

**Graphing Periodic Trends**

**Purpose:** It is your job to make a line graph comparing your group's assigned property to the atomic number/symbol of the first 20 elements, so you can observe any trends in the data.

**Materials:** calculator, element data cards, graph paper, ruler, Microsoft Excel or Google Sheets/Spreadsheets

**Prelab Questions:** Define the following terms and draw a picture to help you remember the definition.

Term	Definition	Picture
1) atomic number		
2) atomic radius		
3) electron affinity		
4) electronegativity (Pauling's scale)		
5) ionization energy (1 <sup>st</sup> )		
6) valence electrons		
7) reactivity		

**To save time, I will just have you use copies of my [graphs](#) to finish the activity.**

**Procedure:** Make a line graph according to your group's data listed below. Paste a copy of your graph into the Google Classroom Template so it can be graded.

Group 1 — Make a line graph comparing atomic radius (y-axis) and atomic number-element symbol, 1-H, 2-He, 3-Li, etc. (x-axis).

Group 2 — Make a line graph comparing electron affinity (y-axis) and atomic number-element symbol, 1-H, 2-He, 3-Li, etc. (x-axis).

Group 3 — Make a line graph comparing electronegativity (Pauling's) (y-axis) and atomic number-element symbol, 1-H, 2-He, 3-Li, etc. (x-axis).

Group 4 — Make a line graph comparing 1<sup>st</sup> ionization energy (y-axis) and atomic number-element symbol, 1-H, 2-He, 3-Li, etc. (x-axis).

Group 5 — Make a line graph comparing the # of valence electrons (y-axis) and atomic number-element symbol, 1-H, 2-He, 3-Li, etc. (x-axis).

Group 6 — Make a line graph comparing chloride ratio (y-axis) and atomic number-element symbol, 1-H, 2-He, 3-Li, etc. (x-axis). **You must divide the number of chlorine atoms by the number of atoms for the element.** \*If the formula is CCl<sub>4</sub>, there are 4 chlorine atoms and only 1 carbon atom. The chloride to element ratio is 4:1 or 4/1 = 4.0. **You would type "4.0" into your spreadsheet.**

_____/1 Appropriate title (Main Topic: The Effect of ____ on ____)
_____/1 Appropriate x-axis label (with units, if applicable)
_____/1 Appropriate y-axis label (with units, if applicable)
_____/1 Correct data is graphed
_____/1 Graph is properly turned in using the Google Classroom rubric
_____/5 Total Points

**Questions:** RTQ—Restate the question in your answer in complete sentences.

- Does your [graph](#) reveal a repeating (cyclic) pattern? (*Hint:* Focus on the highs and lows of your graph.) **Describe** any patterns you observe.
- Cut out your element cards and arrange them in a row ([Digital Version](#)). When the pattern you observed in your graph repeats, start a new row below the first row. **Draw a picture of your arrangement below. Do you notice anything special about your arrangement?**  
 Ex) A B C D E  
     F G H I J  
     K L M N O

3. What happens to the [atomic radii](#) as you go. . .
- across a period (left to right) on the periodic table?

A blank periodic table grid with 7 rows and 18 columns. The first two columns are on the left, and the last two are on the right, with a gap in the middle representing the transition metals. The grid is intended for students to write the trend of atomic radii across a period and down a family.

- down a family (top to bottom) on the periodic table?

4. What happens to the [electron affinity](#) as you go. . .
- across a period (left to right) on the periodic table?

A blank periodic table grid with 7 rows and 18 columns. The first two columns are on the left, and the last two are on the right, with a gap in the middle representing the transition metals. The grid is intended for students to write the trend of electron affinity across a period and down a family.

- down a family (top to bottom) on the periodic table?

5. What happens to the [electronegativity](#) as you go. . .
- across a period (left to right) on the periodic table?

A blank periodic table grid with 7 rows and 18 columns. The first two columns are on the left, and the last two are on the right, with a gap in the middle representing the transition metals. The grid is intended for students to write the trend of electronegativity across a period and down a family.

- down a family (top to bottom) on the periodic table?

6. What happens to the [ionization energy](#) as you go. . .
- across a period (left to right) on the periodic table?

A blank periodic table grid with 7 rows and 18 columns. The first two columns are on the left, and the last two are on the right, with a gap in the middle representing the transition metals. The grid is intended for students to write the trend of ionization energy across a period and down a family.

- down a family (top to bottom) on the periodic table?

7. What happens to the [# of valence electrons](#) as you go. . .  
 a. across a period (left to right) on the periodic table?

- b. down a family (top to bottom) on the periodic table?

8. What happens to the [chloride ratio](#) as you go. . .  
 a. across a period (left to right) on the periodic table?

- b. down a family (top to bottom) on the periodic table?

9. Elements in the same family/group (column) have similar properties. Even though rubidium (Rb) and bromine (Br) weren't graphed as part of this activity, elements from their family/group were. Using the [graphs](#) and similar elements from the same family/group, predict **three** properties the following elements might have. Explain Your Answers.

A) rubidium (Rb):

B) bromine (Br):

10. Based on the class's graphs, why is the chemist's organization of elements called a *periodic* table? Are there other things in life that are periodic? Explain.

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**Conclusion:** Tell me something "NU"

**New:** What new modifications would you make to the experiment to study new independent variables or some other real-life application of this experiment? **Be specific.** Adding more repeated trials doesn't count as a modification. You cannot say you wouldn't make any changes. Don't use the words **change**, **different**, **etc.** If you want to use different materials, give me some **specific examples**.

**Uncertain:** What concepts from the lab are you still uncertain about? In other words, what questions do you still have after completing the lab? You cannot say that you are uncertain about nothing. If you have no uncertainties, then ask me a [H.O.T. question](#) related to the lab.

