**Impacting the Time of a Chemical Reaction**

**Directions:**

1. *You will design an experiment to test a variable on reaction time*
2. *Read the background information*
3. *Choose a variable: temperature, concentration, or surface area*
4. *Create a purpose, question, hypothesis, and prediction by filling in the blanks*
5. *Write a brief procedure-* 
   1. *remember to test only ONE variable and measure ONE variable*
   2. *make procedure detailed enough for me to follow at home on my own*

**Background**

Chemical reactions are part of life. Your body is constantly converting molecules from your food into the molecules that make up the parts of you. These reactions would occur slowly without enzymes that act as catalysts. Adding catalysts are one method of speeding up chemical reactions. These are needed to bring the molecules together and cause these to interact in order to react. Increasing temperature, concentration, and surface areas are other methods of increasing reaction time. A simple reaction involves alka-seltzer (or antacids) tablets and water. When placed in water, these tablets effervesce or produce carbon dioxide bubbles as the sodium bicarbonate reacts with water. The reaction time can be measured by timing the production of bubbles. If bubbles are produced over a long period of time, then the reaction time is slow. If bubbles are produced quickly and stop fizzing in a short period of time, then the reaction time is considered fast. A summary of the reaction is shown below:

Chemical Reaction:

Alka Seltzer tablets + water → bubbles

Sodium bicarbonate dissolves into ion form and reacts with citric acid to make bubbles and water

The time of the reaction is the time over which bubbles form.

**Purpose**

The purpose of this lab is to observe the effect of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on the time of a chemical reaction.

(2 points)

**Question**

What is the effect of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on reaction time?

(2 points)

| **Hypothesis**  Increasing the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the time of the reaction because  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (5 points) |
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| **Prediction**  If the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the reactants is increased, then the time of the reaction will  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (3 points) |
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**Protocol**

| **Every Test Needs** | **Options for different variables** |
| --- | --- |
| * 4 alka seltzer tablets * graduated cylinders for 50 mL of water * timer * 4- cups * enough water to fill each beaker with 50 ml of water | balance to measure mass of crushed tables if needed (concentration) |
| access to cold, room temp, mild, and hot water if needed (temperature) |
| thermometer- to measure temperature of water (temperature) |
| mortar and pestle- to break or crush tablets if needed (surface area) |

* design a protocol that will test the assigned variable. You must complete 3 different increments of the variable (for example, three different temperatures, surface areas, or concentrations)
* use the first steps as a guideline and use the materials listed (14 points)

| 1.  2.  3.  4. |
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**Analysis**

1. [**Create a graph**](https://nces.ed.gov/nceskids/createagraph/) **to represent your data. Choose a line or bar graph depending on the variables used.** (title-2, y axis title and units-2, x axis title and units-2, no data labels-3, scale changed to fit graph-6 = 15 points)
2. **State a conclusion by filling in the statements below.** (3 points per statement = 9 points)
3. **You should discuss the trend or lack of trend in the data. Use actual data points, highest and lowest or slope or pattern.**

| The data shows that as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ increasesthe time of the reaction \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
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| For example, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| In conclusion, increasing the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **did or did not** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the time  of the reaction. |