

## Periodicity Excelet

Name: \_\_\_\_\_ Block: \_\_\_\_\_

### Pre-Lab:

1. Periodic trends are caused by :
2. The 4 factors that affect Periodic Trends are: ( supply explanations)
  - a.
  - b.
  - c.
  - d.
3. Octet Rule:
4. Valence electrons are:
5. Determine the atomic number & do the electron configuration for :  
H(atomic number \_\_\_):  
Li(atomic number \_\_\_):  
Na(atomic number \_\_\_):  
K(atomic number \_\_\_):
6. Determine the atomic number & do the electron configuration for :  
Li(atomic number \_\_\_):  
Be(atomic number \_\_\_):  
B(atomic number \_\_\_):  
C(atomic number \_\_\_):  
N(atomic number \_\_\_):  
O(atomic number \_\_\_):  
F(atomic number \_\_\_):  
Ne(atomic number \_\_\_):

### Model Set 1: ATOMIC RADIUS/SIZE

7. **ATOMIC RADIUS** is:
8. What is the **UNIT** that the **ATOMIC RADIUS** is expressed in this excelet?( hint: look at the graph)\_\_\_\_\_
9. Big Radius means:
10. Small Radius means:

#### Atomic Radius going down a group: ↓

11. Now enter the atomic numbers of the elements in question 5 in the trace box to observe their atomic radii.  
What seems to be happening to the atomic radius within the elements in this group?

*Repeat this for another group (choose group 2, 13, 14, 15, 16, 17, or 18).*

12. Does this match what occurred with group 1 elements? \_\_\_\_\_

#### \*\*\*Manipulating the graph by **GROUPS**\*\*\*

Scroll down to the red arrows, use the left arrow for period & right arrow for group manipulation

*For period, select all and for group select group 1, observe. Repeat this for all the groups 2-8 (do each group solo)*

13. **Conclusion:** The atomic size (increase/decreases) going down any group on the periodic table **because:**  
(hint: look at question 2 & 5)

14. Which atom is larger: Nitrogen or Arsenic

**Atomic Radius going across a period:** →

15. Enter the atomic numbers of the elements in question 6 in the trace box to observe their atomic radii. What seems to be happening to the atomic radius within the elements in this period?

*Repeat this for another period (choose period 3 or 4)*

16. Does this match what occurred with period 2 elements? \_\_\_\_\_

**\*\*\*Manipulating the graph by PERIOD\*\*\***

Scroll down to the red arrows, use the left arrow for period & right arrow for group manipulation

*Now, change group to select all and change period to period 2, then 3, then 4, etc*

17. **Conclusion:** The atomic radius (increase/decreases) going across any period on the periodic table **because:**  
(*hint: look at question 2 & 6*)

18. Which atom is larger: Magnesium or Sulfur

19. The smallest atom on the periodic table is: \_\_\_\_\_ the biggest atom on the periodic table is: \_\_\_\_\_

**MODEL SET 2: FIRST IONIZATION ENERGY**

20. Ions are:

21. **IONIZATION ENERGY** is:

22. Atoms on the periodic table want to achieve stability, they want \_\_\_\_\_ valence electrons so that they have a full \_\_\_\_\_ . (except for energy level 1, they want \_\_\_\_\_ valence electrons)

23. What group on the periodic table is completely stable and unreactive? \_\_\_\_\_

24. High ionization energy means it is (hard/easy) to remove an electron.

25. Low ionization energy means it is (hard/easy) to remove an electron.

26. What is the **unit** that the **ionization energy** is expressed in this exceclet? ( hint: look at the graph) \_\_\_\_\_

**Ionization Energy going down a group:** ↓

27. Look at question 5, enter the atomic numbers of these elements in the trace box to observe their ionization energies. What seems to be happening to the ionization energy within the elements in this group?

*Repeat this for another group (choose group 2, 13, 14, 15, 16, 17, or 18).*

28. Does this match what occurred with group 1 elements? \_\_\_\_\_

**\*\*\*Manipulating the graph by GROUPS\*\*\***

Scroll down to the red arrows, use the left arrow for period & right arrow for group manipulation

*For period, select all and for group select group 1, observe. Repeat this for all the groups 2-8 (do each group solo)*

29. **Conclusion:** The ionization energy (increase/decreases) going down any group on the periodic table **because:**  
(*hint: look at question 2, 5, & 13*)

30. Which atom has a higher ionization energy: Nitrogen or Arsenic

**Ionization Energy going across a period:** →

31. Look at question 6, enter the atomic numbers of these elements in the trace box to observe their ionization energies. What seems to be happening to the ionization energy within the elements in this period?

*Repeat this for another period (choose period 3 or 4)*

32. Does this match what occurred with period 2 elements? \_\_\_\_\_

\*\*\*Manipulating the graph by PERIOD\*\*\*

Scroll down to the red arrows, use the left arrow for period & right arrow for group manipulation

Now, change group to select all and change period to period 2, then 3, then 4, etc.

33. **Conclusion:** The ionization energy (increase/decreases) going across any period on the periodic table **because:** (hint: look at question 1, 2, & 17)

34. Which atom has a higher ionization energy: Magnesium or Sulfur

35. The atom on the periodic table that has the highest ionization energy is: \_\_\_\_\_ the atom on the periodic table that has the lowest ionization energy is: \_\_\_\_\_

**MODEL SET 3: ELECTRONEGATIVITY**

36. What is **ELECTRONEGATIVITY**?

37. Explain how the game of tug of war is an analogy for electronegativity.

38. What is the **UNIT** that the **ELECTRONEGATIVITY** is expressed in this excellet? ( hint: look at the graph) \_\_\_\_\_

**Electronegativity going down a group:** ↓

39. Look at question 5, enter the atomic numbers of these elements in the trace box to observe their electronegativity. What seems to be happening to the electronegativity within the elements in this group?

Repeat this for another group (choose group 2, 13, 14, 15, 16, 17, or 18).

40. Does this match what occurred with group 1 elements? \_\_\_\_\_

\*\*\*Manipulating the graph by GROUPS\*\*\*

Scroll down to the red arrows. use the left arrow for period & right arrow for group manipulation

For period, select all and for group select group 1, observe. Repeat this for all the groups 2-8 (do each group solo)

41. **Conclusion:** The electronegativity (increase/decreases) going down any group on the periodic table **because:** (hint: look at question 2, 5, & 13)

42. Which atom has a higher electronegativity: Nitrogen or Arsenic

**Electronegativity going across a period:** →

43. Look at question 6, enter the atomic numbers of these elements in the trace box to observe their electronegativity. What seems to be happening to the electronegativity within the elements in this period?

Repeat this for another period (choose period 3 or 4)

44. Does this match what occurred with period 2 elements? \_\_\_\_\_

\*\*\*Manipulating the graph by PERIOD\*\*\*

Scroll down to the red arrows, use the left arrow for period & right arrow for group manipulation

Now, change group to select all and change period to period 2, then 3, then 4, etc.

45. **Conclusion:** The electronegativity (increase/decreases) going across any period on the periodic table **because:** (hint: look at question 2, 3, & 6)

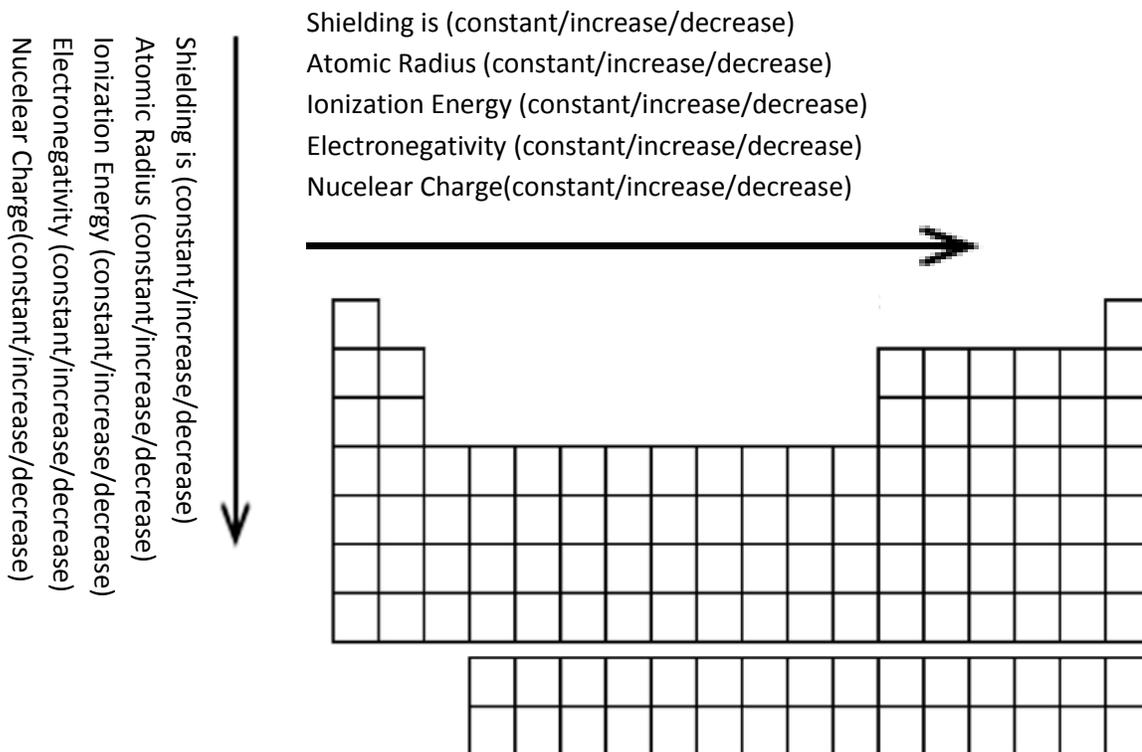
46. Which atom has a higher electronegativity : Magnesium or Sulfur

47. The atom on the periodic table that has the highest electronegativity is: \_\_\_\_\_ the atom on the periodic table that has the lowest electronegativity is: \_\_\_\_\_

**Summary:**

Let's summarize the trends you discovered in this activity. For each of the atomic property in the table below, indicate whether that property *increases* or *decreases*:

Property	Across the period (Left to right)	Down an group (Top to bottom)
<b>Atomic Radius</b>		
<b>Ionization Energy</b>		
<b>Electronegativity</b>		



**ION SIZE:** Click on the tab at the bottom: "Ion Properties". Check the boxes as shown to the right.

- 48. Ions:
- 49. Cation:
- 50. Anion:
- 51. Using the graph, how does the size of a **cation** compare to the neutral atom? Why?
- 52. What type of elements are **cations**?
- 53. How does the size of an **anion** compare to the neutral atom? Why?
- 54. What type of elements are **anions**?
- 55. Looking at this images below, label each as cation or anion ionic size.

add to the plot:

add cations

add anions

(click on the check boxes)

