Chemistry WebQuest No. 1
TEACHER EDITION

Name _____
Period ___ **Date Turned In** _____

DATA TABLE

Second Row Elements	Na	Mg	Al	Si	P	S	Cl	Ar
Atomic Radius (in pm)	186	160	143	118	110	103	100	98
Electron Configuration	$[Ne]3s^1$	$[Ne]3s^2$	$[Ne]3s^23p^1$	$[Ne]3s^23p^1$	$[Ne]3s^23p^1$	$[Ne]3s^23p^1$	$[Ne]3s^23p^1$	$[Ne]3s^23p^1$
First Ionization Energy (kJ/mol)	496	738	578	786	1012	1000	1251	1521
Electronegativity Value	0.93	1.31	1.61	1.9	2.19	2.58	3.16	None
First Column Elements	**H**	**Li**	**Na**	**K**	**Rb**	**Cs**	**Fr**	
Atomic Radius	37.1	152	186	227	248	265	unknown	
Electron Configuration	$1s^1$	$[He]2s^1$	$[Ne]2s^1$	$[Ar]4s^1$	$[Kr]5s^1$	$[Xe]6s^1$	$[Rn]7s^1$	
First Ionization Energy	1312	520	496	419	403	376	384	
Electronegativity Value	2.2	0.98	0.93	0.82	0.82	0.79	0.70	

Questions based on research:

1. What trends are apparent in the second row elements? Explain any exceptions to the trend you observe.

- **a. In Atomic Radius** — Atomic radius decreases as one goes across the second row elements from left to right.
- **b. In Electron Configuration** — Each element has one additional electron than the previous element as one goes across the second row elements from left to right.
- **c. In First Ionization Energy** — 1^{st} IE increases as one goes across the second row elements from left to right, except where there is one unpaired p electron.
- **d. In Electronegativity** — Electronegativity increases as one goes across the second row elements from left to right, with the exception of argon, a noble gas.

2. What trends are apparent in the second row elements? Explain any exceptions to the trend you observe.

- **a. In Atomic Radius** — Atomic radius increases as one goes down the first column elements from top to bottom.
- **b. In Electron Configuration** — All elements in this group end in a single "s" electron.
- **c. In First Ionization Energy** — 1^{st} IE decreases as one goes down the first column elements from top to bottom.
- **d. In Electronegativity** — Electronegativitydecreases as one goes down the first column elements from top to bottom.

Additional questions on back.

3. Explain which element(s) of the fifteen examined is most likely to form a –1 ion.

Chlorine is most likely to form a –1 ion because it only needs 1 electron to reach noble gas structure and it has the highest electronegativity value.

4. Explain which element(s) of the fifteen examined is most likely to form a +1 ion.

Francium is most likely to form a +1 ion because its outer electron is in the seventh energy level and it has the lowest electronegativity value.

5. Based on electronegativity values, which two elements would form the most ionic bond?

Francium and chlorine would form the most ionic bond because they have the greatest difference in electronegativity values.

6. Based on electronegativity values, which two elements would form the most covalent bond?

Silicon and phosphorus have the smallest difference in electronegativity values and would therefore form the most covalent bond.

7. What general statement can be made about the configurations of the first column of elements?

They all end in a single s electron, which means they are all very reactive elements.

8. What general statement can be made about the configurations of the second row of elements?

The configurations each add one additional electron as the atomic number increases by one.

9. Which element has the largest atomic radius? Which element one has the smallest atomic radius?

Francium has the largest atomic radius and argon has the smallest atomic radius.

10. Which element has the highest first ionization energy? Why is this true?

Argon has the highest 1st IE because it has a full octet of electrons in the outer energy level and does not want to lose any of them.

What is your group's conclusion about the properties of an element and its placement on the periodic table?

Elements are arranged according to their periodic properties with few exceptions.
Elements in a column tend to have similar chemical properties with some exceptions.