1¶ The original research question was whether or not different water temperatures would affect the speed at which one Alka Seltzer tablet dissolved. The hypothesis proposed was that at higher water temperatures, the tablet would dissolve faster than room temperature water. At lower temperatures it would dissolve slower than room temperature water. This is because water at high temperatures has more energy and molecules move around faster so it would dissolve faster (***[***www.howstuffworks.com***](http://www.howstuffworks.com)***, 8/20/13).***

***2¶ The experiment data show that at 90°C water, the 4 trials done were similar in that they all dissolved at around 30-50 seconds. The average of all 4 trials was 38.8 seconds. At room temperature water (37°C), all 4 trials also showed similar dissolving times of around 100 seconds. The average of these 4 trials was 98.8 seconds. Lastly, when the tablets were dissolved in almost freezing water (0°C), the 4 trials showed a consistent time of around 300 seconds to dissolve. The average of these trials was 293.8 seconds. Overall, there seems to be a trend supported by the data that shows the higher the water temperature Alka Seltzer is dissolved in, the faster it will dissolve.***

***3¶ The results from the experiment seem to support the original hypothesis. From Graph 1, the trend line clearly shows a linear relationship between temperature of water and time it takes for one tablet to dissolve. The higher the temperature of water, the less time it took for the tablet to dissolve.***

***4¶ There are several sources of error that could have affected the outcome of the experiment. One is the less-than-accurate way of determining when all of the tablet was dissolved. It was less than accurate because the definition and criteria of “dissolved” could have differed from one experimenter to the next. Another source of error could have happened if the person operating the stopwatch did not start the timing as accurately as possible. It was also possible that some stirring of the flask could have occurred even if it was not supposed to. Finally, there is the possibility of systemic error stemming from the manufacture of the tablets themselves, even though consistent quality is expected from the manufacturing company.***

**➊➋Works Cited:**

***How Stuff Works. 2009. Aug20 2013.*** [***www.howstuffworks.com/kineticenergy***](http://www.howstuffworks.com/kineticenergy)