**Log Book**

| Class & Group | S2-04, Group D |
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| Member Names | **Yeoh Tian Huai, Nathan Quek, Justin Ang** |
| Title | **Investigation of the acetaminophen in different fever and flu tablets** |

**Project planning:**

* As you plan your science project, use your lab notebook to capture the [questions](https://www.sciencebuddies.org/science-fair-projects/science-fair/science-fair-project-question) you hope to investigate, your [hypothesis](https://www.sciencebuddies.org/science-fair-projects/science-fair/writing-a-hypothesis), and your [variables](https://www.sciencebuddies.org/science-fair-projects/science-fair/variables).

| Research Question | Is the acetaminophen level in different fever and flu tablets from different companies safe for consumption? |
| --- | --- |
| Research Hypothesis | H1: The amount of acetaminophen in the 8 different brands of Panadol which should not exceed 500 mg per tablet (Assuming a lethal dose of 4000mg and taking 8 tablets within a 24 hour period). |
| Independent Variable | Different brands of tablets containing acetaminophen |
| Dependent Variable | Amount of acetaminophen |
| Control Variables | 1. Same method of finding 2. Same duration 3. Same method of testing 4. All are tablets 5. Their mass is the same |

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| **Log 1: Materials:**   * Did you make any changes or modifications to your materials used? * If yes, state the changes. * What have the changes affected the experiment? | |
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| **Date** | T1W3 |
| **Details** | Start gathering resources from home to see what else we need to buy. Some resources are celite, and hte different brands to use |

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| **Date** | T1W4 - 26 Jan - Wednesday |
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| **Details** | Ordering the Celite filter, gathering and buying the necessary amount of Paracetamol/Panadol/etc, tablets. |

| **Log 2: Experimental design:**   * Did you make any changes or modifications to your experiment design? * If yes, state the changes. * What have the changes affected the experiment? | |
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| **Date** | T1W4-27 Jan |
| **Details** | Adding in the Celite filtering steps. We have mastered filtering substances, sort of. |

| **Log 3: Procedures:**   * Did you make any changes or modifications to your procedures? * If yes, state the changes. * What have the changes affected the experiment? | |
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| **Date** | T1W5-30 Jan |
| **Details** | Finalise all equipment needed for experiment and bring to school |

| **Log 4: Test** | |
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| **Date** | T1W5 - 31 Jan |
| **Details** | Did a calibration run of Spectrometer and learnt how to use it. Will continue to do the experiment. |

| **Log 5: Test** | |
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| **Date** | T1W5 - 1 Feb |
| **Details** | Tested the diatomaceous earth filter, substituted a blue tack for a vacuum stopper. Filter works. To reduce instance of putting to much filter, use a spoon. Fill about half a spoon for satisfactory results. |

| **Log 6: Test** | |
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| **Date** | T1W5 - 3 Feb |
| **Details** | Tested some samples after filtering with diatomaceous earth filter, some samples include overdose of paracetamoul and tylenol |

| **Log 7: Test** | |
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| **Date** | T1W6 - 7 Feb |
| **Details** | Tested expired Paracil after filtering with diatomaceous earth ALONG with mixing it with potassium hexacyanoferrate 3. Satisfactory results |

| **Log 8 Data collection 1.**   * Insert your table(s) and graph(s) below. * Highlight the data points that are anomalous and try to explain why. | |
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| **Dates** | T1W6 - 8Feb, 10 Feb |
| **Details** | 8 Feb: Did some runs on Guardian, Paracil and Progesic tablets. We managed to fliter it and the results for Progesic were strange. Have to try again next week, see all the variables if they are working. Will check through and redo to see if it is an anomaly or incorrect preparation.Chart  Chart  Both runs are almost the same, with the exact same peak of 1.903 abs from around 400nm to around 450nm  10 Feb: Chart  Chart  As you can see, a clear peak of around 2 Abs can be noted at around 450nm in wavelength. This runs true even with both brands tested.  COMPARISON: Obeidat, W. M., Abuznait, A. H., & Sallam, A. (2010, January 7). *The UV scanning of paracetamol solution. the maximum absorbance occurs ...* ResearchGate. Retrieved February 10, 2023, from <https://www.researchgate.net/figure/The-UV-scanning-of-paracetamol-solution-The-maximum-absorbance-occurs-at-243-nm_fig1_40870552> |

| **Log 9 Data collection 2.** | |
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| **Date** | 17 February |
| **Details** | Tested today Tylenol and Progesic. Clear trend emerges in the form of a peak at about 410nm - 425nm. Checked to see if waiting 20min before testing impacts anything. No effect on trend or values obtained whatsoever. Chart  ChartChart  From this graph, we can see that the differences between waiting 10 minutes and waiting 20 minutes between samples have little to no change to the readings of acetaminophen  Chart  Chart |

| **Log 10 Data analysis 3** | |
| --- | --- |
| **Date** | 20 Feb 2023 |
| **Details** | We tested Panadol Mini Caps, which is a small capsule of Panadol  Chart  Chart  Panadol Mini Caps have a normal contour to Acetaminophen  We tested non-expired Paracil.  Chart  Chart  The contour is also very normal and similar to normal acetaminophen spike levels |

| **Log 11 Data analysis. In point form,**   * What are your key findings? * Limitations and recommendations of your experiment. * Explain your experimental results using your theory. * Compare your graphs or histograms with your hypothesis graph and conclude whether your hypothesis is accepted, rejected, or partially accepted. * Is there a modified theory behind this behavior? | |
| --- | --- |
| **Date** | 10 Mar |
| **Details** | Key Findings:  All levels of acetaminophen are below 500mg, highest is 411mg  Limitations and Recommendations:  Our results most likely would be very simplified compared to the more advanced equipment that are used to get very precise results. To remedy this, we could check with an external laboratory with more sophisticated equipment and check our results with theirs.  Hypothesis:  Can conclude that the hypothesis that is correct. Specifically, we hypothesized that the amount of acetaminophen in each tablet will be less than 500mg. This holds true for all of the different brands, regardless of cost or pricing. The highest was Non-Expired Paracil, with 411mg, which is still less than 500mg. |

| **Log 12 Discussion. In point form,**   * What are the contributions of your research? * What are the practical applications? * What are the areas for further study? | |
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| **Date** | 9 Mar |
| **Details** | Contributions:  UN Goals 3, 12 and 16, which are Good Health and Well Being, Responisble Production and Consumption, and Peace, Justice and Strong Institutions. The research helps to ensure safety in the tablets.  Practical Applications:  It is a relatively simple experiment, although it requires the usage of some harmful chemicals, such as Potassium Hexacyanoferrate(III). Nevertheless, so long as protective gloves and goggles are used, no life should be harmed. Can be used to investigate and measure levels of acetaminophen in pills on a regular basis and to sniff out counterfits.  Further Study:  Analysing acetaminophen in liquids or syrups and sold commercially. |