**Name(s): Due Date:**

**Science 9: Static Electricity Lab Design**

**Goal:** Design, complete and interpret experiment results to test your hypothesis.

**Your task:** Perform an experiment to determine **which 2, of a possible 8 materials, produces the best static charge?**

1. Choose a dish of paper pieces & any 6 of the materials on the side bench. Two rubbing materials; Four solid materials.
2. The experiment needs:
* Purpose- state the question to be answered/problem to be solved!
* **Use independent variable and dependent variable(s) to create the hypothesis**
 -prediction of results ….. if \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_then\_\_\_\_\_\_\_\_\_\_\_\_\_occurs
* Constants
* Materials
* Safety concerns
* Procedure
* Results – Table of Observations/Qualitative observations

After experiment performed

* Final Analysis – What do your results show?
* Conclusion and Critique of Experiment
	+ - 1. You will discuss the design of your experiment with your partner. I have created a template for you to use in google classroom. Please complete all required parts.
			2. **The procedure is already provided but you must choose the materials you wish to test!**
* A step-by-step description of how to carry out the lab exercise.
* How will you create static charge?
* A statement explaining how to measure and determine the amount of static charge build-up using paper pieces
* Describes how many times each trial/test will be repeated, and any calculations required to analyze data.
	+ - 1. **Quantitative Observations will be recorded in a table**. Use the table in the template to help you set up **your** table or delete table and create your own. Label columns/rows with variables. Ensure enough space to record all observations for all trials. Record relevant qualitative observations in the next section. You may wish to create a table for these as well.
			2. **On lab day** follow the procedure, record all observations in the table(s) you provide, and come to a conclusion based on your evidence from the lab. **Summarize results in final analysis section. Use this to write conclusions.**
			3. Then **type the conclusion**. Was your hypothesis supported by evidence or refuted? Your statements should be backed-up by clear evidence (numbers?) that would have been discovered by doing the lab.
			4. You will also **type the critique in a paragraph** that states what you would do differently if you were to repeat the lab over again and discuss improvements to design.
			5. All parts of the lab should be typed into the google classroom document, including data recorded when performing lab. You will need to meet with your partner during flex time or after school to finish the lab report! **Completed and typed reports must be turned in through google classroom. Only one partner needs to submit lab, but both of you must collaborate to finish all parts. If this does not happen, then each person will be required to complete conclusion and critique independently and then submit lab separately including all parts.**

**Names:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block:\_\_\_\_\_\_\_**

**PURPOSE:** (state the question to be answered/problem to be solved)

**INDEPENDENT VARIABLE** (what is changed):

**DEPENDENT VARIABLEs** (what is measured, counted, observed):

**DESCRIBE CONSTANTS** (Describe variables you need to control to ensure a fair test!/Explain):

**HYPOTHESIS:**

 **LIST OF MATERIALS USED:**

**SAFETY CONSIDERATIONS:**

**PROCEDURE:**

1. Spread out the punched paper in the petri dish so that they are evenly distributed.
2. Choose your test materials: Two soft rubbing materials and three solid materials. List materials choose in the table of observations in the results section of this lab.
3. Decide the number of trials you will do for each combination of solid and soft rubbing materials
 *two times* or *three times* **circle one.** *On the computer revise the table so the cells to record # of paper pieces are split into two/three rows.*  **For each trial (soft rubbing material + solid material):**
4. Use one of the two soft rubbing materials to rub the end of a solid object **20 times**. *Avoid touching your hand where you rubbed the solid object! This step creates static charge!*
5. Hold the end that you rubbed horizontally, directly above the punched papers for a 2-3 seconds.
6. Slowly lift the object and count how many pieces of punched paper stick to the object, are lifted, and/or dropped by the object. What does the number of pieces picked up tell you about static charge build up?
\_**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
7. Record this value in your observation table.
8. Remove the paper pieces from the solid object and return them to the petri dish.
9. Describe any relevant qualitative observations in the results section.
10. Repeat this trial one or two more times with the same cloth and solid object combination. Record all counts in the table of observations.
11. Then repeat steps 4 - 9 with the other solid objects and the same rubbing material.
12. Switch to the second rubbing material and repeat steps 4-11.
13. The table should be complete. Calculate the average paper piece counts for each combination of materials (solid object + rubbing material) by finding the total pieces and dividing by the number of trials (2 or 3)
14. Discuss average counts in final analysis and the conclusion.

**RESULTS: Table of Observations - Quantitative**

|  |  |  |  |
| --- | --- | --- | --- |
|  **Solid  Material** **Rubbing Material** |  |  |  |
|  | **Number of Paper pieces attracted to soil material! Two or Three Trials** |
|   |  |  |  |
| **Average Count #** |  |  |  |
|  |  |  |  |
| **Average Count #** |  |  |  |

**Qualitative observations:** *Be sure to organize these observations by solid + material combination*

**FINAL ANALYSIS** – What do the results show? Summarize findings! Which combination of materials picked up the most paper pieces? What does this mean in terms of static charge build-up? Did any solid materials not pick-up paper pieces? What does this mean?

**Complete after performing lab:**

**Conclusion**: Did you answer your original question/stated problem? In a concise and clear paragraph, briefly summarize your results. Which combination of materials picked up the most paper pieces? Did any solid materials not pick-up paper pieces? Was your hypothesis supported or refuted? What did you measure and observe to test your hypothesis? Use your observations to back up your conclusions. Explain why some solid materials pick-up paper pieces while other solid materials did not pick up paper pieces?

 **Critique of Experiment**: How could you have performed the lab better? Were there any design flaws in the procedure, how you counted the paper pieces or in the observation table that need to change to improve the lab? What are some sources of error that might make your results unreliable? Are there some other controlled variables (constants) that need to be included if the experiment were repeated. Explain reasons for changes to lab procedure, additional constants, and sources of errors.

**Rubric – Skill Based Assessment Names:**

|  |
| --- |
| ***Competencies 1- I can design portions of an experiment to test a hypothesis***.-Write the purpose – create a prediction based on your studies of static electricity use this to formulate a hypothesis; determine the independent and dependent variables and constants; make predictions; list materials |
| **Emerging**Poor attempt to identify IV, DV and/or state hypothesis.Unfinished. Completed parts often incorrect.List of materials missing many items.Many **constants** are not identified. No explanation given to explain relevance.  | **Developing**Identified the IV, DV and stated Hypothesis.Several required components are incorrect/unclear. Incomplete list of materialsSome of the **constants** identified are unrealistic/not effective and/or some important **constants** are not identified or understood. | **Proficient**Identified the IV, DV and stated Hypothesis.Most required components correct/clear.Complete list of materials.**Most constants identified** are suitable but have some weaknesses and/or attempts are made to justify.  | **Extending**Identified the IV, DV. and stated Hypothesis. All components correct/clear.Complete list of materials.**All constants are identified** which are important to the reliability of test results and are justified. |
| ***Competencies 2 - I can conduct a scientific experiment obtaining appropriate qualitative and quantitative observations and present this data in an organized manner using tables, charts and/or graphs.*** -qualitative observations are specific and relevant; quantitative observations are accurate and contain units; results organized and presented neatly in tables.  |
| **Emerging** | **Developing** | **Proficient** | **Extending** |
| ***Competencies 3 - I can process, analyze, and evaluate results to write a conclusion and critique results/experiment design.*****-** Summarize observations/data obtained in both parts of experiment; describe whether the hypothesis was supported or refuted; explain results; suggest revisions/changes to procedure/design to improve experiment and/or errors or problems with experiment design/results. |
| **Emerging**Conclusion not made. Questions not discussed or answered thoughtfully. Many statements not backed up by the correct evidence. Very unclear.Critique of experiment fails to meet most requirements. | **Developing**Results/ analysis are used to produce a conclusion and/or interpreted logically. Some statements are backed up by reasonable evidence.Critique of experiment attempted and showed some understanding of flaws in design but no suggestions for improvement stated. | **Proficient**Results/analysis are used to produce a conclusion and/or interpreted logically. Most statements are backed up by reasonable evidence.Critique of experiment recognizes some flaws in design/execution and suggests at least two appropriate improvements. | **Extending**Results/analysis are used to produce a conclusion and/or interpreted completely and logically. All statements are backed up by clear evidence.Critique of experiment addresses all questions and describes important flaws and some improvements in design/execution of experiment. |