WODSS SCIENCE Name: _____

SCH 3UI Date: _____

Investigation: Patterns of Chemical Reactivity in Metals

Purpose: To compare the reactivity and properties of Li, Na, K, Mg, and Al.

Materials:

Li, Na, Mg, Al	tap water	250-mL beaker	tweezers	scalpel
Phenolphthalein	paper towel	watch glass	spot plate	splint
Bunsen burner	goggles			

Procedure:

1. **Put on goggles. Never touch an alkali metal.** If you get any on your skin remove it immediately, flush the area with water, and then wash with soap and water. Since these metals react with water, caution should be used if you are flushing the area. Use copious amounts of water; if any metal remains, a large volume will be needed to neutralize the heat produced when the metal reacts.

2. Record the appearance of each magnesium and aluminum in your table. Add magnesium and aluminum to separate wells on a spot plate that are filled with water and one drops of phenolphthalein. Leave this until you are finished the other two reactions and then record your observations.

3. **Half-fill one** 250-mL beaker with tap water and add one drop of phenolphthalein.

4. Using tweezers, place one piece of lithium onto a clean, **dry** watch glass. Blot the metal using a piece of paper towel to remove the oil.

5. Cut into the metal with your scalpel to determine its hardness. Record your observations.

6. Drop the lithium into the water and quickly place the watch glass on top of the beaker. Record your observations.

7. **As soon as the metal has stopped reacting**, slide the flaming splint into the mouth of the beaker. Record your observations.

8. Look for any leftover pieces of metal. If you don't see any, dump the water from the beaker into the sink. If you do, call your teacher over to dispose of the leftover metal. Carefully rinse the sides of the beaker and the bottom of the watch glass (occasionally metal will splatter onto these surfaces).

9. Repeat steps 4-8 for sodium.

10. Go back and record your observations for magnesium and aluminum. Make sure to look very closely at these two. When fished, rinse and dry these metals and return to your teacher.

11. Watch teacher demonstration for potassium.

Observations:

	Li	Na	K	Mg	Al
Appearance					
Relative hardness (soft, softer, softest)				NA	NA
Behaviour of metal in water (list all observations)					
Effect of burning splint				NA	NA
Colour of phenolphthalein					

Questions:

1. Of Li, Na, and K, which was the most reactive (i.e. reacted most violently)? Which was the least reactive?
2. Imagine two electrons in one atom: one is close to the nucleus and one is farther away. Which electron should be easier to remove from the atom? Why?
3. Picture the Bohr-Rutherford diagrams for Li, Na, and K. Based on this information and your answers from 1 and 2, explain why ____ was most reactive and ____ was least reactive.
4. Name an alkali metal that is more reactive than K, Na, and Li.
5. Alkali metals react according to the equation: metal + water → metal hydroxide (^{-}OH) + hydrogen gas What did we use to test for the presence of metal hydroxides? What did we use to test for hydrogen gas? Write a balanced chemical equation for the reaction of sodium and water.
6. Why did the K beaker not react (pop) when the flaming splint was used?
7. Of Na, Mg, and Al, which was the most reactive? Which was the least reactive? Can you explain this trend?
8. What is the general trend for metal reactivity as you go down a group on the periodic table?
9. What is the general trend for metal reactivity as you go across a period (left to right)?

Marking Scheme

Section	Required Elements	Marks
Title	❑ Descriptive Title Given	1
Question	❑ Purpose of the lab	1
Results	❑ Observations are in a data table ❑ Data table has a proper title ❑ Columns are labelled ❑ Observations complete and descriptive	1 1 1 5
Discussion	❑ Answer questions #1-9	16
		Total /26