**PERIODIC TABLE LAB**

Ms. Kovach is interested in purchasing two chemicals that the science department has never used in demonstrations before: rubidium and titanium. Before she invests in the materials, the science department needs to know which element is more reactive with water… and they need your help!

Using the given metals, test their reactivity with water to identify a trend in reactivity on the periodic table. Using your quantitative and qualitative data, make a recommendation for Ms. Kovach- which element will produce more energy when reacting with water? In addition, what other qualities should she expect when she purchases this substance (hardness, malleability, expected observations when reacted with water)? You will need to support your recommendation with data from your lab as well as research on the trends in the periodic table. You should also include an explanation of *why* you think one substance will be more reactive than the other using your knowledge about atomic properties.

# LAB REPORT: You will be completing just a data table and conclusion for this lab, building off the skills we practiced (making a claim and backing it up with evidence and scientific reasoning) in the steel wool lab. This will be a digital document submitted on Google Classroom by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

# SAFETY: This lab can be very dangerous if not conducted safely. Do NOT touch any of the alkali metals with your hands. Be sure to wear safety goggles at all times. Most importantly, follow all instructions from your teacher.

# MATERIALS. You will be provided with the following items, along with other items of your choice from lab.

* Small chunks of the following elements:
  + Aluminum
  + Magnesium
  + Lithium
  + Sodium
  + Potassium
* Phenolphthalein
* 1- 250mL or 150mL beaker
* Watch glass
* Forceps
* Goggles
* Steel Wool

**DATA.** Create a data table to record both qualitative and quantitative data:

# Substance

# Location of each element on the periodic table (group number, family name)

* Qualitative data before reaction (hardness, malleability, shininess)
* Qualitative data during reaction (observations)
* Length of time substance takes to react to water

# PROCEDURE.

GROUP 13: THE BORON FAMILY

The element we are studying in this group is aluminum. Locate it on the Periodic Table (record as an observation).

1. Clean a small piece of aluminum with steel wool.
2. Place about 50 mL of distilled water and 1 drop of phenolphthalein solution in the beaker.
3. Drop in the aluminum, start timer, and observe carefully to see a reaction. Note the change in color of the indicator. Record your observations in your data table. \*If nothing happens after 2 minutes, assume this substance will not react with water and move on.

## GROUP 2: THE ALKALINE EARTH METALS

The element we are studying in this group is calcium. Locate them on the Periodic Table (record as an observation in your data table).

1. Clean a small piece of magnesium ribbon with steel wool.
2. Place about 50 mL of distilled water and 1 drop of phenolphthalein solution in the beaker.
3. Drop in the magnesium ribbon and observe carefully to see a reaction. Note the change in color of the indicator. Record your observations.
4. Pour solution down the drain and repeat the procedure using a small piece of calcium.

GROUP 1: THE ALKALI METALS (G**oggles are required**!!)

The elements we are studying in this group are lithium, sodium, and potassium. Locate them on the Periodic Table (record as an observation in your data table).

1. Obtain a small piece of metallic lithium. **Handle only with forceps**. Blot the excess mineral oil from the metal with paper towels. Next, cut into a small piece of each metal with a razor blade to observe how hard the metal is. Record the difference in hardness. \*will likely do this at the teacher’s prep station up front
2. Place about 50 mL of distilled water and 1 drop of phenolphthalein solution in the beaker.
3. Keeping the beaker at arm’s length, drop in the small piece of lithium metal.
4. **Immediately** cover the top of the beaker with a petri dish or watch glass. Record your observations.
5. Pour solution down the drain and repeat the experiment with sodium and potassium.

**CONCLUSION.** Write a conclusion using the rubric below to answer the prompt.

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| **Criteria** | Distinguished (3) | Proficient (2) | Approaching (1)  Proficiency | Not (0) Proficient |
| *Purpose and Procedure* | Includes descriptive purpose. Briefly summarizes techniques used (1-3 sentences) | States the main idea of lab, but not all components. Lists procedure step by step | Missing purpose OR procedure | Not included |
| *Data* | Includes multiple pieces of relevant data- quantitative (averages, when applicable) and qualitative | Includes some relevant data. Missing either important numbers OR observations | Lacking most important data. | Not included |
| *Claim and Evidence* | Draws specific conclusion(s) based on results (answers questions in prompt). Claim is logical, and both qualitative and quantitative data are used to support the claim. | Draws specific conclusion(s) based on results (answers questions in prompt). Only qualitative OR quantitative data is used to support the claim. | Not all of the questions from the prompt are answered  OR No data is used to support the claim. | Not included |
| *Reason* | Justifies WHY the claim and evidence make sense by explaining the chemistry of what is happening. Discusses their observations on the atomic level. | Includes some explanation as to why they saw the results they did, but it is lacking necessary detail OR does not connect with data (evidence) | Reason is vague OR incorrect | Not included |
| *Error Analysis* | Describes 2 possible errors in the lab and how those errors could have affected the data (increase or decrease final results); Data is referenced and effect of error matches. | Describes 1 possible error in the lab and how the errors affects results; Data is referenced and effect of error matches. | States human mistakes, not experimental errors  OR  Does not state the effect of each error. | Not included |
| *Extension* | Includes how to correct each error described. Poses a research question or an extension to the experiment they would like to test next. | Includes how to correct each errors described | Includes surface changes, such as “I will be more careful” or “measure better” | Not included |