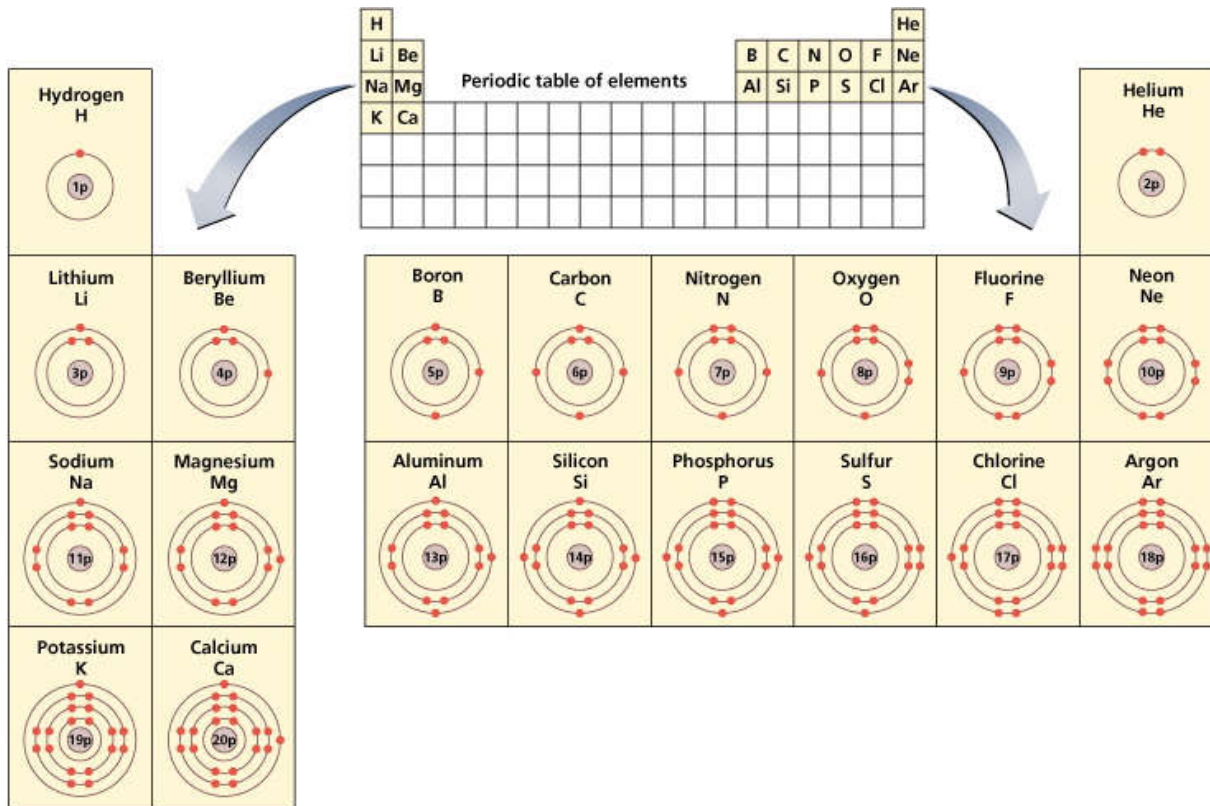


Periodic Table and Element Properties
Chemistry

Name _____

Date _____ Block _____

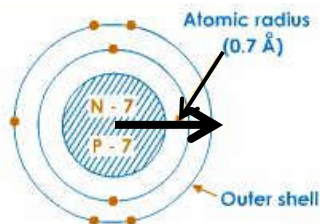
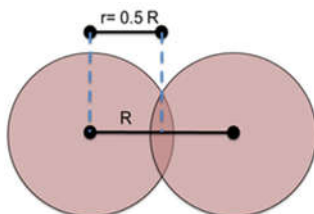


- Find and label the noble gases on the periodic table. What is special about the noble gases?
- Pick **one group (column)** of elements to examine.
 - What do elements in the same group have in common?
 - What changes about the *structure of the atom* as you go down the group (top to bottom)?
- Pick **one period (row)** of elements to examine.
 - What do elements in the same period have in common?
 - What changes about the *structure of the atom* as you go across the period (left to right)?

Properties of Elements

1. Atomic Radius:

- A measure of the _____ of an atom



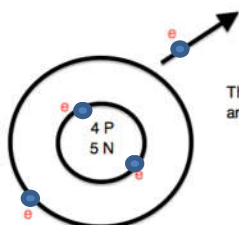
2. Electronegativity

- A measure of an atom's ability to _____ or _____
- Can be thought of as an atom's _____ or greediness _____
("greedy like the Grinch")



3. Ionization Energy

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



This image depicts an atom losing an electron. The ionization energy is the energy required to accomplish this.

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 _____

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

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 numbered 1-6.
2. For each round, turn over the element card that corresponds to the round number. Find your element's specific value for the "property to compare" on the reference table.
3. As a group, order the cards from smallest value to largest value. Determine who wins the round based on who has the greatest value for the property you are looking at for this turn.
4. Fill in each row of the following table as you complete each round

Round	Property to Compare	Your element and its value from the <i>reference table</i>	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			

PERIODIC TABLE TRENDS WAR SUMMARY QUESTIONS

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

1. Round 1:

- Place your elements in order of increasing atomic number in the boxes provided.
- In general, what happens to atomic radius as you compare elements going down a group (top to bottom)?
- Based on what you know about the structure of an atom and the definition for atomic radius, why do you think this occurs?

2. Round 2:

- Place your elements in order of increasing atomic number in the boxes provided.

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- In general, what happens to electronegativity as you compare elements going across a period (left to right)?
- Based on what you know about the structure of an atom and the definition for electronegativity, why do you think this occurs?

3. Round 3:

- Place your elements in order of increasing atomic number in the boxes provided.
- In general, what happens to ionization energy as you compare elements going down a group (top to bottom)?
- Based on what you know about the structure of an atom and the definition for ionization energy, why do you think this occurs?

4. Round 4:

- a) Place your elements in order of increasing atomic number in the boxes provided.

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

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

5. Round 5:

- a) Place your elements in order of increasing atomic number in the boxes provided.

- 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

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

- c) Does the pattern above surprise you? Based on what you know about the structure of an atom, why do you think this pattern might be observed?