

Activity #4: Periodic Trends and Properties of Elements

Materials:

Magnesium Chloride (MgCl_2) 0.1 M	Magnesium Metal	3 Small Beakers
Calcium Chloride (CaCl_2) 0.1 M	Calcium Metal Turning	Beral Pipets
Strontium Chloride (SrCl_2) 0.1 M	Aluminium Foil	Steel Wool
Barium Chloride (BaCl_2) 0.1 M	Phenolphthalein Indicator	Well Plate
Sodium Carbonate (Na_2CO_3) 1.0 M	Video: "Chemistry - A Volatile History" (Part 2) by BBC	

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. Add water into each of the three beakers until it is one-third full.
3. Add 4 drops of phenolphthalein indicator to each of the beaker.
4. Use a piece of steel wool and clean the surface a piece of magnesium metal until it shines.
5. If the magnesium metal is not pre-cut, use a pair of scissors and cut it into a smaller piece.
6. Place the magnesium metal in one of the beakers. Record any observations.
7. Repeat the last step with the aluminium metal. Again record any observations.
8. Ask your teacher to give you a piece of calcium metal and record any observations.

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 (SrCl_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.