

Abstract

The abstract is primarily a summary of your paper. It is a shortly worded section of 100-250 words that outlines the research question and states the argument(s) presented in the paper.

This research investigates how different amounts of five monosaccharides—glucose, fructose, D-ribose, D-mannose, and dextrose—affect the rate at which methylene blue changes into its colorless form, leucomethylene blue. Methylene blue undergoes a redox reaction in which the sugar acts as a reducing agent by transferring electrons to the methylene blue. In this experiment, different amounts of each sugar were tested with sodium hydroxide and methylene blue to compare their reaction rates. The color change from blue to colorless was observed to determine which sugar and amount produced the fastest reaction. Based on the current results, glucose produced the fastest observed reaction among the five sugars. Further testing with fructose will be conducted to determine the amount that produces the fastest color change and to further compare its reaction with the other sugars.

Introduction

In our research, our main goal was to find the exact amount of sugar we would need for methylene blue to turn to leucomethylene and back to methylene blue. Our hypothesis was to find out of the 5 sugars, which one can turn methylene blue into leucometheylene blue the fastest. We are trying to figure out which sugar has the best time and so far from our results, glucose had the best time of 15 seconds.

Methods

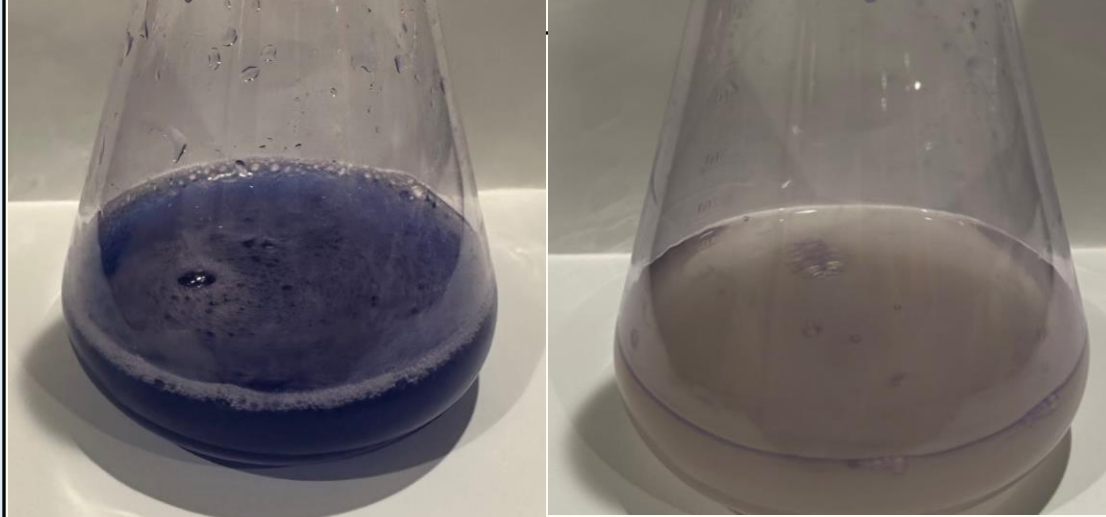
Using a 500ml flask, add 2 grams of sodium hydroxide to 100ml water and stir until it is completely dissolved. Dissolve 2g of glucose with the sodium hydroxide and swirl until clear. Next, add 1 ml of methylene blue solution was added. The methylene blue solution was prepared by mixing 1g of methylene blue and 1000 ml of water. The flask must be sealed and wait until it turns colorless. Once the solution is clear, you can swirl the solution, making the solution turn back to blue. The solution should take approximately 15 seconds to change back to blue.

Sugar Methylene Blue

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Results

- 2 grams of glucose to sodium hydroxide/methylene blue solution reduced methylene blue to Leucomethylene the fastest at 15 seconds.
- To achieve clear Leucomethylene blue, solution of 2g Sodium Hydroxide, 2g Glucose, & 1ml Methylene blue solution (1g methylene blue & 1000 ml water).
- Not all the monosaccharide sugars acted like this however, sugars like d-mannose took around 1 minute and 15 seconds to fully turn into Leucomethylene blue.
- Not all sugars acted alike and each sugar reduced methylene blue into Leucomethylene blue at different speeds.

	Glucose: 15 seconds
	Dextrose: 30 seconds
	Fructose: 30 seconds
	D-Ribose: 30 seconds
	D-Mannose: 1 minute 15 seconds

Discussion

Our results from the current test indicated that the rate of change of color of glucose was quicker than that of the other four sugars. It can be seen from the results that glucose was able to change the color of methylene blue, to leucomethylene blue at a much faster rate than dextrose, D-mannose, fructose, and D-ribose. In changing the color of methylene blue, glucose exhibited the redox reaction where glucose served as a reducing agent. Dextrose and D-mannose were also able to change colors at a reversible manner between blue and colorless, while fructose had varying results and it is currently being tested. Using different amounts of each sugar, we were able to compare the observed reaction times under the tested conditions. According to our current results, glucose produced the fastest reaction and thus our best result so far.

Conclusion

- **Findings:** Glucose reduced Methylene blue into Leucomethylene blue the fastest at 15 seconds. While D – Mannose was the slowest at 1 minute 15 seconds.
- **Hypothesis:** Not all sugars reduce methylene blue to leucomethylene blue the same. This is supported by our findings for the difference in time took to reduce in Glucose vs D – Mannose
- **Continued:** Through the next experiments, we will continue to experiment with Glucose and other sugars by comparing Glucose to similar sugars like Fructose.

End-Game Strategy

We will continue to work with other sugars to find the best solution. Our hopes are that with Fructose, we can get the fastest time because it is the sugar that reacts the fastest out of the five sugars that we have.

References

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