Chemistry 101—Lab 5: Using the Scientific Method

Questions:

1. What question did you seek to answer?

Can the amount the balloon fills up be controlled by the amount of baking soda?

2. What was your hypothesis?

Our hypothesis was that the more baking soda that was added, the bigger the balloon would get, answering yes to the proposed question.

3. Procedure: How did you design an experiment to test this hypothesis? Specifically, what was the independent variable? Dependent variable? Controls? Degree of replication?

We did one trial of the experiment and then chose what we thought would be the best question to test based on the reaction during the first experimental trial. The independent variable was the baking soda, because that is what we changed throughout the experiment. The circumference of the balloon after it filled up was what we were testing, making it the dependent variable. The controls—the things that stayed the same throughout all trials of the experiment—were the amount of vinegar (always 100mL), the size of the bottle, and the type of balloon. The degree of replication was five.

4. Results and Discussion: Include your data below in a tabular or graphical form. What did your data tell you? Did you confirm the hypothesis?

Our hypothesis was confirmed. Our data shows that the more baking soda added did increase the amount that the balloon filled up. It was not a drastic difference, but it was definitely noticeable, especially comparing our smallest amount of baking—4 grams—with our largest amount of baking soda—31 grams. There was almost a 15 cm difference in the balloon’s circumference between the two. The middle three numbers did not differ as much though.

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| Trial Number: | Amount of Baking Soda (in grams): | Balloon’s Circumference (in centimeters): | Amount of time it took the balloon to fill up (in seconds): | Amount of vinegar (in milliliters): |
| Trial 1: | 11 g | 40 cm | 24 s | 100 mL |
| Trial 2: | 26 g | 42 cm | 14 s | 100 mL |
| Trial 3: | 12 g | 42 cm | 16 s | 100 mL |
| Trial 4: | 4 g | 30 cm | 14 s | 100 mL |
| Trial 5: | 31 g | 44 cm | 12 s | 100 mL |

5. Conclusion: How could you modify your hypothesis and/or experiment in light of this data to more completely answer your initial question?

I don’t think that our hypothesis would need to be modified, but aspects of the experiment could be. Using a larger range of grams for the baking soda would better prove the hypothesis, such as starting with 5 grams and increasing by intervals of 10 grams, so that the fifth (and possibly final) trial would be 45 grams. Doing more trials of the experiment would also help prove the hypothesis. You could use a different amount of vinegar for the constant to possibly change the data, but since we were testing the amount of baking soda, the amount of vinegar did not really matter as long as it stayed constant. This same concept could apply to using a different size bottle from what we used.