Name_____

Hour _____

Guiding Question: What affects the fizz rate of antacid tablets?

Observe and **describe** what happens during the teacher's demonstration.

Container A	Container B

Plop Plop Fizz Fizz: A Review of $QPOE_2$

Independent Variable • Take a close look at how you could change the materials in the experiment. • List materials and possible ways to change each material. • Circle the material and change you want to make, that is your independent variable		*Dependent Variable* • What outcome is the independent variable going to change? • How will you measure the change?		
1	2	Measurement	Tool	Metric Unit
3	4			
		Counting	Start Location/ Time	End Location/ Time
5	6			

What is your independent variable? (What are you testing?)

_____

What is your dependent variable? (How will you measure this?)

_____

Control: Everything in your experiment that you NEED to keep the same; used for comparing your data.

Testable **Question:** What do I want to know?

Write your testable below. Make sure it contains both your independent and dependent variables.

_____

_____

Evaluate your question: Things to consider.....

Is this question measurable? Explain:

_____

_____

Are there enough materials available? Is there enough time available? Explain:

_____

_____

Does my question have both independent and dependent variables and is it measurable?

☐ If yes continue with the lab.

☐ If no rewrite your question.

Why is this question important? Is there a real life connection?

_____

_____

_____

_____

_____

_____

_____

Knowledge Probe: What do I know? What do others know?

What do you and your group members already know about antacid tablets?

What do others know about antacid tablets? Make sure you CITE your sources and have a minimum of 4 pieces of information.

Websites

1. http://www.alkaseltzer.com/as/faqs.html#q1
2. http://www.alkaseltzer.com/as/facts.html
3. http://science.howstuffworks.com/innovation/science-questions/question116.htm
4. https://www.youtube.com/watch?v=TKpMTz06qrU
5. http://antoine.frostburg.edu/chem/senese/101/consumer/faq/why-does-alkaseltzer-fizz.shtml
6. http://learn.bcbe.org/mod/resource/view.php?id=421686
7. https://www.youtube.com/watch?v=NQhwNtY3N2k

Prediction: An expected outcome of an investigation, based upon prior knowledge. Some predictions are hypotheses. The hypothesis describes the relationship between the independent and the dependent variables.

What do you predict will be the answer to your testable question?

_____

_____

_____

Is your prediction a hypothesis? Yes or No (Circle one) Explain.

_____

_____

Guidelines for evaluating your prediction (check if the answer is yes):

- ☐ Does your prediction try to answer the testable question?
- ☐ Did you use your knowledge probe to answer the testable question?
- ☐ If the prediction is a hypothesis, does the hypothesis describe the relationship between the independent and dependent variables?

Investigation Plan: What steps do I use?

An investigation plan is a fair test designed to answer the question being investigated. A fair test can be repeated. It clearly states:

*what is going to be observed, measured, and recorded
*what will change (variable)
*what will stay the same (control)

The steps in the investigation plan

*must be in number order
*must be complete and clear to let another person repeat the investigation
*might include labeled drawings or diagrams

Items to consider in writing an investigation plan include:

*what data to gather and how much data to gather
*what tools/materials to use
*what measurements to record and to what accuracy
*the number of trials to conduct
*how to reduct the sources of error

My investigation plan:
List the materials and equipment that your group will need. BE VERY SPECIFIC!!!

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

List your groups' investigation plan below.

- [ ] Can your investigation plan be repeated?
- [ ] Are you only testing one variable?

Did all other factors stay the same?

Is it clear how your results will be measured?

Observation: What is my data?

Observation is the process of gathering information (your data) from the investigation in an organized way. There are two categories of scientific observations.

Qualitative Observation: Information about the characteristics of an object or an event that are gathered directly by using your senses (touching, hearing, looking, smelling, and tasting). Examples include color, shape, texture and odor. They may be recorded using written descriptions, sketches, drawings, photos, videos and audio media.

Quantitative Observation: Information that can be described using numbers. Examples include the number of leaves on a plant, change in mass, measurement of the height of an object, temperature.

Inference: A conclusion based upon what you are observing. Inferences go beyond what we can directly sense or prove.

All observations must be clearly labeled.

Record all of your observations in the space below.

Data Analysis: How do I make sense of my data?

Data analysis is the process of working with the data collected, thinking about the information and selecting which data will provide evidence to support your answer. Data analysis can include:

- summarizing observations
- determining what data are important
- identifying patterns and trends that help explain the data
- choosing a data analysis strategy (a way to work with or show my data) that organizes the data (counting, graphing, or a mathematical operation (mean, median, mode, range)

Organize your data below using a graph, chart or a diagram.

Summarize your data using complete sentences.

_____
_____
_____
_____
_____
_____
_____

Evaluating My Data Analysis (check if the answer to the question is yes):

☐ Did I choose the best way to organize my data?
☐ Did I summarize my data using complete sentences?

Explanation: What did I learn?

Explanation is a set of statements providing your **claim** based on your **evidence** and supported by sound **reasoning**. **(CER)**

Claim: A statement that provides the researcher's answer to the question investigated. (It tells what you learned).

Evidence: The scientific data selected (gathered or collected) to support the claim. Scientific data is information that can be gathered through investigations, observations or looking up what others have done.

Reasoning: The argument used to show why the selected data should count as evidence. A strong argument should include:

- ☐ personal prior knowledge
- ☐ how the investigation was a fair test
- ☐ scientific concepts , principles or theories (science ideas)
- ☐ alternative explanations (ideas, evidence, and arguments) from others

Write your explanation of the fizz rate of antacids in the space below.

Claim:_____

_____

_____

Evidence:_____

_____

_____

_____

_____

Reasoning:_____

_____

_____

_____

_____

_____

Have members of another group peer edit your explanation in a color.

Confidence Chart

How Confident am I in my investigation results?

Strongly confident because I

- ☐ Conducted a minimum of 10 trials
- ☐ Minimized the sources of error
- ☐ Others had similar results and confirmed my investigation
- ☐ Used scientific concepts, principles or theories (to support my thinking)

Somewhat confident because I

- ☐ Conducted a minimum of 5 trials
- ☐ Attempted to minimize the sources of error
- ☐ Others had similar results and confirmed my investigation
- ☐ Used scientific concepts, principles or theories (to support my thinking)

A little confident because I

- ☐ Conducted a minimum of 3 trials
- ☐ Considered (thought about) potential sources of error
- ☐ Others didn't have similar results and did not confirm my results
- ☐ Did not use scientific concepts, principles or theories (to support my thinking)

Not confident at all because I

- ☐ Conducted less than 3 trials
- ☐ Did not consider any sources of error
- ☐ Others didn't have similar results and did not confirm my results
- ☐ Did not use scientific concepts, principles or theories (to support my thinking)

Evaluation: How well did I/we do?

This self assessment is used by the researcher to critique the investigation/lab experience. To help with this, use the following questions.

What were my sources of error? (These can be issues with timing, procedures, equipment, temperature changes, etc..)

What would I do differently next time?

How confident are I in my results? (See the Confidence Chart)

What surprised you?

What would your prediction be if you did this investigation again?

What question would you like to investigate next?

Give an example of where you showed integrity in this lab?

Give an example of where you showed curiosity in this lab?

Give an example of where you showed persistence in this lab?