

Trends of the Periodic Table Notes

1. _____ was the Russian man who invented the modern Periodic Table.
2. The COLUMNS on the table are called _____, there are _____ on the table.
3. The ROWS that go across the table to the right are called _____, there are _____ of these.
4. Group 1 (Li to Fr) are called the _____ metals
5. Group 2 (Be to Ra) are called the _____ metals
6. Groups 3 to 12 (plus under the stairs) are the _____ metals
7. On the right side of the staircase (and H) are the _____
8. Group 17 (F, Cl, Br, and I) are called the _____
9. Group 18 (He, Ne, Ar, Kr, Xe, and Rn) are the _____ gases
10. Seven (out of 9) atoms that touch the staircase are called the _____.
11. The 2 rows of atoms at the bottom are called the _____ metals.
They ALL fit into GROUP _____ and PERIOD _____ OR into GROUP _____ and PERIOD _____
12. Atoms in the same group share many _____ properties, because they have the same number of valence (outermost) _____, which means they al bond in similar ways.
13. Skip this one.
14. What does PERIODIC mean?
15. The elements of the Periodic Table are arranged in order

16. The Periodic Law states....

17. Similar properties “show up” periodically, IN THE _____.

18. At the top of the table, this happens every _____ atoms, but starting in the middle, it’s every _____ atoms.

19. The periods of the table go _____.

20. The periods contain many elements that have _____.

21. Period numbers go from _____, and they correspond to the number of _____ that all of the atoms of that period have.

22. Fill in this chart.

<i>Period</i>	<i>Example element</i>	<i>Electron configuration</i>	<i>Number of electron orbitals</i>
1	H		
2	Be		
3	S		
4	Mn		
5	Xe		
6	Ba		
7	Ra		

23. Fill in this chart that shows the SUBATOMIC particles.

Particle	Location	Charge	Mass	symbol
	Nucleus			
	Nucleus			
	Outside of the nucleus			

This is a cool way to show an element, with the important numbers.
Cobalt has mass of 59 amu, and it's atomic number is 27.



24. Calculate the number of protons, neutrons and electrons for this element now.

25. List ALL of the nonmetals (by symbol, in numeric order)

1	2	5	6	7	8	9	10
14	15	16	17	28	33	34	35
36	52	53	54	85	86		

26. List all of the metalloids by symbol—put a small M or NM in the box for the METALS and NONMETALS

5	14	32	33	51	52	85
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27. How many elements are METALS?

118 total elements — 22 nonmetals = _____ metal elements

28. There are _____ trends that we examine as

_____ trends are patterns going down a group, while the

_____ trends are patterns going across the table

29. These seven trends are:

Fill in these 2 charts for atomic mass (group 2 and period 3)

30. State the group trend for atomic mass?

31. State the period trend for atomic mass?

Group 2 ↓	Mass in amu
Be	
Mg	
Ca	
Sr	

Period 3 →	Na	Mg	Al	Si
Mass in amu				

Fill in these 2 charts for atomic Radius (from Table S) in picometers.

32. State the group trend for atomic radius

33. State the period trend for atomic radius

Group 1 ↓	Radius in pm
Li	
Na	
K	
Cs	

Group 2 →	Li	Be	B	C
Radius in pm				

34. Why is the group trend for atomic radius (size) increasing?

35. Why is the period trend for atomic radius decreasing?

36. Define Net Nuclear Charge:

Net Nuclear Charges. Fill in the charts.

Period 4 →	K	Ca	Sc	Ti
Atomic number				
Net Nuclear Charge				

Group 2 ↓	Atomic Number	Net Nuclear Charge
Be		
Mg		
Ca		
Sr		
Ba		

37. State the Group Trend for Net Nuclear Charge

38. State the Period Trend for Net Nuclear Charge

39. First Ionization Energy is

40. Fill in the chart.

Group 1 atom	1 st ionization energy	Electron configuration
Li	kJ/mole	
Na	kJ/mole	
K	kJ/mole	
Rb	kJ/mole	

41. State the group trend for 1st Ionization energy:

42. Why is the group trend for first ionization energy decreasing?

43. Fill in the chart, then...

Period 5 →	Rb	Sr	Y	Zr
1 st Ionization Energy kJ/mole				

State the period trend for first ionization energy.

44. The reason for this trend is...

45. List some metallic properties

46. List some nonmetallic properties

47. If you could rank all of the metals in all properties, and score out who wins the most times, the most metallic element is _____
48. If you could rank all of the NONmetals in all properties, and score out who wins the most times, the most NONmetallic element is _____ **This is dopey.**
49. Which element of these is the most metallic: strontium, copper or lead? _____
50. Which element in this group is the most nonmetallic: sulfur, bromine, or neon? _____

Cation Sizes and Anion Sizes

We have no charts to look over to determine the actual sizes of any ions, but we can still figure out the trends of cation sizes and of anion sizes by thinking.

51. How big is a PICOMETER?

Fill in these charts, for Group 1 CATIONS and Group 17 ANIONS

52 group 1 CATIONS	Electron configurations of cations	53. group 17 ANIONS	Electron configurations of anions
Li^{+1}		F^{-1}	
Na^{+1}		Cl^{-1}	
K^{+1}		Br^{-1}	
Rb^{+1}		I^{-1}	

54. State the GROUP TREND FOR CATION SIZE AND FOR ANION SIZE.

55. Why do these trends exist?

Fill in these charts for cation and anion sizes

CATIONS in Period 3 →	Na^{+1}	Mg^{+2}	Al^{+3}
56. Electron configurations			
ANION in Period 3 →	N^{-3}	O^{-2}	F^{-1}
57. Electron configurations			

58. State the period trend for CATION size

59. State the period trend for ANION size

60. Why is it that the Period Trend for CATION size decreases?
Why is it that the Period Trend for ANION size decreases?

ELECTRONEGATIVITY

61. Define Electronegativity (created by Dr. Linus Pauling)

Where are these electronegativity values located? _____

62. Draw... Let's imagine two hydrogen atoms bonding. They both have electronegativity values of 2.2

This is a
NON POLAR
BOND

63. Draw... Let's imagine HCl bonding now.

This is a
POLAR
BOND

64. Draw the structural diagram for HCl add the "arrow"

65. The arrow itself is called a _____

66. Fill in these two charts

Group 1 Atoms	electronegativity values
Li	
Na	
K	
Rb	

Group 17 Atoms	electronegativity values
F	
Cl	
Br	
I	

67. State the group trend for electronegativity. (it works for ALL groups)

68. Fill in this chart

Period 2	Li	Be	B	C	N	O	F	Ne
Electro Negativity Values								

69. State the period trend for electronegativity.

70. What's up with NEON?

71. The reason for the period trend for electronegativity to be increasing is...

72. Exceptions to the trends.

73. Here are the atomic masses for Period 4. Which way does the trend go (up or down?)

atoms	Mn	Fe	Co	Ni	Cu
Atomic mass units	54.9380	55.845	58.9332	58.693	64.456
Trend arrows					

74. Does nickel DESTROY the trend?

75. These are the Atomic Radii in period 2. Are the atoms getting bigger or smaller?

Atoms	Li	Be	B	C	N	O	F	Ne
Radius in pm	130.	99	84	75	71	64	60	62
Arrows	start	↓						

The period trend for atomic radius is decreasing. (mention fluorine)

76. Fill in table. Noble gases have no tendency to make bonds ever, so they don't have electronegativity values either, right? Look them up now.

Symbols	Names	Electronegativity value
2 -		
10 -		
18 -		
36 -		
54 -		
86 -		

77. Whoa! What's up with Xe?

78. Are there exceptions to Net Nuclear Charge?

79. Predict the actual sizes of these cations & anions

Atom	Atom Electron config.	Radius	Ion	Ion Electron configuration	Radius
Lithium	2-1	pm	Li^{+1}	2	pm
Magnesium	2-2-2	pm	Mg^{+2}	2-8	pm
Scandium	2-8-9-2	pm	Sc^{+3}	2-8-8	pm
<i>Oxygen</i>	2-6	<i>pm</i>	O^{-2}	2-8	<i>pm</i>
<i>Phosphorous</i>	2-8-5	<i>pm</i>	P^{-3}	2-8-8	<i>pm</i>

80. Cations are always...

Anions are always...

81. A relative scale is one that...

82. Electronegativity is a relative scale, all atoms being relative to _____.
Dr. Pauling determined that fluorine has the greatest tendency to gain electrons when making a bond.

83. An arbitrary scale is one that uses numbers that _____.
Dr. Pauling choose 4.0 for his highest value, given only to fluorine. All other values descending to zero.

84. Electronegativity is both...

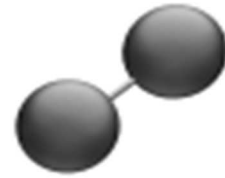
85. Allotropes are....

Examples include

Atomic oxygen



Diatomic oxygen



Ozone

