Reaction of Alkali Metals with Water

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

Procedure:

1. **Put on goggles**. Protective eyewear must be worn at all times due to the dangerous nature of handling alkali metals and their by-products. Never touch an alkali metal. If you get any metal 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. Half-fill a 250 mL beaker with tap water. Cover the top of the beaker with a watch glass. → 
3. Get another watch glass, a blade, lit candle, splint, forceps, litmus paper (3 red, 3 blue). Please, do not play with candles (e.g. don't write your name on lab benches with candle drippings, no miniature wax snowmen, and don't melt candles together to make one "super, hybrid, two-headed mutant candle, Mr. Schneider")

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4. Onto a clean, **dry** watch glass place one piece of Li using your forceps (2-3 mm^3 pieces will be cut for you).
5. Cut into the metal using the blade provided. Push the blade down with your forceps if it is difficult to cut. Look at the freshly cut metal (if you could only get halfway through the sample, you can get a better view by bending the two sides apart using the blade and forceps). Record your observation in the chart below.
6. Lift the watch glass off of the beaker just high enough to drop the Li into the water. Drop all of the lithium in at the same time. Quickly replace the cover and record your observations. Get ready for step 7.
7. As soon as the metal has stopped reacting, simultaneously lift one end of the watch glass and place a flaming splint in the mouth of the beaker (hold firmly to the watch glass). Record your observations below.
8. Touch one piece of red litmus and one piece of blue litmus to the water. Place used litmus in the trash.
9. Dump the water from the beaker into the sink. Carefully rinse the sides of the beaker and the bottom of the watch glass (occasionally metal will splatter onto these surfaces).

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10. Repeat steps 4 – 9 using Na in place of Li (**ensure that the watch glass is dry before getting the Na**).
11. Repeat steps 4 – 9 using K in place of Li (**ensure that the watch glass is dry before getting the K**).

Clean up: Rinse the sink (use the beaker to distribute water). Also rinse the following equipment very well: beaker, watch glasses, blade, forceps. Dry these with a paper towel and return. Wipe off your lab bench.

Observations:	Li	Na	K
Appearance			
Relative hardness (soft, softer, or softest)			
Behaviour of metal in water (list all observations)			
Effect of burning splint			
Colour of litmus (blue or red)			

Questions:

1. Of Li, Na, and K, which was the most reactive (i.e. reacted most violently)? Which was least reactive?
2. Draw B-R diagrams for Li, Na, and K.
3. Imagine two electrons in an atom: one is close to the nucleus and one is far away. Which electron should be easier to remove from the atom? Why?
4. Essentially, alkali metals react when an electron in the outer shell is removed. Based on this information, and your answers to 2 and 3, explain why __ was most reactive and __ was least reactive.
5. Name an alkali metal that is more reactive than K, Na, and Li. Name an alkali metal that is less reactive.
6. All metals in this lab, reacted according to the equation: metal + water → metal hydroxide + hydrogen. What did we use to test for the presence of metal hydroxides? What did we use to test for hydrogen?
7. Why did the K beaker not react (pop) when the flaming splint was used?