Name: _____ **Date:** _____

Chemistry *~ Ms. Hart* **Class:** Anions or Cations

THE URBAN ASSEMBLY SCHOOL FOR CRIMINAL JUSTICE

Lab #18: Factors that Affect the Rate of Chemical Reactions

Introduction:

What are the five factors that most affect the rate of a chemical reaction? Write a briefly description of how each affect a chemical reaction.

1. _____

_____

2. _____

_____

3. _____

_____

4. _____

_____

5. _____

_____

This lab will focus on exploring these different factors and seeing how they affect the reaction of an alka-seltzer tablet. Alka Seltzer tablets contain solid sodium bicarbonate and citric acid. When dropped into water, sodium citrate, carbon dioxide, and water are formed:

$NaHCO_3$ + Citric acid ---> CO_2 + H_2O + Sodium Citrate

The sodium citrate is a weak base. It neutralizes stomach acid (mainly HCl).

Hypothesis: (What do you think will affect the rate of the chemical reaction, alka-seltzer tablets dissolving in water?)

_____

_____

_____

Materials:

1. Effervescent tables
2. Plastic cups
3. Beaker
4. Plastic knife
5. Water (different temperatures)
6. Test tubes

Procedure:

PART 1: SURFACE AREA

1. Obtain 3 effervescent tablets, 3 plastic cups, and 1 beaker.
2. Crush up into powder ONE effervescent tablet in the beaker w/ the plastic knife. BE CAREFUL not to break the plastic knife. (Use your fingers to help powder it if necessary). Pour the powder into the first plastic cup.
3. Break apart a second effervescent tablet. Place this in a second cup.
4. Place the last effervescent tablet in the third cup.
5. Pour the **SAME** amount of water (using what tool?) over each tablet and record the time it takes for each effervescent tablet to completely dissolve.
6. Make observations and CLEAN OUT YOUR CUPS so the next student group can complete this.

PART 2: TEMPERATURE

1. Create a data table for this part in your results section.
2. Obtain 2 effervescent tablets. Place them each in separate beakers.
3. Pour 50 mL of HOT water into one beaker and record the time it takes for the tablet to dissolve.
4. Pour 50 mL of COLD water into the second beaker and record the time it takes for the tablet to dissolve.
5. Make observations.

PART 3: PRESSURE

1. Create a data table for this part in your results section.
2. Obtain 2 test tubes. Fill them ½ way with room temperature water.
3. Obtain 1 effervescent tablet and break it in half evenly. Place approximately the same amount/size piece into each test tube (2 test tubes).
4. COVER ONE TEST TUBE with your thumb, and leave the other uncovered while the tablet dissolves.
5. Observe the difference in reactions.

Observations:

PART 1

_____

_____

_____

PART 2

_____

_____

_____

PART 3

_____

_____

_____

Data:

TABLE 1: Effect of Surface Area

Size of Tablet	Dissolving time (s)

TABLE 2: EFFECT OF TEMPERATURE

TABLE 3: Effect of Pressure

Conclusion:

Directions: In the space below, write a conclusion that addresses the following:

- Describe the purpose of this lab
- Use evidence from your data to explain how surface area, temperature and pressure affect the rate of a chemical reaction
- Analyze your results and explain why these factors affect the rate of a chemical reaction
- Explain the application of this finding on the field of chemistry.

	Exceeding Standards	Met Standards	Approaching Standards	Initiating Standards
Introduction	☐ All pre-lab questions are complete and accurate ☐ Hypothesis is thoughtful and complete	☐ All pre-lab questions are complete and accurate ☐ Hypothesis is complete, but not scientifically based	☐ Missing some pre-lab questions ☐ Hypothesis is complete	☐ Missing some pre-lab questions ☐ Hypothesis is incomplete
Data, Observations	☐ Data is properly recorded ☐ Table is set up in a logical, easy-to-read manner. ☐ Observations are detailed and clear	☐ Data is properly recorded ☐ Table is set up but not entirely easy to follow. ☐ Observations are complete	☐ Data is properly recorded ☐ Table is incomplete. ☐ Observations are lacking sufficient details to draw conclusions	☐ Data is incomplete. ☐ Results not presented in a table ☐ Observations are incomplete
Conclusion	☐ Answers the purpose of the lab ☐ All explanations are thoroughly explained and supported by the experimental data. ☐ Makes a connection to how this finding relates to chemistry at large.	☐ Answers the purpose of the lab ☐ Most explanations are thoroughly explained and supported by the experimental data. ☐ Explains connection to how this finding relates to chemistry at large.	☐ Answers the purpose of the lab ☐ Most explanations are thoroughly explained and supported by the experimental data. ☐ Explain is unclear on the application of this lab	☐ Missing two of the previous characteristics

OVERALL LAB: _____/12 POINTS