Honors Chemistry
Ms. Ye

Name ___________________________
Date _________________ Block ____

Do Now: Periodic Table Review…

1. Why do all elements want to be like a noble gas?

2. In terms of electrons, what can an atom do to try to be like a noble gas?

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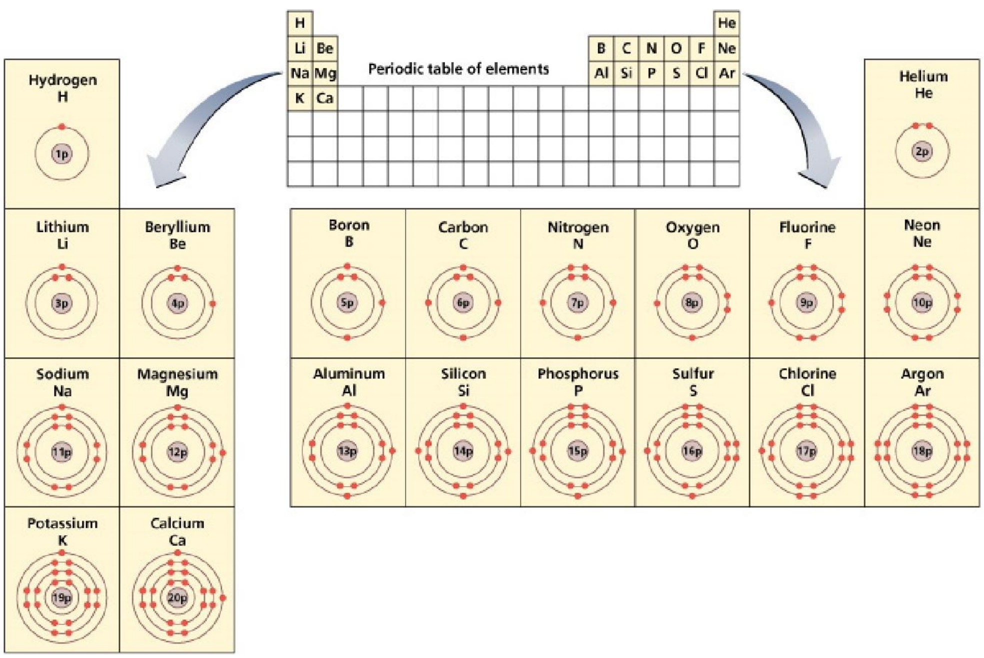
Periodic Table of Elements

- Is organized….
  - by increasing ________________________
  - based on elements with ____
- Each **row** is called a _______________________
- Each **column** is called a ___________________ or _____________________



1. As you go across a period (left to right):
   a. Does the number of energy levels change?

   b. Do you get closer or further from a noble gas element?

2. As you go down a group (top to bottom):
   a. Does the number of energy levels change?

   b. Do you get closer or further from a noble gas?
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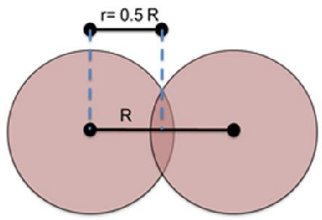
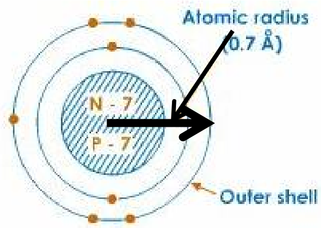
Periodic Trends

A periodic trend is a pattern for a specific characteristic of an element that is observed in the periodic table. These trends are general and have their exceptions.

1. Atomic Radius:

- A measure of the ___________________ of an atom



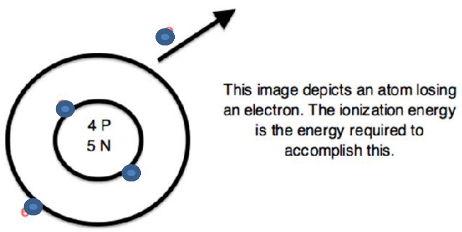


2. <u>Electronegativity</u>

- A measure of an atom's ability to ____________ or ______________________________
- Can be thought of as an atom's _____________ or greediness for electrons ("greedy like the Grinch")

3. <u>Ionization Energy</u>

- The amount of ______________required to _______________________ from the outermost shell of an atom
- A measure of an atom's ability to _________________________________ and form a cation



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1. Look up and record the value for the atomic radius for Mg and Ca. Which one has a greater atomic radius?
   1) Mg ____________ 2) Ca ____________

2. Look up and record the value for the electronegativity for Mg and Ca. Which one has a greater electronegativity?
   1) Mg ____________ 2) Ca ____________

3. Look up and record the value for the ionization energy for Mg and Ca. Which one has a greater ionization energy?
   1) Mg ____________ 2) Ca ____________
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REFERENCE TABLE

Atomic Number	Symbol	Name	First Ionization Energy (kJ/mol)	Electro-negativity	Melting Point (K)	Boiling* Point (K)	Density** (g/cm^3)	Atomic Radius (pm)
1	H	hydrogen	1312	2.2	14	20.	0.000082	32
2	He	helium	2372	—	—	4	0.000164	37
3	Li	lithium	520.	1.0	454	1615	0.534	130.
4	Be	beryllium	900.	1.6	1560.	2744	1.85	99
5	B	boron	801	2.0	2348	4273	2.34	84
6	C	carbon	1086	2.6	—	—	—	75
7	N	nitrogen	1402	3.0	63	77	0.001145	71
8	O	oxygen	1314	3.4	54	90.	0.001308	64
9	F	fluorine	1681	4.0	53	85	0.001553	60.
10	Ne	neon	2081	—	24	27	0.000825	62
11	Na	sodium	496	0.9	371	1156	0.97	160.
12	Mg	magnesium	738	1.3	923	1363	1.74	140.
13	Al	aluminum	578	1.6	933	2792	2.70	124
14	Si	silicon	787	1.9	1687	3538	2.3296	114
15	P	phosphorus (white)	1012	2.2	317	554	1.823	109
16	S	sulfur (monoclinic)	1000.	2.6	388	718	2.00	104
17	Cl	chlorine	1251	3.2	172	239	0.002898	100.
18	Ar	argon	1521	—	84	87	0.001633	101
19	K	potassium	419	0.8	337	1032	0.89	200.
20	Ca	calcium	590.	1.0	1115	1757	1.54	174
21	Sc	scandium	633	1.4	1814	3109	2.99	159
22	Ti	titanium	659	1.5	1941	3560.	4.506	148
23	V	vanadium	651	1.6	2183	3680.	6.0	144
24	Cr	chromium	653	1.7	2180.	2944	7.15	130.
25	Mn	manganese	717	1.6	1519	2334	7.3	129
26	Fe	iron	762	1.8	1811	3134	7.87	124
27	Co	cobalt	760.	1.9	1768	3200.	8.86	118
28	Ni	nickel	737	1.9	1728	3186	8.90	117
29	Cu	copper	745	1.9	1358	2835	8.96	122
30	Zn	zinc	906	1.7	693	1180.	7.134	120.
31	Ga	gallium	579	1.8	303	2477	5.91	123
32	Ge	germanium	762	2.0	1211	3106	5.3234	120.
33	As	arsenic (gray)	944	2.2	1090.	—	5.75	120.
34	Se	selenium (gray)	941	2.6	494	958	4.809	118
35	Br	bromine	1140.	3.0	266	332	3.1028	117
36	Kr	krypton	1351	—	116	120.	0.003425	116
37	Rb	rubidium	403	0.8	312	961	1.53	215
38	Sr	strontium	549	1.0	1050.	1655	2.64	190.
39	Y	yttrium	600.	1.2	1795	3618	4.47	176
40	Zr	zirconium	640.	1.3	2128	4682	6.52	164
41	Nb	niobium	652	1.6	2750.	5017	8.57	156
42	Mo	molybdenum	684	2.2	2896	4912	10.2	146
43	Tc	technetium	702	2.1	2430.	4538	11	138
44	Ru	ruthenium	710.	2.2	2606	4423	12.1	136
45	Rh	rhodium	720.	2.3	2237	3968	12.4	134
46	Pd	palladium	804	2.2	1828	3236	12.0	130.
47	Ag	silver	731	1.9	1235	2435	10.5	136
48	Cd	cadmium	868	1.7	594	1040.	8.69	140.
49	In	indium	558	1.8	430.	2345	7.31	142
50	Sn	tin (white)	709	2.0	505	2875	7.287	140.
51	Sb	antimony (gray)	831	2.1	904	1860.	6.68	140.
52	Te	tellurium	869	2.1	723	1261	6.232	137
53	I	iodine	1008	2.7	387	457	4.933	136
54	Xe	xenon	1170.	2.6	161	165	0.005366	136
55	Cs	cesium	376	0.8	302	944	1.873	238
56	Ba	barium	503	0.9	1000.	2170.	3.62	206
57	La	lanthanum	538	1.1	1193	3737	6.15	194

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Periodic Trends War

This is an adaptation of the card game 'war', except instead of using playing cards, we will use cards with an element on it.

Instructions:

1. Get into groups of 4. Distribute the cards so that everyone has ONE card that is numbered 1-6
2. For each round, you will be comparing your element cards and a specific value from the provided reference table. For each round, make sure you turn over the element card that corresponds to the round number.
3. As a group, order the cards from smallest value to largest value. Then, determine who wins the round based on who has the greatest value for the trend you are looking at for this turn.
4. Fill in each row of the following table as you complete each round

Round	Periodic Trend to Compare	Your element and its value from *the reference table*	Order of elements (from smallest to largest value)	Winner (greatest value)
1	Atomic Radius			
2	Electronegativity			
3	Ionization Energy			
4	Ionization Energy			
5	Electronegativity			
6	Atomic Radius			

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PERIODIC TABLE INDEPENDENT STUDY PART 1

Questions: Based on the values you filled in the table, answer the following questions (each question matches the corresponding round number in the table):

1. Round 1:
   a) Place your elements in order of increasing atomic number

   b) In general, what happens to atomic radius as you compare elements going down a group (top to bottom)?

   c) Based on what you know about the structure of an atom, why do you think this occurs?

2. Round 2:
   a) Place your elements in order of increasing atomic number

   b) In general, what happens to electronegativity as you compare elements going across a period (left to right)?

   c) Based on what you know about an atom's desire to obtain a noble gas electron configuration, why do you think this occurs?

3. Round 3:
   a) Place your elements in order of increasing atomic number

   b) In general, what happens to ionization energy as you compare elements going down a group (top to bottom)?

   c) Based on what you know about the structure of an atom and the definition for ionization energy, why do you think this occurs?

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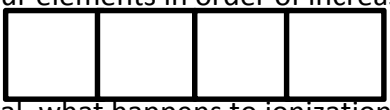
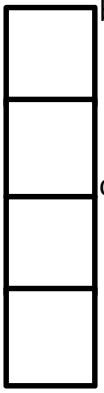
4. Round 4:
   a) Place your elements in order of increasing atomic number



   b) In general, what happens to ionization energy as you compare elements going across a period?

   c) Based on what you know about an atom's desire to obtain a noble gas electron configuration, why do you think this occurs?

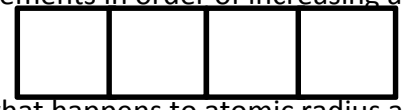
5. Round 5:
   a) Place your elements in order of increasing atomic number



   b) In general, what happens to electronegativity as you compare elements going down a group?

   c) Based on what you know about the structure of an atom and the definition for electronegativity, why do you think this occurs?

6. Round 6:
   a) Place your elements in order of increasing atomic number



   b) In general, what happens to atomic radius as you compare elements going across a period?

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Independent Study: Periodic Table Part 2

Read "The First Periodic Table" (link to reading posted on chemistrye.weebly.com) and answer the following questions:

1. What was the first way that Mendeleev organized his element cards?

2. Why did Mendeleev organize the element cards into several short rows and columns?

3. Why is the element table called the "periodic" table of elements?

4. Why did Mendeleev move Titanium (and the elements after it) to the right after organizing his table? What occurred as a result?

5. How was Mendeleev able to predict elements?

6. What part of Mendeleev's original periodic table is still used in the way the periodic table is currently organized?

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How is the Periodic Table Organized?

Below is a portion of the periodic table. In the answer spaces provided in the table, fill in the appropriate information for each element as indicated in the key below. Then, answer the questions that follow.

Key
[1] atomic number
[2] abbreviated electron configuration
[3] number of energy levels (shells)
[4] number of valence electrons

H [1] _____ [2] _____ [3] _____ [4] _____							He [1] _____ [2] _____ [3] _____ [4] _____
Li [1] _____ [2] _____ [3] _____ [4] _____	Be [1] _____ [2] _____ [3] _____ [4] _____	B [1] _____ [2] _____ [3] _____ [4] _____	C [1] _____ [2] _____ [3] _____ [4] _____	N [1] _____ [2] _____ [3] _____ [4] _____	O [1] _____ [2] _____ [3] _____ [4] _____	F [1] _____ [2] _____ [3] _____ [4] _____	Ne [1] _____ [2] _____ [3] _____ [4] _____
Na [1] _____ [2] _____ [3] _____ [4] _____	Mg [1] _____ [2] _____ [3] _____ [4] _____	Al [1] _____ [2] _____ [3] _____ [4] _____	Si [1] _____ [2] _____ [3] _____ [4] _____	P [1] _____ [2] _____ [3] _____ [4] _____	S [1] _____ [2] _____ [3] _____ [4] _____	Cl [1] _____ [2] _____ [3] _____ [4] _____	Ar [1] _____ [2] _____ [3] _____ [4] _____

Base your answers to the following questions on the information you filled out in the table above:

1. In what order are the elements of the Periodic Table arranged?

2. What do all the elements in the same group of the Periodic Table have in common?

3. What do all the elements in the same period of the Periodic Table have in common?

4. Imagine element number 15 had never been discovered. What characteristics would you predict it to have based on its location on the periodic table?

H							He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	?	S	Cl	Ar
K	Ca						

Element 15
Number of energy levels: _____

Number of valence electrons: _____

5. Based on how Mendeleev organized the elements of the periodic table, which characteristic (of the 4 in the table above) do you think is responsible for elements in the same group for having similar chemical properties?