Science 10 Chemistry Design Lab (Alka Seltzer Lab)– Summative Assessment 1

Criterion B: Inquiring and designing

i. describe a problem or question to be tested by a scientific investigation

ii. outline a testable hypothesis and explain it using scientific reasoning

iii. describe how to manipulate the variables, and describe how data will be collected

iv. design scientific investigations.

Achievement level	Level descriptor
0	The student **does not** reach a standard identified by any of the descriptors below.
1–2	The student is able to: i. **state** a problem or question to be tested by a scientific investigation, with **limited success** ii. **state** a testable hypothesis iii. **state** the variables iv. design **a method, with limited success**.
3–4	The student is able to: i. **state** a problem or question to be tested by a scientific investigation ii. **outline** a testable hypothesis **using scientific reasoning** iii. **outline** how to manipulate the variables, and **state** how **relevant data** will be collected iv. design a **safe method** in which he or she **selects materials and equipment**.
5–6	The student is able to: i. **outline** a problem or question to be tested by a scientific investigation ii. **outline and explain** a testable hypothesis **using scientific reasoning** iii. **outline** how to manipulate the variables, and **outline** how **sufficient, relevant data** will be collected iv. design **a complete and safe method** in which he or she **selects appropriate materials and equipment**.
7–8	The student is able to: i. **describe** a problem or question to be tested by a scientific investigation ii. **outline and explain** a testable hypothesis **using correct scientific reasoning** iii. **describe** how to manipulate the variables, and **describe** how **sufficient, relevant** data will be collected iv. design a **logical, complete and safe method** in which he or she **selects appropriate materials and equipment**.

Criterion C: Processing and evaluating

i. present collected and transformed data

ii. interpret data and describe results using scientific reasoning

iii. discuss the validity of a hypothesis based on the outcome of the scientific investigation

iv. discuss the validity of the method

v. describe improvements or extensions to the method.

Achievement level	Level descriptor
0	The student **does not** reach a standard identified by any of the descriptors below.
1–2	The student is able to: i. **collect and present** data in numerical and/or visual forms ii. **accurately interpret** data iii. **state** the validity of a hypothesis **with limited reference** to a scientific investigation iv. **state** the validity of the method **with limited reference** to a scientific investigation v. **state limited** improvements or extensions to the method.
3–4	The student is able to: i. **correctly collect and present** data in numerical and/or visual forms ii. **accurately interpret** data and **describe** results iii. **state** the validity of a hypothesis based on the outcome of a scientific investigation iv. **state** the validity of the method based on the outcome of a scientific investigation v. **state** improvements or extensions to the method that would benefit the scientific investigation.
5–6	The student is able to: i. **correctly collect, organize and present** data in numerical and/or visual forms ii. **accurately interpret** data and **describe** results **using scientific reasoning** iii. **outline** the validity of a hypothesis based on the outcome of a scientific investigation iv. **outline** the validity of the method based on the outcome of a scientific investigation v. **outline** improvements or extensions to the method that would benefit the scientific investigation.
7–8	The student is able to: i. **correctly collect, organize, transform and present** data in numerical and/or visual forms ii. **accurately interpret data** and **describe** results **using correct scientific reasoning** iii. **discuss** the validity of a hypothesis based on the outcome of a scientific investigation iv. **discuss** the validity of the method based on the outcome of a scientific investigation v. **describe** improvements or extensions to the method that would benefit the scientific investigation.

For this lab you are expected to design a lab, which investigates the effect of a factor that changes the rate of reaction of Alka Seltzer in water.

Preliminary Research

- Do some background research of what Alka Seltzer is and make notes making sure that you record all the sources you used as it will be necessary to reference them in your lab.
    - Questions you may want to ask can include but are not limited to the following: What is Alka Seltzer, what is the chemical make up of it, what is it used for
- Watch the video in the link below:
    - https://www.youtube.com/watch?v=GBiCdm-zcd4
    - Write down your observations of the video
- Any other research you need to do to get a whole picture before you start your design

Decision

- using your notes and learning of rates of reaction and factors that affect rate of reaction, pick ONE factor that you'd like to test to see how it affects the dissolving of Alka Seltzer in water.

Hypothesis/Prediction

- Make a hypothesis about your factor that changes the reaction. The hypothesis must be based on your previous research and knowledge of the topic (it's not just a random guess)
    - Ex. Based on my research on how pressure changes the density of the molecules, I think that as pressure decreases the rate of reaction decreases, because less pressure means molecules move further apart and become less dense reducing the likelihood of colliding. On the other hand increased pressure means the molecules move more closely to each other and chances of them colliding is higher, which means the reaction will occur faster.
    - (extra learning → the above example is called an "alternate hypothesis" where the statement states that changing the variable in question WILL, in fact, change the outcome. Meanwhile a "null hypothesis" is the hypothesis that states that the variable in question has no impact on the outcome. – by the end of the experiment, you should be able to prove the alternate hypothesis OR the null hypothesis)

Design (the most tedious part)

- Determine your dependant and independent variables.
- Design an experiment which controls ALL the variables possible except the one you are testing as the factor that affects the rate of reaction
- Make sure your experiment is designed to collect quantitative data, thought qualitative data can be helpful too.
- Your lab design
    - Must be simple & repeatable, you must have as many trials as possible, your procedure must be detailed
- List out all your materials you need – ask your teacher for anything that you need help with
- List out the safety precautions that you need to take
- List out a detailed procedure and the estimated dates of the completion of the trials
    - How many trials are you going to have?

Collection of Data

- Using PREMADE tables and charts record any and every observation possible, once the lab is completed, you can't go back in time, you will only have your recorded observation. Did I mention QUANTITATIVE observations are better as they are more objective?

Write up

As you have practiced before your write up must include the following.

i. Background/Introduction- this comes from your preliminary research. It would make it relevant if you talked about why do we care? Why are we doing this experiment in the first place?
ii. Hypothesis/prediction
iii. Methods/procedure – be RELEVANTLY detailed – someone reading your procedure should be able to repeat the experiment and should, theoretically, get the same results
iv. Observations – This includes your RAW DATA – that is the tables of observations you recorded AND your TRANSFORMED DATA – which is your data represented and interpreted in graphs and charts or descriptions. This is your analysis of the data – what does the data show? How do you interpret it?
v. Conclusion – refer back to your hypothesis. Were you right? Wrong? Why? What went right? What went wrong? (experimental errors) How would you do it differently next time? What did you become curious about more and would be interesting and RELEVANT to explore in future experiments? SO WHAT: Why do we care at all? How does this experiment help us understand a bigger picture of rates of reactions? How does it help us better our world?

MAKE SURE TO READ COMPARE YOUR WRITE UP TO THE RUBRIC HOW CAN YOU IMPROVE IT?