Activity #3: Periodic Trends and Properties of Elements

Materials:

Well Plate	Magnesium Metal	Magnesium Chloride ($MgCl_2$) 0.1 M
Small Beakers	Calcium Metal Turning	Calcium Chloride ($CaCl_2$) 0.1 M
Beral Pipets	Aluminium Foil	Strontium Chloride ($SrCl_2$) 0.1 M
Steel Wool	Phenolphthalein Indicator	Barium Chloride ($BaCl_2$) 0.1 M
Video: "Chemistry - A Volatile History" (Episode 2) by BBC		Sodium Carbonate (Na_2CO_3) 1.0 M

Procedure:

A. Metal Reactivity to Water:

1. Watch the video "Chemistry – A Volatile History (Episode 2: The Order of the Elements)" (19:05 to 21:02). Make detail observations.
2. Watch the video "Calcium with Water". Make detail observations.
3. Use a piece of steel wool and clean the surface a piece of magnesium metal until it shines.
4. Use a pair of scissors and cut a small piece of magnesium and place it in one of the well of the well plate.
5. Add about half a well plate of water. Record any observations.
6. Add 4 drops of phenolphthalein indicator to the well containing the magnesium metal and water. Again record any observations.
7. Repeat steps 4 to 6 with about the same size of aluminium foil.

B. Solubility of Alkaline Earth Metal Compounds with Sodium Carbonate:

1. Choose four wells horizontally along the well plate. For the first well you chose, add 20 drops of magnesium chloride solution ($MgCl_2$). In the second well, add 20 drops of calcium chloride solution ($CaCl_2$). In the third well, add 20 drops of strontium chloride solution ($StCl_2$). In the fourth well, add 20 drops of barium chloride solution ($BaCl_2$).
2. To each of the four wells above, add 20 drops of sodium carbonate solution (Na_2CO_3). Record any similarities and differences in these wells as your observations. (You might need to make note on any changes every few minutes for about 10 minutes until the reactions are completed.)

Observations:

Part A: Metal Reactivity with Water

IA	IIA	IIIA
Li: Lithium		
Na: Sodium	Mg: Magnesium	Al: Aluminium
K: Potassium	Ca: Calcium	

Part B: Solubility of Alkaline Earth Metal Compounds with Sodium Carbonate:

IIA: Alkaline Earth Metals
Mg: Magnesium
Ca: Calcium
Sr: Strontium
Ba: Barium

Questions to Ponder Before Writing the Statement of Understanding:

1. Using scientific principles you have learned so far, explain what metal atoms have to do first before they can undergo a chemical reaction in Part A.
2. What trends or patterns do you see in Part A as these different metal pieces react with water?
3. In Part B, the metal component of each compound (Mg, Ca, Sr, and Ba) is responsible for the chemical change with the carbonate in Na_2CO_3. What are the new substances formed in each of these wells?
4. What are the similarities and differences did you observe in the wells in Part B. What trend is responsible for these similarities and differences?
5. How can the observations you made in both parts of this activity proved or illustrated the specific periodic trends you mentioned in the last four questions?

Statements of Understanding:

When writing the paragraphs, make sure you address the following:

1. What are the phenomena you are investigating? (There are many, you should choose two.)
2. How can you explain the phenomenon using the evidences you collected (please list those evidences)? (**Particle Reasoning** please!)
3. What claims are you making from your explanations?

Hand in the observations along with your statements of understanding! A Title is also highly appropriate.